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Briefs
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IN CHANCERY OF NEW JERSEY.

Between

PATRICK H. FLYNN,
Complainant,

and

THE CITY OF JERSEY CITY,
Defendants.

BEFORE His Honor Vice Chancellor Stevens.

Mr. Vredenburgh and Mr. Record for the Complainant.

Mr. Corbin and Mr. Edwards for the Defendants.

Transcript of shorthand report of the evidence given upon the trial of the above stated cause on Wednesday the sixteenth day of May, 1906, at the Chancery Chambers, Newark, New Jersey.

WINTHROP W. RUGGLES, sworn.

Direct Examination. By Mr. Vredenburgh.

Q. Mr. Ruggles, this map that is on the easel before you, who prepared it?
A. It was prepared under my direction.
Q. Is it prepared from actual survey?
A. Yes, sir.

Q. Made by whom?

A. Well, made by me.

Q. And what have you entitled it?

A. Map showing lands south of and adjacent to Parsippany dyke effected by seepage from Boonton Reservoir.

Q. How is the dyke shown on this map?

A. By a black line marked "Bottom of slope at dyke."

Q. In the upper left hand portion of the map?

A. Yes, sir; there is a little slope.

Q. Along that line to which you refer I see "Bottom of slope at dyke" in two places. That means that the whole of that black line on which those words are written, represent the land at the bottom of the slope at dyke?

A. Yes, sir.

Q. Does that line represent the whole length of the dyke?

A. No, sir, it doesn't.

Q. Does it commence at either end of the dyke?

A. At the north east end, it commenced at the end of the dyke.

Q. And how far does the dyke extend beyond the south west portion of it?

A. Three or four hundred feet.

Q. Now, what is the meaning of the red figures commencing at the south west portion above that black line reading 24, 23, 22, 21, 20, 19?

A. Stations commencing from here (indicating).

Q. And how far about are those stations apart?

A. About one hundred feet.

Q. What do you mean by stations?

A. Well, stations, we call one hundred feet apart; they commence at the north and we number up as far as we go.

By the Court:

Q. What is there on the ground to indicate a station?

A. We commence at a certain point and measure from there, and that first station where we commence is station 1.

Q. It is simply for convenience?

A. Yes, sir.

Further Direct.

Q. Why do you make those stations?

A. Why, for convenience.

Q. Convenience of what?

A. Plotting—anything.

Q. Now, what is the meaning of the figure 283.4 in red, above that line between stations 18 and 19?

A. That is the elevation of that ditch, this little line here (indicating) is a ditch, and that is the elevation of the bottom of that ditch.

Q. At what point?

A. Well, it is about eighteen plus forty.

Q. No, at what point, as to the bottom of the slope?

A. Well, it is four or five feet away from the bottom of the slope.

Q. Well, which way?

A. South.

Q. Away from the bottom?

A. Yes, sir.

Q. Now, what are the red figures immediately below the black line called bottom of the slope, such as 294.5, 293.1?

A. 294.5 is the elevation of the bottom of the ditch along the bottom, just outside of the foot of the slope of the dyke, and the other is the original surface of the ground.

Q. The figures 294 and 293 and 290 and all the figures next below the black line marked "bottom of slope" indicate the bottom of a ditch, you say?

A. Yes, sir, of the ditch along side—at the foot of the slope of the dyke.

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Q. And do the letters b. d.—what do the letters b. d. on the same line with 294.5 mean?

A. Bottom of the ditch.

Q. Now the parallel red figures that you have mentioned, for instance, just below 294.5 b. d. is 296.1, what does that mean?

A. That is the original surface of the ground.

Q. And opposite those figures I see the letters o. s., that stands for original surface?

A. Original surface, yes, sir.

Q. Now the red figures—the second red figures below the direct line marked bottom of the slope, all along the bottom of the slope indicate original surface?

A. O. S.?

Q. O. S.

A. Yes, sir.

Q. Now the third set of red figures below—immediately below, indicate what?

A. Well, in some cases b. s. stands for bottom of slope, and in some cases the slope in the dyke runs clear to the bottom of the ditch, and in some cases there is a bench in there, and in all cases where there is a bench between the foot of the slope and the ditch I mark it b. s. at the bottom of the slope.

Q. Where the letters b. s. is opposite those figures it means bottom of slope, and where the letters b. d. is opposite the red figures it means bottom of ditch?

A. Yes, sir.

Q. Where the letters o. s. is opposite it means original surface?

A. Original surface, yes, sir.

Q. Now, what are these parallel blue lines—the first on the south west corner, being called open ditch, indicate or purport?

A. They are open ditches.

Q. And there are several across the map?

A. Yes, sir.

Q. Are they made ditches or natural ditches?

A. Made.

Q. Are they ditches made since the building of the dyke or before?

A. Since.

Q. Now, what is this, marked Parsippany Dyke, what does that indicate?

A. That is the Parsippany Turnpike, a turnpike between—I don't know what—Denville, I think.

Q. It is a public road in use?

A. Yes, sir.

Q. And there is through what seems to be the center of that road a broken black line, what does that indicate?

A. Indicates the center of the Turnpike.

Q. And the figures 5, 6, 7, 8, 9, 10?

A. Those are the stations.

Q. One hundred feet apart?

A. One hundred feet apart.

Q. Then the figures 295.6 opposite station five and 292.9 opposite station seven, 293 opposite station 7, along the middle of that Turnpike indicate what?

A. The elevation of the center of the Turnpike.

Q. Now there is a plot south of the road towards the left hand part of the map marked "Children's Home," what does that mean?

A. It belongs to the property of the Children's Home.

Q. Any house on there?

A. Yes, about here (indicating).

Q. A house to the left of that plot?

A. Yes, sir.

Q. There is figures 1. and 9/10 acres, what does that mean?

A. That means the number of acres contained on the inside of that line, the center of that road.

Q. Now what do the red figures 285.4 and 283.5, 283.6 on the inside of that plot indicate?

A. Elevation of the ground.

Q. Now, in one corner of that plot there is a bunch of marks, what are they called—blue lines, what does that indicate?

A. Indicates wet or marshy ground.

Q. Now there is on that portion of the map a plot marked "Morristown Road," what does that indicate?

A. Road leading from Parsippany Turnpike to Morristown.

Q. And the plot next to that road called Children's Home, one and 49/100 of acres, represent land—

A. That belongs to Children's Home.

Q. Now the next plot going towards the east marked "A. Cobb," four and forty-five acres?

A. That belongs to Mr. Cobb, I suppose.

Q. And these figures 276.6, 276.7, etc., indicate what?

A. The elevation of the water at that stream.

Q. And the marsh is indicated there also in the same way as on the Children's Home?

A. Yes, sir.

Q. I see you have open cellar marked there?

A. Yes, sir.

Q. On that plot. Do you know whether the water is standing in that cellar or not?

A. I don't think it is now.

Q. Did you ever see it in the cellar?

A. Yes, sir.

Q. Now the next block, "Estate of Condit," one and eighty-six acres, the elevation is shown there by red figures also?

A. Yes, sir.

Q. And the plot surrounding the plot marked "Estate of Condit," the elevation is also shown there by figures?

A. It is.

Q. 277.9 and 277.4. Now the next plot is marked, nine acres, and there is no statement as to

whom it belongs to, do you know whose property that is?

A. William J. Ryder.

Q. Now the land to the north of the road between the road and the dyke that you have marked on this map, do you know to whom that belongs?

A. All the rest of that line belongs to—

Q. All west of a line marked fence?

A. Yes, sir.

Q. Belongs to who?

A. Jersey City Water Supply Company.

Q. All west of that fence and north of the road belongs as you understand it to the Jersey City Water Supply Company?

A. No, sir.

Q. Now there is marsh shown upon that land too, and the figures 278 in the marsh and the other figures in red represent what?

A. Elevation in that plot of ground.

Q. Now to the south east of that fence there is a plot shown upon this map on which there is marked a barn and dwelling houses, to whom does that belong?

A. William J. Ryder.

Q. Did you go in either of those houses, in the cellar of either of those houses?

A. I went down to the cellar of this house and the cellar of this one (indicating).

Q. Cellar of the house marked elevation of cellar, 280 feet and nine-tenths on the Ryder plot, you went in, did you?

A. I went in the cellar.

Q. When?

A. Last Friday.

Q. What condition was the cellar in?

A. There were about five or six inches of water in it.

Q. Now the plot on the Condit estate marked elevation of cellar—marked in yellow, did you go into the cellar of that house?

A. I did.
Q. What did you find there?
A. Found water there.
Q. When did you do that?
A. The same day.
Q. Have you done it more than once?
A. Yes, sir.
Q. Have you ever been there when there wasn't water in the cellar?
A. No, sir.
By the Court:
Q. When you say water, what do you mean by water?
A. Water standing in the cellar.

Further Direct:

Q. About how deep?
A. Well, I have seen it when there was six or seven inches of water in there.
Q. Well, last Friday how was it?
A. Right by the door there was no water, and when you got back about ten feet there was water standing there, about two or three inches, I think, I didn't measure it.
Q. Is there anything to indicate there what the depth of the cellar was, below the original surface?
A. No, sir.
Q. Do you know what the depth was?
A. The cellar is about three feet deep.
Q. The houses are indicated on that map by what color?
A. Yellow.
Q. Is the brook called Troy Brook indicated on that map?
A. Yes, sir.
Q. How?
A. Colored blue.
Q. And is it marked Troy Brook anywhere?
A. I think it is.

Q. Marked Troy Brook?

A. Yes, sir.

Q. Are the elevations of the brook given on that map?

A. They are.

Q. In red?

A. In red.

Q. What does that indicate, the bottom or the side or what portion of the brook?

A. The elevation of the water in the brook.

Q. Is there any indication of the elevation of the bank?

By the Court: I don't quite understand what that means. The water may be one heighth to-day and another heighth to-morrow.

Q. What do you mean by saying the heighth of the water in the brook?

A. As I found it that day; it varies of course.

By the Court: Was it full that day?

A. It wasn't full, but I have seen it lower too.

Further Direct:

Q. Was the brook within its banks?

A. Yes, sir.

Q. Can you tell whether it was about the normal flow that day or was it at an unusual flood, or unusually dry, or what condition was it in with respect to that?

A. Well, I should say it was a little above the average.

Q. Last Friday you are now talking about?

A. Yes, sir.

By Mr. Vredenburgh: I think that is all. I offer the map in evidence, if the Court please. Marked Exhibit C 63.

Q. Just one moment, Mr. Edwards, before you start to cross-examine him, I notice, looking across

this map from the turnpike to the Parsippany road, two blue lines marked vit. line 15 inches; what does that mean?

A. Vitrified pipe running through the road down across here and alongside of the Morristown road.

Q. There is another one in the Morristown road?

A. Yes, sir.

Q. Shown upon this map by the parallel blue lines?

A. Yes, sir.

Q. That is a pipe 15 inches in diameter?

A. Yes, sir.

Q. What is that?

A. Vit. pipe.

Q. What does that mean?

A. Vitrified pipe.

Q. Now the blue figures along the first pipe spoken of, 375 indicate what?

A. That is the distance from the brook up to the road.

Q. Does that pipe cross the road?

A. It does not.

Q. Does the pipe of the Morristown road cross the road?

A. Yes, sir.

Q. I notice, Mr. Ruggles, that the leters A, B, C, D, E, F, G and H, are here in red on this map, capital letters; what do they indicate?

A. They indicate the same places on the profile.

Q. They indicate the same location as the same letters on the profile which you also have on this map?

A. Yes, sir.

Q. Where is that profile on the map?

A. Here.

Q. Well, that don't indicate anything. Where, in the lower left hand corner?

A. Yes, sir, on the map.

Q. And that is the profile?

A. Yes, sir.

Q. Well, that profile seems to run in the opposite direction from what the map does; that is so, isn't it?

A. Yes, sir, that is so.

Q. The letter A is on the right hand corner of the map?

A. Yes, sir.

Q. And on the left hand end of the profile?

A. Yes, sir.

Q. The parallel blue lines on the profile indicate how many feet apart?

A. One foot.

Q. When you speak of these elevations, what datum line do you refer to?

A. I took the elevation of the water in the reservoir at the dyke. I assumed it to be a certain elevation. I know what the water was at the spillway, and the water was level; I therefore assumed that the elevation of the water at the dyke out of the wind would be the same elevation.

Q. Now, take the figures 294.5 along the bottom of the slope B. D.; what does that 294.5 mean?

A. 294½ feet above.

Q. Above what?

A. Above tide water. I think we took the city base—state base.

Q. Well, have you sworn what base you took, don't you recollect?

A. I do not.

Q. The difference between mean and high water and the tide water base—state base, is how many feet, do you recollect?

A. I do not.

Cross Examination. By Mr. Edwards:

Q. Then you don't know exactly what these figures on your map indicate, do you?

A. Yes, sir.

Q. What does 294.5 mean?

A. It means the elevation, at that point.

Q. Above what?

A. Above tide water.

Q. Where?

A. Jersey City.

Q. Mean or high tide?

A. Mean high tide.

Q. Don't it as a matter of fact mean that you adopted the base of the Water Supply Company, that is what you have done, haven't you?

A. Yes, sir.

Q. Don't you know that the base of the Water Supply Company is mean high water at Sandy Hook?

A. I do not.

Q. You don't know anything about that?

A. No, sir.

Q. Now, Mr. Ruggles, where is the divide in the water shed on this map; show us about where it is?

A. Divide of the water shed?

Q. Yes, the original lay of the land?

A. I can't tell.

Q. You don't know?

A. No, sir.

Q. Now, where did all of this land originally drain into—Troy Brook, didn't it?

A. Not all of it.

Q. What part of it didn't?

A. That I can't tell you, I never was over there but once or twice in my life until the dyke was built.

Q. You were not very familiar with the situation there?

A. No, sir.

Q. But the great portion—you know that the greater portion of it always drained into Troy Brook, don't you?

A. I think it must have.

Q. Now, you have on your map here certain

figures given as O. S., meaning original surface; how did you get those figures?

A. As near as I can tell, I had the rod held where I considered the original surface of the ground was.

Q. Then you guessed at it?

A. Yes, sir.

Q. You don't pretend that is accurate, do you?

A. No, sir.

Q. Have you been familiar with the Parsippany Turnpike for a number of years?

A. Yes, sir.

Q. You have seen drains and ditches all along that road, haven't you?

A. Alongside of the road, yes, sir.

Q. They have always been there, haven't they?

A. That I can't say, but there are drains alongside of the road.

Q. You have spoken of certain culverts under the road; are they new culverts or were they put there in place of old culverts?

A. I should judge so from appearance.

Q. All right?

A. On the Morristown road the pipe runs clear across the road and I have no doubt that is a new one.

Q. Can you tell us whether it was not put there in the place of an old culvert?

A. No, sir.

Q. At the Righter property don't you know that there is a culvert there for forty years?

A. I should say there has been a culvert there because at one end the road now goes under the old one.

Q. Well defined across the road, is it not?

A. It is now.

Q. And all this land adjoining Troy Brook is low land, is it not?

A. Yes, sir.

Q. And always has been?

A. Yes, sir.

Q. There have been no excavations south of the road?

A. Not that I know of.

Q. North of the road there are ditches, are there not?

A. North of the road?

Q. Yes, between that and the dyke?

A. Yes, sir, there are in some places, and in some places it has been filled in.

Q. This place marked as marshy, were they not all old gravel beds from which gravel was taken and used in the construction up there?

A. I should say so in some cases.

Q. In all the cases are they not, where you have marked it, were there not gravel beds?

A. I don't think so.

Q. Now, Mr. Ruggles, the pressure and the heighth of the water in the reservoir has been for many months at the same heighth, has it not?

A. About the same heighth.

Q. Always running over the dam?

A. For a long time, yes, sir.

Q. Has there been any intermission in that for over a year?

By Mr. Vredenburgh: Is that cross examination?

Q. Haven't you been at the reservoir all the time?

A. Not all the time.

Q. Well, for the last two or three years you have been there pretty steadily?

A. Quite often.

Q. And the water was always running over the dam?

A. It has been running over ever since the construction of the dyke.

Objected to as not cross-examination.

Q. Well?

A. Well, I think it has been running over ever since the dyke was repaired.

Q. Well, you would say for the last 18 months?

A. Yes, sir.

Q. Now, you say you have seen water in these cellars?

A. Yes, sir.

Q. And you have seen the cellars at other times when they have been dry?

A. No, sir. I never went there until the families moved out, that is, one man moved out there.

Q. When was that?

A. I think in the fall perhaps.

Q. When you have seen the water at different heights in the cellar, it was not in one uniform heighth at all?

A. No, sir.

Q. At times you have seen it when there has been no water in the cellars?

A. No, sir.

Q. But now take last Friday, how soon was that after the rainfall?

A. The next day.

Q. Quite a heavy rainfall, wasn't it?

A. Yes, sir.

Q. Is that the only time you ever made any measurements of the water in the cellar?

A. I took rough levels from Mr. Righter, to know if he could drain his cellar before that, and there was more water in the cellar that day than there was last Friday.

Q. It varies at different times.

A. Yes, sir.

Q. Were you ever in the Righter house or Condit house before the reservoir was filled with water?

A. No, sir.

Q. You know nothing about their condition prior to that at all?

A. No, sir.

Q. You say these ditches are new ditches?

A. Yes, sir.

Q. You don't know the condition of the land before the reservoir was built, do you?

A. No, sir.

Q. You don't know whether they are not old ditches simply cleaned out?

A. No, sir.

Q. You don't know whether they are old ditches simply cleaned out?

A. Well, perhaps one or two of them are.

Q. Can you say that all of them are—can you say that all of them are not?

A. Well, I couldn't say, I don't know.

Q. In fact you don't know very much about this location there?

A. I can't tell about old ditches; there may have been old ditches there years ago, but they have been dug out if there was.

Q. That is all.

Re-Direct.

Q. When you say that the amount of water in the cellar varied; what do you mean by that?

A. The first time I went into the cellar on the Condit estate, the water was almost up to the bottom step as you go down from the outside, and last Friday it was 4 or 5 inches below that.

Q. That is what you meant when you said in answer to cross examination that the water varies?

A. Certainly.

Q. Now, do you know whether between those dates those ditches or some of them had been dug or dug deeper. Do you know that?

A. I can't tell about that.

Re-Cross.

Q. When were you in the Condit house the first time?

A. I think in March.
Q. March of this year?
A. Yes, sir.

By the Court:

Q. I don't quite understand why if there should be a ditch dug east of the dam and running south across the Parsippany turnpike carrying the water into Troy Brook, why that would not afford complete protection to all of the houses and lands east of the ditch that might be so dug. It seems to be possible in looking at that map, to construct such a ditch. Why, if a ditch were constructed in that way I have mentioned, and deep enough, why would not that be a complete protection to everything east of it?
A. Are you asking me that question?
Q. Yes.
A. I think if it was deep enough it would be.
Q. Then it is a mere question of digging the ditch deep enough?
A. Yes, Sir.

By Mr. Edwards: I don't think the witness understands the purport of your Honor's question.

(At this point the witness, counsel and Court went to the map, and the matter was explained, the stenograher being directed not to take it down.)

Re-Direct.

Q. Perhaps Mr. Ruggles can tell us something about that. Do you know anything about the subsoil where the dyke is built?
A. I do not.
Q. You have never examined it?
A. I never was there.

Q. Do you know anything about the sub-soil of the ditches?

A. On all of these ditches in here?

Q. (Interrupting) Don't say in here. Describe where you mean?

A. I mean this ditch here (indicating).

Q. Well, we can't tell from that.

A. On the right hand of the map running from the Righter property down to the main ditch—across the road running into Troy Brook, that ditch and the ditch below it starts from the Righter land and runs down to that same ditch; the main ditch itself has a clay bottom.

Q. How about the other ditches?

A. Some of them are clay sub-soil, some gravel, that is, up on higher ground.

Q. Do you know whether there was any difference made in water which came out of that portion of it which you say is clay and that portion which you say is gravel or sand, did you notice anything about that?

A. I did not notice any difference, I think.

By Mr. Edwards:

Q. You made no very exact——

A. No test.

Q. You did not expect to be examined on that subject. That is all.

Mr. Vredenburgh: The map is offered in evidence, may it please your Honor.

Marked Exhibit C 64.

GARWOOD FERRIS, recalled for the complainant.

Direct Examination by Mr. Vredenburgh.

Q. You have a tracing in your hand now, from whom did you get that tracing?

A. I got it from the Jersey City Water Supply Company, sir.

Q. When did you get it, about?

A. It was dated August 3, 1900. I got it shortly after that date.

Q. Did you get any table with that map?

A. Yes, sir.

Q. Where is that table?

A. Here is the table, dated July 27, 1900, signed by R. Godfrey.

Q. Who was R. Godfrey?

A. The assistant to Mr. Hume, the assistant engineer to Mr. Hume, the chief engineer.

Q. Chief engineer of what?

A. The Jersey City Water Supply Company.

Complainant's counsel offered in evidence the tracing and table produced by this witness.

Objected to as not competent evidence against the defendant.

Q. Who was Mr. Godfrey, who signed this paper?

A. Mr. Godfrey was the engineer in charge of the office, under Mr. Hume, at Boonton, and he was the computing engineer for this work.

Q. Of what company?

A. Of the Jersey City Water Supply Company.

Q. How long was he in charge there?

A. Well, I really cannot tell you that, sir.

Q. About? Was the engineer in charge there at the time this map was given you?

Objected to as leading.

A. I am under that impression, sir; I know he continued up at Boonton for some little time, but what time he left there I cannot tell you.

Q. Who were that calculation and map given to?

A. To me.

Q. By whom?

A. By some of the official representatives of the company but I cannot tell you now definitely who gave it to me—through the engineering department.

Q. For what purpose was it given to you?

A. In order that I might satisfy myself as to the capacity of the reservoir.

Q. After it was given to you where was it kept?

A. That paper?

Q. Yes, the paper and the map?

A. I have kept it right straight along, it has been in my custody ever since.

Q. Was it in use in any way in determining with respect to this reservoir?

A. We had our survey made afterwards and that map became of no account at all because the water company accepted my map, a map that was prepared under my direction, as showing the height of the flow line which would be necessary in order to impound the necessary quantity of water and therefore that map——

Mr. Corbin: I object and want to be heard.

The Court: Do you wish to cross examine?

Mr. Corbin: No, sir; I object to it as not pertinent evidence, not competent evidence.

The Court: It has not been proven yet that it was the work of Mr. Godfrey.

Mr. Corbin: My objection goes deeper than that, assuming that it was his work.

The Court: That objection is sufficient at present.

Mr. Corbin: But there is no issue in these pleadings on the question of the capacity of this reservoir to give fifty million gallons of water a day and Mr. Ferris as engineer has already testified that he rejected this map and made a survey of his own and required the dam to go so many inches higher—there is no such issue as this here.

The Court: I cannot admit it yet, it has not been proven.

Q. Mr. Ferris, do you know the signature of Mr. Godfrey—do you know whether that is his signature or not?

A. No, sir, I cannot say positively as to that, but I think that I got it direct from Mr. Godfrey; I think I got that paper direct from Mr. Godfrey.

Q. Well, was it recognized in any way by Mr. Harrison or any of the others afterwards?

A. Why, yes, sir.

Q. In what way was it recognized, was it shown to Mr. Harrison or in what way was it recognized by Mr. Harrison—Did you subsequently write to Mr. Harrison with respect to it?

A. I did, yes, sir; I wrote to him on the 11th day of November, 1901.

Q. What objection, if any, did Mr. Harrison raise to those figures on this statement?

Mr. Corbin: I object to that as not pertinent to the issue.

Q. Mr. Ferris, don't you know whether or not Godfrey was ever the engineer of this Jersey City Water Supply Company?

A. Well, as I supposed at that time——

By the Court:

Q. No, not what you supposed, but what you know, and if you don't know, say so.

A. I don't know definitely the date of the organization of the Jersey City Water Supply Company, but Mr. Hume was the chief engineer, as I understood it, of the Jersey City Water Supply Company, and Mr. Godfrey was the engineer of the Jersey City Water Supply Company, that is, as I under stood it. Now it was either the question of P. H. Flynn or the Jersey City Water Supply Company, and I don't think there is any question in my own mind——

Further Direct.

Q. Then he was the engineer of one or the other, either P. H. Flynn or the Jersey City Water Supply Company?

A. Certainly, there is no doubt about it, and I think it was the Jersey City Water Supply Company, but I cannot tell. It is beyond my province to tell when the changes outside of my own knowledge occurred.

Q. Where was the office of Flynn or the Water Company after they succeeded Flynn in their office, in connection with the building of this reservoir?

A. Their office was at Boonton.

Q. Who was in charge there?

A. Mr. Godfrey.

Q. How often did you see him?

A. Used to see him nearly every time I went up there. Every time that I had occasion to go into the office.

Q. Who did you deal with as representative of the city, with reference to the calculations of the reservoir?

A. Mr. Harrison.

Q. Of the representative of the company?

A. Of the company, Mr. Harrison.

Q. When Mr. Godfrey was there?

A. Well, all my talk was with Mr. Godfrey.

Q. And in the office of the company?

A. In the office of the company. I had no talk with anyone else up there besides him, on those kinds of questions.

Q. Now on the receipt of this statement, did, at your suggestion, the city do anything with regard to verifying those figures?

A. Yes, sir.

Q. What did they do?

A. We inaugurated a survey.

Q. Who made the survey?

A. My son and a party from the engineering bureau.

Q. Your son was in control, was he?

A. Yes, sir.

Q. He is a surveyor?

A. Yes, sir.

Q. Where is he now?

A. He is connected with the Subway Transit in New York.

Q. He can be had here at any time, can he?

A. Well, he resides up in New York.

Q. Well now, so then a map was prepared by him and by the other official of the city?

A. He prepared a map, sir, of his survey.

Q. Where is that map?

A. It is down in my office.

Q. Have you not any map here?

A. From that map my assistant, Mr. Bowley, made the present map, which I have with me.

Q. Which map is that, have you it in your hand?

A. No, sir.

Q. Well, where is it?

A. (Witness produces same.)

Q. Is that the same map you produced while you were being examined a few days ago?

A. Yes, sir.

By the Court:

Q. How is it marked?
A. I don't think it is marked, I don't know.

The Court: Well, it don't seem to have been offered in evidence.

Mr. Vredenburgh: No, your Honor, it was objected to by Mr. Edwards on the ground that Mr. Harrison was not here, and they couldn't tell whether it was correct or not, and thereupon it was not admitted in evidence.

Further Direct:

Q. After that map was made was any calculations made by you or by any one under you, of the capacity of this reservoir?
A. There was.
Q. And when that was made did you serve the Jersey City Water Company or their engineer with the calculations?
A. I gave the calculations in a letter to Mr. Harrison, showing the acreage of our survey.
Q. Have you that letter or a copy of it in your hand?
A. I have a copy of that in my hand.

Mr. Vredenburgh: Will you produce the original or shall he read the copy?

Mr. Corbin: I don't know the date of it.

Q. What is the date of it?
A. November 11, 1901.

Mr. Corbin: I object to it as having no pertinancy.

The Court: I will allow it.

Q. Go on and read the letter, if you will, Mr. Ferris?

A. "November, 11, 1901. E. W. Harrison, Esq., Engineer Jersey City Water Supply Company. Dear Sir: I herewith transmit to you result of surveys made by city of the proposed reservoir basin, from same I deduce that dams of proposed heights for the fifty and seventy million supply would fail to impound the quantity of water called for by the specifications—that the flow line for the fifty million daily supply would have to be slightly increased and a larger acreage furnished for a reservoir for a seventy million daily supply. When you have had estimate made of results from figures I herewith furnish I would be glad to have you submit same to me, so that I can see how they agree with figures I have made.

"Yours truly,"

(Signed) by me as engineer.

Below that I gave Mr. Harrison the area of the reservoir basin at different elevations. State elevations.

These are as follows:

Result of Survey Banta Reservoir Basin:

State Elevations.	Area.	Remarks.
259.75	161.646 acres.	
265.	222.786 acres.	
270.	275.349 acres.	
275.	346.850 acres.	
280.	451.920 acres.	By Planimeter.
285.	552.863 acres.	
290.	635.315 acres.	
295.	683.318 acres.	
300.	728.381 acres.	

304.7	767.021 acres.	By Traverse.
310.	831.291 acres.	
315.	879.740 acres.	By Planimeter.
320.	935.671 acres.	
333.8	970.916 acres.	By Traverse.

Q. You have the map in your hands from which those were made?

A. Yes, sir.

Mr. Vredenburgh: I again offer that map in evidence.

Mr. Corbin: I desire to cross examine.

By Mr. Corbin:

Q. Here are two lines called Banta dam, a blue line marked "Inside face Banta dam"—that had not been settled upon at the time this map was made in 1901 had it?

A. That was given to my son as being the inside line of the dam at that time.

Q. Is the dam built on that line now?

A. I so understand it, sir.

Q. What is this red line parallel to it still further up in the reservoir?

A. Oh, that is merely part of the survey.

Q. Now look at the Parsippany dyke; there is a blue line marked "Proposed Parsippany dyke"?

A. Yes, sir.

Q. That was as proposed at that time, in 1901?

A. And I think this mark (indicating) has been put in since.

Q. Here is also "Dyke as located" in black.

A. Yes, sir.

Q. That must have been put on the map since?

A. Yes, put on since.

Q. The dyke was not actually located until 1902 was it?

A. Well, it was located at that time, we got the approximate location, but the location of the dyke has been changed and corresponds with the— (interrupted).

Q. So that this map has been changed at the Parsippany dyke?

A. Sure.

Q. In 1902 or afterwards?

A. Sure.

Q. It was not settled until 1902 was it?

A. No, sir. The location was only approximate.

Q. This location is merely an approximate location, it is not accurate even now?

A. My assistant put it positively there from information given him by Mr. Sproule.

Q. And it is supposed to indicate substantially the location of the earth embankment known as the Parsippany dyke, as it now actually is?

A. Supposed to represent it, yes, sir.

Q. But it may not be strictly accurate.

A. It may not be strictly accurate.

Q. But at the main stone dam you understand the blue line does represent the face of the dam as it is?

A. Yes, sir.

Q. Have you ever had any surveys made to show that the dam actually corresponds to that new line?

A. No, sir.

Q. Which line on this map indicates the flow line as it now is, if any line does?

A. Oh, yes, there is a flow line there.

Q. The lower blue line?

A. No, that does not indicate the flow line as it now is.

Q. What is the elevation of the flow line as it now is?

A. 305.25.

Q. That is the line you required them to put it up to?

A. Yes, sir.

Q. And they did so?

A. Yes, sir, to the best of my knowledge and belief.

The Court: The map had better be marked.

Q. That change in the elevation of the dam was made following this letter you sent to Mr. Harrison and which you have read?

A. Yes, sir.

Q. There were other letters and negotiations before the change was finally made were there not?

A. I hardly understand you, Mr. Corbin.

Q. Was there not correspondence pro and con at intervals?

A. I think not; I may have mentioned it.

Q. But at all events they conceded your view of it, didn't they?

A. Yes, sir.

Q. And as you finally raised the dam it gave the necessary impounding capacity?

A. I believe that it does, yes, sir.

The original map and the tracing thereof produced by the witness were each marked Exhibit C-65.

Q. This tracing marked the same number as the exhibit is a copy of the exhibit?

A. Yes, sir.

Q. In every respect, is it?

A. I believe it to be, yes, sir; it was so directed to be.

Q. The title of both maps—may it please your Honor—is contour map of Boonton reservoir, 1901, H. H. Boley, delineator. Who is H. H. Boley?

A. My assistant.

Q. That same paper is marked Exhibit C-65—(interrupted).

By the Court: Will you admit, Mr. Corbin, that the tracing and the statements were made by Mr. Godfrey?

By Mr. Corbin: The title of the paper is in Mr. Godfrey's handwriting.

By Mr. Edwards: The figures are by Mr. Sproul.

Q. Who is Mr. Sproul?
A. The engineer employed by the Jersey City Water Supply Company.
Q. What is his first name?
A. I don't remember his first name.

By Mr. Edwards: Cyrus T.

By the Witness: Yes, that's right.

By Mr. Corbin: When I say that this is in Mr. Godfrey's handwriting, I mean the ink portion of the paper; the pencil portion which appears to have been made by the city is not by him.

By the Court: Well, I will admit it in evidence. State on the notes the state of your admission.

By Mr. Corbin: I was asked to say whether that was in Mr. Godfrey's handwriting; I say it is except the pencil part. We concede nothing else.

By the Court: Then I will admit that paper so far as it is in Mr. Godfrey's handwriting.

By Mr. Corbin: We would like to have it all admitted, if it goes in at all.

By the Court: Then the paper will be admitted as a whole.

Marked Exhibit C-66.

Q. Now, Mr. Ferris, taking this map, Exhibit C-65, will you tell us the distance from the gate-house at the dam, to elevation 305.25 in the extreme end of the reservoir in the Rockaway River inlet?

By Mr. Corbin: I object to that because that map is not intended obviously to represent differences.

By the Court: Mr. Ferris may be able to testify from his knowledge? Do you understand the question, Mr. Ferris; did you hear it?

(The Stenographer read the question to the witness.)

A. As I scale it, it will be 5,370 feet on this map from the gate house to the extreme end of the reservoir at elevation 305.35 in the Rockaway River inlet.

Q. What is the distance from the same gate-house at the dam, elevation 294.12 at the extreme end of the same inlet?

A. I have not scaled it on this map, sir. The scaling I did at that distance was made upon a map furnished by the Water Supply Company of this same reservoir.

Q. Well, what is that distance?

A. On the Water Company's map the distance is 360 feet, as I understood your question.

Q. You didn't hear my question.

(The Stenographer read the question.)

A. It will be 360 feet less.

Q. Less than what?

A. Less than 5,370 feet.

Q. What do you mean by elevation 305.25?

A. The elevation 305.25 is the elevation of the

flow line and of the crest of the spillway.

Q. What do you mean by elevation 294.12?

A. 294.12 is equivalent to the elevation given as 292. 294.12 would be equivalent to the state elevation 292 above mean high tide, and elevation 292 was the flow line of the reservoir with the dam built at the originally intended location on the Kingsland property.

Q. What is the distance from the gatehouse at elevation 305.25 to the Parsippany bank?

A. The distance from the bank to the gatehouse at the dam, by the Water Company's map, upon which I scaled it was 9,740 feet.

Q. At what point in the dyke is that?

A. I took it at the greatest inbowlment towards the east end of the dyke; the dyke curves in somewhat, and I took each curve up to the gatehouse.

Q. What would be the distance from the same point in the Parsippany dyke to the location of the dam that you call the Kingsland dam?

Mr. Corbin: I object to this line of evidence as not competent and as not pertinent to any issue in the case.

The Court: I don't see any objection to admitting the evidence and dealing with it as the law may require hereafter. If Mr. Vredenburgh was going to open up a subject which would require an immense amount of evidence and where I was satisfied that all that evidence would go for nothing in the end because of its being based upon an inadmissible construction of the contract, why, that would be a different thing, but here he is simply inquiring with respect to a distance, and whether your contention is right or whether his contention is right this evidence, it seem to me, would be useful in showing just what the situation is. You may interpose your objection to the relevancy.

Mr. Corbin: I do object to it.

A. Well, in the neighborhood of four thousand feet more, or forty-three hundred feet, somewheres along there, it is very difficult to scale it close.

Q. Mr. Ferris, at the close of your testimony on the last day when you were examined, just before recess, the notes show that you were shown a small tracing attached to some written papers, the notes do not show that you designated it—what papers those were or what tracing you referred to. I show you now exhibit C-22 and ask you whether those were the papers and the tracing?

A. Yes, sir, these are the papers and the tracing attached to the papers of that exhibit.

Q. What is the particular paper in that exhibit to which the tracing is attached?

A. It was a communication sent to me by the Board of Street and Water Commissioners giving the status of the dyke question at that time.

Q. Now the tracing, is that signed by anybody?

A. The tracing is signed by E. W. Harrison, chief engineer, and it shows two sketches, sketch A and sketch B.

Q. What is the date of it?

A. September 12, 1902.

Q. What is the date of your communication?

A. September 16, 1902.

Q. And who prepared that tracing?

A. It is Mr. Harrison's signature as chief engineer.

Q. What does that tracing show?

Objected to.

Q. More than one sketch?

Mr. Corbin: He said two, the tracing is the best evidence.

Q. Does it show more than one sketch?

A. It shows two sketches, sketch A and sketch B.

Q. According to which sketch was the dyke substantially built, sketch A or sketch B?

A. Approximately in accordance with sketch B; but a tracing which I have here shows the actual construction.

Q. As to the location of the core wall, was it located according to sketch A or according to sketch B?

A. According to sketch B.

By Mr. Corbin:

Q. You say the dyke was built substantially as shown here on sketch B?

A. Not exactly like it, but—

Q. Yes, the core wall was moved further back from the water, was it not?

A. Yes, sir, than sketch A.

Q. Well, further than shown in sketch B even, the core wall was moved further back, was it not?

A. Well, I have a tracing as it was constructed.

Q. Let us see it?

A. (Witness produces a tracing.)

Q. The core wall was moved back so that when the dyke should be raised hereafter it could be done without drawing down the water, was it not?

A. Yes, sir.

Q. So that the core wall on the completed and enlarged dyke would come in the middle of the bank?

A. Yes, sir, or—

Q. At the proper place in the bank?

A. At the proper place in the bank, yes, sir.

Further Direct Examination:

Q. Does the correspondence in exhibit C-12 show why the core wall was located as in sketch B and not as in sketch A?

A. I think it does, sir.

Mr. Edwards: The correspondence speaks for itself, I object.

The Court: I suppose the correspondence does speak for itself.

Q. When Mr. Corbin asked you about raising the water, what did you understand he meant?

Mr. Corbin: Raising the dyke, I said nothing about raising the water.

A. Raising the dyke.

(The Stenographer being so directed, read the former testimony of the witness as follows:

"Q. The core wall was moved back so that when the dyke should be raised hereafter it could be done without drawing down the water, was it not?"

"A. Yes, sir."

"Q. So that the core wall on the completed and enlarged dyke would come in the middle of the bank?"

"A. Yes, sir, or—"

"Q. At the proper place in the bank?"

"A. At the proper place in the bank, yes, sir."

Q. What did you mean by the proper place in the bank, or what did you understand Mr. Corbin meant by raising the dyke?

A. Raising the dyke to the necessary height to impound the quantity of water required for a seventy million supply; that has been my whole contention in the matter—between myself and Mr. Harrison; I wanted that core wall so located that the dyke should be raised eventually without interfering with the construction of the dyke, without having to build a new core wall, and without going down the reservoir.

Q. Raised to what heighth?

A. Nineteen feet and one-tenth more.

Q. More, do you mean?

A. Nineteen feet and one-tenth higher.

Q. Higher than what?

A. Higher than the present location, the present elevation of the top of the dyke.

Q. That being the elevation to impound the seventy million gallons a day supply, is it?

A. Yes, sir.

Q. Mr. Corbin had you produce a tracing, I ask you who signed that tracing?

A. Mr. Harrison.

Q. Is that his signature to that tracing?

A. Yes, sir, I believe it to be so, sir.

Q. How did you get it?

A. He gave it to me.

Q. I notice on this map this language, "Black dotted lines, dyke raised to medium capacity"?

A. To seventy million capacity.

Q. Is the "70" there?

A. Yes, sir, in pencil marks.

Q. Who put the pencil mark there, or was the map that way when you received it?

A. Really, I cannot tell who—I cannot tell wether those are my figures or not; I should think, though, they were my figures, the seventy in pencil. I would also state the top elevations there are in my figures in pencil.

Q. Mr. Ferris, Mr. Corbin says that the 70 is in ink. Look at it again?

A. It looks to me as if it were in pencil, but who put it in I cannot say. It is in ink up here (indicating further up on the map) 70 million line.

Q. It is in ink above there?

A. Yes, sir, 70 million line. But it is pencil elevation 334.35 and 331.35 and they are my figures.

Said map is offered in evidence and marked Exhibit C-67.

Cross Examination. By Mr. Corbin:

Q. On this sketch Exhibit C-67, which you have just produced, dated October 27, 1902, signed E. W. Harrison, the back part of the dyke and the core wall are actually built as indicated in red lines, is it not?

A. Red dotted lines, yes, sir.

Q. That is the actual construction?

A. Yes, sir.

Q. And these were the sketches accompanying the correspondence between you and Mr. Harrison, were they not?

A. Yes, sir.

Q. Actual working drawings showing this in detail were afterwards used in the construction?

A. A large map of the dyke was afterwards given to me, yes, sir; profile and plan.

Re-Direct:

Q. I call your attention to contract of March 31, 1902, known as contract Y, and to the 4th clause of that contract which reads as follows: Party of the first part guarantees that the Jersey City Water Supply Company shall construct and complete Jersey City's new water works to such an extent that the water from the new source can be turned on on or before March 1, 1904, and that the same shall be turned on, etc., and I ask you whether at that date there was any change made in the carrying on of the work?

By Mr. Corbin: At what date?

By Mr. Vredenburgh: March 31, 1902.

A. You mean change in the administration, I presume?

A. Shortly after that date Mr. Gardner of the East Jersey Water Company was elected president of the Jersey City Water Supply Company, and the offices of the company were moved down to Paterson in the same location as the East Jersey Water Company, and after that date all drawings and plans and proceedings were prepared in that office.

Q. What office?

A. From the Paterson office.

Q. In what building was that office?

A. The office of the company was in the same building as the office of the East Jersey—the office of the Jersey City Supply Company was in the same office as the office of the East Jersey Water Company; the engineers connected with the preparation of the plans, however, were located in another building. Of course after that date all matters had to be referred up to Paterson for discussion and final conclusion.

Q. How soon after that date was water delivered to Jersey City at Brookdale?

A. I think it was the 9th day of June, 1903.

Q. What do you mean by Brookdale?

A. Brookdale is the location which I refer to—when I speak of Brookdale, I mean the connection that is made between the East Jersey and our seventy-two inch pipe, it crosses, the first pipe crosses our line at that point. It is a thousand feet east of the end of conduit No. 4.

Q. What Township is it in?

A. I cannot tell you, sir.

Q. Well, where is it?

A. I suppose Montclair, it is up east of Upper Montclair.

Q. It is near Montclair, is it?

A. Yes, sir.

Q. And how far distant from the reservoir in Jersey City into which the water from this plant flows?

A. A little over fifty-five thousand feet from the

reservoir in Jersey City.

Q. Fifty-five thousand?

A. Yes, sir.

Q. A little over ten miles?

A. Yes.

Q. Now, previous to that date the East Jersey furnished the water to Jersey City through what pipes?

A. They furnished the water that came down through the same pipe, I understand it, but the delivery was made at Belleville to our system of pipes—Jersey City system of pipes.

Q. At Belleville, New Jersey?

A. Yes, sir.

Q. New, after that date where did the East Jersey furnish the water that they furnished the city?

A. From June 9, 1903, the main supply came through the 72 inch pipe—our 72 inch pipe, under this contract, this fifty-five thousand feet that I speak of, to Jersey City. There was a portion of the supply for about a month that was continued to be delivered at Belleville, and on the ninth of July, I think it was, that delivery at that point ceased.

Q. Now, how long did the East Jersey Water Company continue to furnish the water at Brookdale or at Montclair—East Montclair?

A. Through the 72 inch pipe—how long did they continue?

Q. Well now, don't use 72 inch pipe, we don't know anything about any 72 inch pipe.

A. I think I understand your question. The East Jersey City Water Supply Company continued to supply water under their contract until some time in May, 1904.

Q. How did the East Jersey Water Company connect their pipe with this pipe from Brookdale to Jersey City?

A. By putting in a system of gates in a gate

house at Brookdale and connecting their main with our main.

Q. Well, what distance was their main from what you call our main, at that place?

A. They crossed each other at that point, went right across one another.

Q. Well, at what distance was the gate that they put in from the Jersey City pipe?

A. Well, it was only a short distance, perhaps a hundred feet, I won't say definitely.

Q. Some short distance. Well now, how did you find out that the East Jersey Water Company was no longer furnishing water there?

A. On inquiry of Mr. Harrison he told me that they turned on the Rockaway supply.

Q. At Jersey City did you not notice, before Mr. Harrison told you that, that that had occurred?

A. No, sir.

Q. Do you know how it was accomplished?

A. Certainly, it was very easily accomplished, by simply shutting off—

Q. Wait, let me change that question. How it could be accomplished?

A. By closing the gates at Brookdale, connecting the East Jersey Company's pipe with our pipe, and opening the gates at the dam at Boonton on our line.

Q. Had you any notice, or the city any notice, of when they intended to do that?

A. No, sir, I had none.

Q. To your knowledge had Jersey City any such notice?

A. Not to my knowledge.

Q. You spoke in your direct examination of an injunction of this court restraining the Jersey City Water Supply Company from turning the water on —how soon after that injunction was removed did you hear from Mr. Harrison that the Rockaway water had been turned on?

A. Within a very few days.

Q. What in your judgment is the proper way to make a test of the capacity of the water works of this water supply company?

Defendant's counsel objected.

Objection overruled.

A. I think the test should be made by parties in the employ of the city, and during the test that they should have such control of the management of the plant as might be necessary.

Q. And for what length of time should such a test be made?

A. This is a very peculiar piece of work; it is not a plant as a whole but it is divided into a number of sections and in order to have a perfect test of the plant and of its capacity I think a continuous test should be made in order to insure perfect levels, or permanent levels in these different sections. The difficulty about the whole thing is not as to determining the capacity of the plant to deliver fifty milions of gallons of water a day, because that there is no question about, but the question is to determine as to whether the work, the plant, as a whole, would—the different conduits would be able to deliver seventy millions of gallons of water a day at their lower end with the heads provided for in construction. So I think that a maximum flow of water through the pipe line number 4 should be kept up for several days, I cannot tell how many, but until elements of stability were obtained in the levels of the different conduits.

Q. Did you make any request upon the Jersey City Water Supply Company for such test?

A. Such a demand was made, yes.

Q. Did you make any demand for such a test?

A. Such a demand was made, yes, sir.

Q. Were they ever granted?

A. No, sir.

Q. How much water did you think ought to pass through these pipes?

A. Well, we stated roughly fifty million gallons of water a day, approximately, whatever the capacity of the 72-inch pipe would be under the head, under those conditions; it might vary from that somewhat.

Q. Was a request made to your knowledge that fifty million gallons should be permitted to go through?

A. Yes, sir.

Objected to on the ground that the requests, if any, would be in writing, and should be produced.

The Court: Was there any written request—put it in that way.

Q. Was there any written request?

A. There was no written request.

Q. Was there not a resolution passed by the Board of Works and served by you?

A. My memory is not very clear upon that; I would be guided by what the resolutions say; I cannot recall that now.

Q. There was a resolution passed on that subject, was there not?.

A. I cannot recall that.

Q. Now, as to these requests that were not in writing, who did you make this request of?

A. It was made by Mr. Kuichling in my presence, of Dr. Leal.

Q. Who was Dr. Leal?

A. He was a representative of the Jersey City Water Supply Company, present at the conference.

Q. When did Dr. Leal first appear in connection with the Jersey City Water Supply Company, before or after March 31st, 1902?

A. Some little time after March 31, 1902.

Q. You say some little time, can you make it more definite than that; was it weeks or months?

A. Oh, I should say it was some months.

Q. Then what did he appear to have control of so far as you dealt with the Jersey City Water Supply Company?

Objected to.

A. He had control over the sanitary condition.

Q. You say that at one time there was a demand made for fifty million gallons; do I understand you to say upon whom that demand was made?

A. Dr. Leal.

Q. What answer did you make to it?

Objected to.

A. That Jersey City would have to pay for any excess of water used in making such test.

Q. In what?

A. Any excess of water over the normal supply which was used in making any such test.

By the Court: Of course you will have to show, if that answer is a material part of your case, you will have to prove his authority to represent the Water Company in that respect.

(The Stenographer was directed to read the above testimony in regard to the demand for tests, and he did so.)

By the Court: That is the way I understood it, that Dr. Leal's reply was that if they wanted fifty millions of gallons they would have to pay for it. Now if that is a material statement, why, of course, you will have to show that the Doctor had authority to make it. You cannot prove your case all at once, and the evidence will go in subject to further proof on the part of the city.

Q. Mr. Ferris, was that demand made more than once?

A. Well, all that I had in mind was the demand that was made at that meeting of January 27th—I think it was—1905. That was the only thing I had in mind. Now, what was done by the city by resolution I cannot recall.

Q. Well, now, this particular meeting of January 27th, I think you said?

A. I think it was January 27th.

Q. What was that meeting?

A. It was a conference at which Mr. Krisling, Mr. Whipple, yourself, myself, Dr. Leal, and others were present.

Q. Was Mr. Harrison there?

A. Mr. Harrison was there too, I believe.

Q. And it was a conference in regard to the acceptance of this work—(interrupted).

Objected to.

Q. What was the object of this conference?

A. I think the main thing was to discuss Mr. Whipple's report on the sanitary condition of the supply; that with other questions came up between the city and the company.

Q. Had the conference anything to do with the acceptance or rejection of the works or a test of the works?

A. Why, certainly, that was the important thing that the conference was held for, to lead up to the question of the acceptance of the work.

Q. How did Dr. Leal and Mr. Harrison happen to be there?

A. As representatives of the Jersey City Water Supply Company.

Q. Now, what was the demand of fifty million gallons made for—what did they want fifty million gallons for?

A. Well, I thought I made that clear before.

For instance, we cannot with our pipe system as it is at present constructed—it is impossible for us to send seventy million gallons of water through the pipe line as a whole; all that we can do is to send the quantity of water which the pipe line, so-called No. 4 from Watchung into Jersey City, will deliver.

Q. How much is that?

A. Well, the contract stipulation is fifty millions of gallons of water a day, and we found out that we would deliver a little bit more under the static head. Now, while fifty millions of the approximate capacity of that pipe is being delivered, of course the conduit will not be full. The conduits full are supposed to deliver seventy millions of gallons of water a day; there will be an intermediate point to which the water will rise, and having that firmly established under those conditions we have got to calculate mathematically what that conduit will deliver under its full and static head.

Q. Now, why do you want fifty million gallons?

A. In order to accomplish that result.

The Court: The witness says that there is no doubt but that these pipes will deliver fifty millions of gallons, and yet he says that he wants a test for the purpose of seeing whether they will deliver fifty millions of gallons. Now, if he knows that they will deliver fifty millions of gallons from what has been observed, I don't quite see what the necessity is of proving what is already demonstrated. That is what I do not understand.

Q. Did you hear the Court?

A. I did.

Q. Will you please explain it?

A. There is no question in my mind but what the system as a whole is capable of delivering fifty millions of gallons of water a day. There is no question in my mind about it. I have tested the

pipes outside of the Water Company by myself, and have been present at tests of the Water Company, and I am absolutely certain in my mind that the system as a whole is capable of delivering fifty millions of gallons of water a day, while that is being done, however, these different conduits will not be running full, they are of a capacity to deliver seventy millions of gallons of water a day, and when they are running full they would have to have seven and a half feet depth of water in the conduits. When the conduits are only delivering fifty millions of gallons of water a day, the depth of water in those conduits will only be three or four feet, I forget the exact figures now, and what I want, and why I want to have a full supply of water going through the eastern pipe—number of this pipe system is, and a continuous supply, is that the different levels of these different conduits of which there are four, can be accurately determined with that even flow, and from that we can calculate satisfactorily that those conduits if they had outlets capable of taking the water, would each deliver seventy millions of gallons of water a day, and if the system as a whole will do it.

By the Court:

Q. Let me see if I understand you. Your statement is that if the Water Company will deliver continuously through a number of days fifty millions of gallons of water, you, by observing the height of the water in the different sections of those pipes and conduits, will be able to determine whether or not the system will ultimately be able to deliver seventy millions?

A. Yes, sir.

Q. And that opportunity has not been afforded you?

A. No, sir.

Further Direct:

Q. Now, Mr. Ferris, when Mr. Hume was chief engineer of the Jersey City Water Supply Company or of Patrick Flynn, did you converse with him as to the method by which the sewage from Dover should be prevented from entering this reservoir?

Objected to as incompetent.

Recess.

AFTER RECESS.

By Mr. Vredenburgh: The question that was asked before recess I intend to withdraw because it is not in shape I thought it was. Thinking over it I don't like the shape it was in, so I will present the same question in a little different shape.

Q. Was any statement made to you by the manager for Patrick Flynn before the assignment of the contract to the Jersey City Water Supply Company, or by the manager of the Jersey City Water Supply Company after the assignment of the contract as to their plan for the prevention of all contamination from any source, of this water supply?

Objected to as not pertinent or competent, and as an attempt to vary a written contract by parole.

(After argument, the Court said:)

I will allow you to ask the question in its present form, but it will be overruled if it does not appear that such plan had existed before the contract was executed.

A. He stated to me that their plan for the prevention of pollution—what is regarded as the pres-

ent pollution of the river was an intercepting sewer at Boonton, the elimination of the rag mill at Powerville, and the construction of a sewerage disposal plant at Dover.

Q. Who stated that to you?

A. Mr. Beldon was the first one that stated it to me.

Q. Who was Mr. Beldon?

A. He was the manager of the company, and I think the vice-president; I am not sure as to his official capacity.

Q. What had he to do with Mr. Flynn?

A. He appeared to be the actual representative of Mr. Flynn. He and Mr. Kennedy and Mr. Connolly appeared to be the actual representatives of Mr. Flynn. I never have seen Mr. Flynn.

Q. Was this statement made to you before this contract was signed?

A. This statement originally was made to me at the time of the visit of the Board to the water shed.

Q. State that fully. What do you mean by a visit to the water shed?

A. Preliminary to the award of the contract.

Q. Who went to the water shed?

A. Well, the representative of Mr. Beldon, and the representatives of the city—the street and water Board more particularly.

Q. Can't you mention the names? Did Mr. Beldon go?

A. Mr. Beldon, yes.

Q. Who else?

A. Mr. Kennedy and Mr. Connolly.

Q. Who went on behalf of the city?

A. There was Mr. Heintz.

Q. Mr. Ringle?

A. Mr. Ringle was present, yes, sir.

Q. And the Mayor?

A. I think the Mayor was present too.

Q. Did you go by appointment or by chance?

A. We went at the request of the contractor, or

of the bidder, not contractor, then; at the request of the bidder, Mr. Beldon.

Q. Do you remember when that was, about?

A. Well, it was in the late summer or fall of the year, prior to the award of the contract, prior to the signing of the contract, 1898.

Q. Where did you go to?

A. We went to Boonton, and from there up through the valley, to Dover, and there some distance up along the valley.

Q. And at that time what was the statement—tell us as near as you can recollect, the substance of what was said in reference to this plan?

Objected to and admitted subject to objection.

A. As regards the rag mill at Powerville there was nothing said by me in the matter, it was volunteered, it was said that it was so bad that it would have to be eliminated. *There* is something that would be eliminated, that is the way Mr. Beldon described it, as we passed by—there is something that will be eliminated, the rag mill, and when we got to Dover I told him the conditions were very bad up there, and I said, what plan have you for rectifying this; he said, we will put in sewage disposal plant here.

Q. Yes?

A. And in that connection he also said that there would be an intercepting sewer put in at Boonton.

Q. Who did he say that to—in whose presence did he say that?

A. Well, there were a number present when he made the statement about the rag mill, but the conversation about Dover, although he may have had the same conversation with other gentlemen, the conversation about Dover was with me directly.

Q. And it was at this date that you speak of that this conversation occurred, at the time you speak of?

A. Yes, sir.

Q. Was there any subsequent conversation about that plan?

A. Yes.

Q. With anyone?

A. Yes, the matter was brought up at a number of times. I kept asking for the definite working plans of the sewage disposal work at Dover, and also for the intercepting sewer at Boonton, but corrections had been made under the auspices of the Water Company, particularly Dr. Leal, which rather negatived any anxiety on my part as regards the rag mill at Powerville.

Q. Now, after this conversation with Mr. Beldon, what officer of the company spoke to you about these plans?

Objected to.

Q. What officer of the company spoke to you about these plans before March 13th, 1902?

Mr. Edwards: I object to that because that was anterior to the signing of the contract, and I understood your Honor to limit this matter to such conversation as took place before the signing of the contract.

Mr. Vredenburgh: I am asking him for any conversation with any other officer, I am trying to get at all that occurred with regard to it, I don't know whether it was before the contract was signed or after the contract was signed; I am asking within a definite time.

The Court: What period of time do you fix now?

Mr. Vredenburgh: I ask him to tell what statements were made by any officer of the company in addition to Beldon, with regard to these plans at

any time after this conversation with Beldon, and before March 13th, 1902.

The Court: I will allow that question to go in.

A. I have already testified that this conversation took place in August or September, prior to the award of the contract. I had nothing further to do until I was appointed the following May, and at that time I believe the Jersey City Water Company had been inaugurated, and Mr. Beldon and Mr. Kennedy—

Objected to.

Mr. Vredenburgh: I propose to prove by this witness that these plans, which we had a right to assume were proper plans and all drawn out—they said so in the strongest way—were continually spoken about both by Mr. Godfrey and Mr. Beldon, the engineer of the Company, and, after Mr. Godfrey went out, by Mr. Harrison, and there was never a question about the building of the disposal works for Dover, according to that plan until February, 1902, until the East Jersey came in and then they changed their plans.

Mr. Corbin: What do you understand was in those plans, a sewage system through the streets of Dover?

Mr. Vredenburgh: No, a sewage disposal works carried along the river bank to a place where it could be disposed of for a very reasonable sum.

I propose to prove that was the condition of things, that it was continually spoken of by the officers of the company until February 13, 1902, and then the thing passed into the East Jersey Company, and they took a different view of it, so that they have not done it.

Mr. Corbin: I object to the offer as incompetent.

The Court: I doubt very much whether admissions made by agents of the company with respect to a past transaction could be used in evidence against the company.

Of course if anything was done that is a different thing; you can prove anything that the agent did in the execution of such a plan, if anything was done in execution of it, but if the agent merely referred to the plan to which the witness has already testified, as something in the past, then I think his admissions with respect to its existence would not be competent. Anything done in execution or part execution of the plan I will permit you to prove, or anything said in part execution of it, but I do not think the mere admission that there had been such a proposition made or suggested or contemplated would be admissible.

Mr. Vredenburgh: Then I understand that is overruled, and if your Honor will permit me I will ask this question in the light of what you have just said.

Q. Was anything said by the engineer in charge of these works for the East Jersey Water Company as to why he did not complete the plans for the sewage disposal works at Dover?

Objected to as incompetent.

Objection sustained.

Q. Did you at any time demand of the East Jersey Water Company that they should complete their sewage disposal works at Dover?

Objected to.

Objection overruled.

A. As engineer of the city it was my duty to, and I did, ask of Mr. Blendon and also of Mr. Harrison as to when I was going to get the working plans of the sewage disposal works at Dover, and also the intercepting sewer at Boonton, and I never received any intimation but what they—

Defendant's counsel objected.

By the Court:

Q. What was the reply, was it in writing?
A. No, sir.
Q. Or was it verbal?
A. Verbal, that that would be taken up at the proper time, before long, and I would receive them.

Mr. Vredenburgh: Mr. Ferris desires to correct his testimony at the last meeting with respect to the amount of water which seeps under the core wall at the Parsippany dyke.

Further Direct Examination.

Q. In what respect do you desire to correct your testimony as to the amount of that seepage water?
A. On investigation I found that the information on which I had relied was defective, that the 15-inch sewer pipe was not laid at grade, so I could not reach definite conclusions from that as to the amount of water that it passed through; the Jersey City Water Company had put in a weir there which undoubtedly is accurate in its measurements and I made an examination of the flow of water, a test of the water as flowing through, by the weir, and also by the defective formula which I had been formerly using, and I accept the weir, and with that construction I would change my deduction as to the flow of seepage, independent of temporary rainfall,

I would change my flow of seepage from 333,000 gallons a day to about 160,000 gallons a day.

By Mr. Edwards:

Q. You do not say that that all seeps, for you don't know whether it does or not?

A. What is that?

Q. You do not claim that that seeps under the wall, you do not know whether it does or not, do you?

A. Well, that is my judgment, I do not know it.

Cross Examination by Mr. Corbin:

Q. When you went out to the water shed with the city officials and others in 1899, and with Mr. Belden to inspect the water shed it was under a previous bidding made by Mr. Flynn, was it not?

A. My recollection—of course it was under a previous bid by Mr. Flynn.

Q. You did not go up there under this last bid at all, did you?

A. Yes, I think I did, that is the bidding I refer to.

Q. Before Jersey City finally awarded this contract to Flynn it had received several sets of biddings, had it not?

A. Yes, sir.

Q. It had awarded one contract which the Supreme Court had set aside, had it not?

A. Yes, sir.

Q. And it had awarded another contract to the East Jersey Water Company which the Boards had accepted, but which the Mayor after some months, had vetoed, had it not?

A. I believe that is correct .

Q. And this bidding which finally resulted in

this contract was about the fifth set of biddings, was it not?

A. I do not remember positively, but I think you are correct.

Q. There was a bid by Flynn which was refused entirely, was there not, before this?

A. Yes.

Q. That is the time you went up to see the water shed, now was it not?

A. No, I think it was on the last bid.

Q. Do you think so?

A. Yes, I think so.

Q. You would have to refresh your memory as to dates, would you not, to be sure of that?

A. I think the bidding took place in August, wasn't it?

Q. I want your memory.

A. I think it was at that time and I think it was in pursuance of that bidding that we were invited to inspect the water shed.

Q. Which of the Belden's was it you were talking to?

A. Mr. Henry Belden.

Q. He is now dead?

A. Yes, sir.

Q. And Mr. Connolly, whom you mentioned as being one of the Flynn party, is also dead, is he not?

A. Yes, sir.

Q. You do not know what their relations were to Mr. Flynn?

A. I only know that they represented the contractor in this matter.

Q. Why, Mr. Connolly was the contractor who afterwards commenced to construct the dam for Flynn, was he not?

A. Mr. Connolly, as I understood it, was representing Mr. Flynn.

Q. I asked you whether he was not the contractor who afterwards commenced the construc-

tion of the dam for Flynn.

A. Not that I am aware of sir.

Q. Don't you know that he made the excavations to find out the foundations for it?

A. I did not know that he was a contractor, I thought he was working for Mr. Flynn; I knew that he did that work, but I supposed he was doing it for Mr. Flynn.

Q. That was his life business, the construction of great dams, was it not?

A. Yes, sir.

Q. And that was his errand at Boonton, was it not?

A. What is that?

Q. That is what he had to do at Boonton, to begin the construction of that dam?

A. I thought Mr. Connolly had charge of all the actual construction under Mr. Hume, I thought he was one of the company, I did not suppose he was a sub-contractor, I never had that intimated to me.

Q. You did not know what his relations were?

A. I only assumed what they were.

Q. You did not know what Henry Belden's relations were to Flynn?

A. Only by what we would naturally assume by the way a person would talk, with authority in the matter.

Q. He was the secretary of the Jersey City Water Supply Company, was he not, afterwards?

A. He was Secretary or Vice-President, I don't know which.

Q. When you say they spoke of a plan for disposal work and of plans for an intercepting sewer, did they show you any written plan or any sketch or any map?

A. I never have seen anything, sir.

Q. With regard to the tunnel through the Watchung Mountain you spoke of the invert as having not been constructed according to the plans, did you get up the plan?

A. No, sir, I got up no plan whatsoever for this work.

Q. When did you first come into the city's employment with respect to their water works?

A. May 25, 1899, I think it was.

Q. Then the plans were all perfected and the bid accepted and the contract signed before you had anything to do with it?

A. The plan as a whole, general plans, were made and the contract was signed before I became connected with the matter in any way.

Q. Then when you were up there in the previous summer with Belden and others you were there as a volunteer?

A. No, sir, I was asked to go.

Q. But you were not in the employ of the city?

A. I wasn't in the employ of the city at that time?

Q. Were you in the employ of any one else?

A. No, sir.

Q. You were, as a citizen of Jersey City, interested in the subject?

A. I was a citizen of Jersey City, and as I had been instrumental in preparing the plans myself and Mr. Vermule, under which this contract was made, I was invited to go along.

Q. I asked you whether you had anything to do with preparing these plans?

A. Not the plans, the specifications.

Q. Did you prepare the specifications?

A. Yes, sir.

Q. As a volunteer, or under the employ of the city?

A. I prepared that in conjunction with Mr. Vermule.

Q. Who employed you to do so?

A. I was employed by the city.

Q. Before 1899?

A. Yes, sir. Let me explain that, Mr. Corbin. Mr. Vermule and myself prepared the specifications

under the first of the tenders by Mr. Flynn, prior to the accepted one, and those specifications with some slight modifications were adopted by the Board.

Q. Were you employed by the city to do that?

A. I was employed by the city, and then the specifications were substantially what we prepared.

Q. Then I ask you again, did you prepare the plans for the tunnel?

A. No, sir, I prepared no plans.

Q. Did you prepare the specifications for the tunnel?

A. Yes, sir.

Q. Did you prepare the specification for the invert of the tunnel?

A. I prepared the specification just as it is written in the published specification.

Q. Which called for Rosendale cement in the bottom of a tunnel?

A. Yes, sir.

Q. Now that tunnel as actually built was wider than you called for, wasn't it?

A. On the sides it was two inches wider, about.

Q. And on the bottom it was two inches deeper, wasn't it?

A. The radius was two inches greater, yes, sir.

Q. That additional radius is at the bottom and not the top?

A. Yes, sir.

Q. So the water in the tunnel is two inches deeper than you designed to have it?

A. Yes, sir.

Q. And two inches wider?

A. Yes, sir.

Q. Other things being equal it has a greater capacity of carrying than it would have had as designed?

A. Yes, sir.

Q. Now in your specification you speak of what shall be done if earth be encountered or if loose rock be found, or if solid rock be found. You did

find solid rock for the whole 7,400 feet, did you not?

A. Yes, sir.

Q. Your specification for earth was that the invert be built of brick?

A. No, sir.

Q. Now inasmuch as the whole length of it was solid rock that brick specification didn't apply, did it?

A. Well, it was to my judgment in writing the specification or preparing the specification, it was either that it should be brick or the contractor should have the option of putting in this Rosendale cement, concrete and surfacing it with Portland cement.

Q. And you didn't say in your specification a word about putting in brick when solid rock was found, did you?

A. I thought that the wording of the specification would be construed that there should be brick there, yes, sir.

Q. Where there is solid rock?

A. Yes, sir, either that or the alternative, the idea being to get a smooth surface for the invert.

Q. You did not prescribe the size of the conduit, did you?

A. No, sir.

Q. But in your specifications, page 43, as printed, you prescribed this, did you not: "The carrying capacity of all masonry conduits or tunnels shall be determined by the Kutter formula, taking the co-efficient N to equal .014 for brick work, concrete or masonry lining, and .018 for rubble lining. All such masonry conduits, tunnels or conduits shall be capable of delivering the full supply called for, when discharged with a free upper surface, the water surface not to be higher than one foot below the top of the arch." Now the engineer had to figure out from that formula what the size of the tunnel on the hydraulic gradient should be, didn't he?

A. Yes, sir.

Q. He did figure on it and made the tunnel two inches wider than the figures showed, didn't he?

A. Yes, sir.

Q. And at the bottom he made it two inches deeper?

A. Yes, sir.

Q. Now, at the bottom, if he had put in Rosendale cement, at the level that you called for, it would have been smooth with cement, would it not?

A. If it had been surfaced up with Portland cement, yes, sir.

Q. Now in lieu of that, he constructed the bottom two inches lower and simply evened it up with gravel, which left it more or less rough, is that it?

A. Yes, sir.

Q. Now, the water at the level where you prescribe it to be has not a cement bottom to have friction on, but has a water bottom two inches thick?

A. At the depth (interrupted)

Q. It should have been?

A. That it should have been under the original formula, yes, sir, it would be wider.

Q. Now with that 2 inches additional depth and 2 inches additional width, has it not a greater carrying capacity than it would have had if built as prescribed?

Objected to.

A. I believe on my direct examination I made a statement with regard to the width of the invert, but notwithstanding (interrupted)

By Mr. Corbin: I object to that and move to strike out that answer. Read my question.

(The Stenographer read the question.)

A. Let me understand that, Mr. Corbin. Will you permit me to assume a gravel bottom?

Q. Assuming the gravel bottom as it is.

A. I already stated in my direct examination I figured that out, and owing to the roughness of the bottom, that in my judgment with the additional area it did not compensate for the additional roughness.

Q. Have you got your figures with you?

A. I have them down at my office.

Q. I wish you would bring them here, Mr. Ferris. Do you mean the roughness of that gravel two inches below what it should have been, that the flow line affects the flow of the water more than two inches high?

A. Yes, sir, I don't say that it wouldn't be so, but I should not be surprised to have the carrying capacity of that tunnel as contracted, a little bit less, but that is a question of tests.

Q. Suppose the bottom was made smooth as you prescribe it with cement, and the enlarged size as it is now constructed, what percentage was added to the carrying capacity by that enlargement?

A. Well, I hardly care to answer that.

Q. You must have that in your figures?

A. I haven't those figures with me, but of course it would add to the carrying capacity.

Q. Doesn't the water on your flow line, at the bottom of your flow line, present a smoother surface for flowing than cement would have presented?

A. I suppose water running on water would be smoother.

Q. Now, then, solid rock encountered in the tunnel, was for long stretches of it, flat strata, wasn't it, practically level, practically on grade?

A. I think it was quite undulating.

Q. At places broken edges of the rock had to be broken off?

A. Yes, sir.

Q. And where it was rough it was filled with brook gravel?

A. In the final construction.

Q. Yes.

A. Yes, sir, so I understand; I wasn't present when it was filled in; I went through it after it was filled in.

Q. In constructing that tunnel, very large springs of water were encountered?

A. Yes, sir, very large.

Q. And the tunnel was fed with those springs all the way through it quite large quantities?

A. Not all the way through.

Q. In many places?

A. In different locations where they came in. One portion of the tunnel was comparatively dry.

Q. The conduit gains two million gallons a day in passing through the mountain?

A. I should think it did, yes, sir.

Q. And that free flow of water in the tunnel was what led to the abandonment of this Rosendale cement idea, wasn't it?

A. Yes, sir.

Q. Now, let me ask you in view of your riper experience, wasn't that idea of stopping the bottom of that conduit with Rosendale cement an error in the specifications, and bad engineering?

A. Do you mean to properly smooth the invert at the bottom?

Q. I mean by stopping the bottom of the invert with Rosendale cement which won't stand water?

A. Rosendale cement will stand water.

Q. Will it, since when?

A. Well, I have done a great deal of construction with Rosendale cement, and I found it would stand water, and as we had it specified, it is merely Rosendale cement concrete was to be put in to even up the uneven excavations at the bottom of the tunnel, and two inches of Portland cement on top of that.

Q. Well, do you think that is good construction?

A. I think it is most excellent construction.

Q. Do you think it could be made to stay there

without another tunnel being made to carry off the water?

A. That wasn't my business to take care of the water.

Q. Your razors were made to sell, not to shave with.

By the Court:

Q. Would the pressure of two million gallons of water flowing into the tunnel have been so great as to have broken through those two inches of cement?

A. Not if properly constructed, sir. The Hook Mountain tunnel is constructed just the same as this, and there was no tunnel with that.

Further Cross.

Q. That is a tunnel about 1,200 feet long?

A. Yes, sir.

Q. Where they didn't encounter so much water?

A. No, sir, that is something the contractor that takes this kind of a contract must figure on taking care of. Provision should have been made for taking care of that water.

Q. It would have been necessary to build another tunnel underneath it, would it not?

A. No, sir, not another tunnel, but it would have been necessary to have a sub-drain, and I spoke about it over and over again.

Q. You think that would have been better than taking the water into this conduit, do you?

A. Yes, sir, I think it would have been desirable to have had a smooth surface at that invert.

Q. And yet the pipes were put in through the sides and top of that tunnel to let these springs into the main, with your concurrence?

A. I did not object to it at all, sir.

Q. Because you gained that good water?

A. There was no objection to it at all, sir.

Q. In fact these pipes bring water right directly into the conduit, and Jersey City gets it?

A. Yes, sir.

Q. And it is good water as shown by analyses?

A. The analyses shown to me, shows it to be good water, and I did not object to that.

Q. Is it not a good engineering job as done now?

A. Well, I don't call it done in accordance with the specifications.

Q. You think as completed it did not conform to the specifications?

A. I think so.

Q. Well, we think it did, and that is a question we can't decide. Suppose there has been no specifications about the invert at all and the contractor had finished it as it now is, would you not have considered it a good engineering job?

A. Well, my objection to that method of construction is mainly that it was not susceptible of being cleaned out readily. With a smooth surface it could have been readily cleansed; a man could go through there very quickly and clean out the invert, but with that gravel it cannot be done so quickly.

Q. Have you known any conduit of that size and character ever to be cleaned?

A. Yes, sir.

Q. And how often does the Croton Aqueduct clean their conduit?

A. I don't know.

Q. Never since it was built?

A. I don't know, but the Sunbury Aqueduct clean their's.

Q. Oh, Sunbury, Massachusetts. Your idea is that water carried through a conduit must make some deposit on the gravel?

A. Yes, sir.

Q. You haven't observed any yet?

A. No, sir, I haven't been through it.

Q. The deposit would be equal if there had been

a cement bottom, would not it?

A. No, not quite as much, or I think approximately the same.

Q. Your point is that if it was cement it would be taken along with the current?

A. Yes, sir.

Q. And you could not in either case suspend the use of that tunnel long enough to clean it out without having a reservoir built east of it, could you, to retain water for the current use of Jersey City?

A. Well, it would have been a little bit inconvenient to do it, Mr. Corbin, but it could be done.

Q. You have a small storage capacity at Jersey City?

A. Yes, sir, very small.

Q. 100 millions?

A. 127 millions.

Q. That is about three days' supply at present?

A. Yes, a little over three days' supply, I suppose it would be four days. Besides that we can get water, small quantities of water from other sources.

Q. How much storage have you on your high service in Jersey City which is available to high service?

A. Practically none.

Q. Right here, what is the elevation of the high service in Jersey City, and what the low service?

A. Low service is 127 feet.

Q. Above sea?

A. Yes, sir, and the high service is being delivered at about 216 feet.

Q. What is it by contract?

A. 210 feet by the contract.

Q. In other words they are giving you a little more than they agreed to?

A. Yes, sir, in that respect.

Q. It is pretty valuable to you, is it not?

A. Not so valuable as if you had made it 226 feet, which you could have done.

Q. That is we could have given you water at 226 feet, all of it?

A. Yes, sir, that is our present supply, and I have asked you to do it, too.

Q. In this Watchung tunnel, you say you estimate that it would cost $2.50 a running foot to have put in the cement concrete which you have described. How much of that did you figure for cement and how much for labor?

A. I haven't those figures with me, Mr. Corbin; I don't remember.

Q. Did you figure it up in detail?

A. Yes, sir, I figured it up in detail.

Q. Do you remember anything about the quantity of cement you were reckoning on?

A. No, sir, I do not remember the details, I would not be willing to state them.

Q. But your total is $2.50 a foot?

A. Exclusive—if there was no water. The only objection to the water in the construction would be that while the cement was setting and this water is pouring in, the tunnel has got to be taken care of in some way.

Q. What would you do with it if you had your own way?

A. Well, I think the proper construction would be to put in a sub-drain under it.

Q. To carry it off and waste it?

A. Yes, sir. You could afterwards have it turned, if you wanted to, but the other alternative would have been to stop off the invert by sections, keeping a section perfectly dry while you were putting in your cement and until your cement was hardened, and I think with that kind of work it would have been necessary to have used Portland cement.

Q. Now you were paying for water in Jersey City about $36 per million, which would be about $72 a day, which that water is worth—you would throw that all away, would you?

A. I would not object to having the water diverted and put back into the conduit; of course we could not demand it.

Q. That water is well worth $70 a day, isn't it?

A. If we were short of water above, it would be, yes, sir, but if we were not short of water it would not be worth anything extra to us.

Q. You were asked something about the difference between the value of steel pipe 72 inches in diameter and steel pipe 76 inches in diameter, what is the pipe which has been made by the Jersey City Water Supply Company, what is the size?

A. 72-inch.

Q. Its size is not specified in the contract and specifications except by formula?

A. That is all.

Q. So as to produce certain results, is not that it?

A. Yes, sir.

Q. What have the figures 72-inch in diameter then got to do with this case, what is the significance of them?

A. Simply it is under the head that you have, it will produce certain results using that formula.

Q. The 72-inch does produce it?

A. Yes, sir.

Q. The greater the head the smaller the pipe need to be?

A. Yes, sir.

Q. The building of more eight and a half feet conduit than was first proposed made less steel pipe necessary, didn't it?

A. Yes, sir.

Q. And it also made it possible to make the steel pipe that was built of slightly smaller size, didn't it?

A. The new arrangement of the gradient there permitted the smaller size pipe.

Q. Made less length of line, subject to the great friction?

A. Yes, sir.

Q. It also reduces the amount of steel pipe necessary to be laid in future to bring your works up to seventy millions of gallons?

A. Certainly.

Q. Some two or three millions less?

A. Yes, sir.

Q. About how much is a steel pipe worth per mile that will carry thirty million gallons on the hydraulic gradient of those works laid?

A. I am not prepared to answer that question at present.

Q. Well, roughly, you can give it to us?

A. I don't want to guess at it.

Q. Over ten dollars a foot any way, isn't it?

A. I am not going to guess.

Q. You speak of the area of the lake which was to be formed at Boonton as 852 acres impounding 7,190 million gallons, that I think you took from a letter received from Flynn. Now the area is, in fact, considerably less than that, isn't it?

A. Of the present reservoir, yes, sir.

Q. How much?

A. It is 773 acres

Q. How much does it impound when it is filled up to the spillway?

A. 7,185 million gallons.

Q. And the depth of the reservoir, of course, averages deeper than was originally planned?

A. Yes, sir.

Q. How much is the total drainage that you can make from that lake in depth?

A. How low can we draw it down?

Q. Yes, how many feet can you draw it down from the top to use in your works?

A. I think, if my memory is right, we could cease to draw water at an elevation of 255.25 no water would pass into the conduit below that elevation, and the storage basin—the base of the storage basin was elevation of 259.75, so we can draw four feet below the base of the storage basin.

Q. What is the total draft you can make—fifty odd feet?

A. Well, from 255.25 up to 325.25, that is fifty feet, that is, at the termination of the fifty feet you cannot get any water.

Q. How much water would that still leave in the reservoir which you could not draw?

A. I have no figures on that, never had any survey.

Q. It would leave a depth of more than fifty feet?

A. Yes, sir.

Q. Could it still be used as a settling basin?

A. That is all that it can be used for.

Q. That is the settling basin in fact?

A. Yes, sir.

Q. The lower fifty feet of the reservoir at its deepest point is the settling basin for the rest?

A. Yes, sir.

Q. How can you clean out the lower part, if you should so desire?

A. By a sluice in the bottom and pipes running through the dam by which you can empty the reservoir.

Q. From the bottom?

A. Yes, sir.

Q. That would draw off the mud?

A. All mud, dirt and whatever might be in the settling basin.

Q. That is a good dam, is it not?

A. I think so, sir.

Q. The design of it is satisfactory and proper for the purpose, is it not?

A. If it had not been you would have heard from me; wherever you were not right, as I thought, you did hear from me.

Q. You are not ashamed of it, as supervising engineer, are you?

A. No, I am not.

Q. With regard to the Parsippany dyke the seep-

age there you conclude after examining the weir that has been put in was somewhat less than you had supposed?

A. Yes.

Q. You would not take it to be over 160,000 gallons a day now?

A. My judgment is that in dry weather, which is the only measure of the seepage, the flow off there would be about 160,000 gallons a day.

Q. The reservoir itself has remained full substantially ever since it was first filled two years ago, has it not?

A. All the time excepting when it was drawn down temporarily for the repair of the slope wall of the Parsippany dam.

Q. With that exception there has been water flowing over the spillway of the dyke all the time?

A. All the time, yes.

Q. For more than two years?

A. Yes.

Q. Then whatever comes from seepage should be a rather steady quantity for the last year, should it not—or two years?

A. If you separate the seepage from the rainfall, yes; but the overflow there is always affected more or less by the rainfall, the only way to judge of the actual seepage is in a dry time and with the absence of any rain.

Q. Is not the Parsippany dyke located substantially upon the ridge pole between two water sheds?

A. I think that substantially it is on the divide.

Q. And it was put there to prevent the water flowing over from the Rockaway water shed into another water shed, was it not? From backing over there?

A. I don't know why it was put there, but I thought it was a good location; it was the highest location they could get.

Q. I mean the purpose of the dam is to prevent

the water going over the hill into the other water shed?

A. Yes, sir.

Q. As a matter of fact was it not put a little further north than the exact ridge of the water shed so that it had the effect to prevent water flowing into the reservoir as well as to prevent it flowing out—I mean flowing towards the reservoir?

A. Well, I can hardly say as to that; my impression was that it was located upon about the highest ground there that it could be located on.

Q. Don't you think that the quantity of water which you have mentioned may be entirely accounted for by the intercepted springs and currents which were cut off by that core wall and compelled to find their way back southward, which formerly went northward, or part of it?

A. That is not my judgment.

Q. You think there is some seepage under the core wall?

A. I have not any doubt of it.

Q. You have not traced it, of course?

A. I have not traced it; of course, it is a matter of judgment, but in excavating for the core wall at the deepest part there were streams, quite a great deal of water that was encountered at the lowest depths which was very troublesome and a very difficult piece of work to do.

Q. Don't you know that these currents which were encountered——

A. Now——

Q. Go on if you are not through.

A. ——that is a portion of the dyke where we are getting hardly any water at all, the seepage or the water that we are complaining of comes from an entirely different area, a different section.

Q. And that is to the eastward?

A. Yes, sir, out here (indicating on map.) At this point here where they went down pretty deep, there is very little water coming through, it all

flows through that fifteen-inch pipe.

Q. It is out towards the east side where you found the water?

A. Yes, sir, over here, the easterly fifteen-inch pipe.

Q. That land over there is springy land, is it not, and always has been.

A. Well, if it always has been I think it is a great deal more so now.

Q. Did you see it before the dyke was constructed?

A. Yes, sir, I was up there but it did not give me the impression of being springy ground; there was one point there where it looked as though it was rather springy, as I remember it, but the impression—I think if it was springy ground I would have noticed it.

Q. When the ditches were put down along the core wall were there not streams encountered which appeared to flow towards Boonton lower than the construction?

A. The streams that I have stated, yes; but I do not remember anything else.

Q. Before it was constructed how often had you ever been there?

The Court: I do not quite understand yet why, if a ditch were constructed to the east of the dam of sufficient depth that would not carry off all the water to the Troy brook.

Mr. Corbin: I think your Honor is quite right.

The Court: I want to get the witness' opinion about that.

Q. Could not an intercepting ditch be dug along the foot of this bank if dug in a proper construction and of proper depth to intercept all this water.

A. Near the toe of the bank?

Q. Wherever the proper location would be.

A. Well, these springs appeared to come up after the water was in there, all over that area, and subsequently these ditches have been put in; they did not appear to come at any one point, they appeared to be distributed all over, some were bubbling springs and these ditches were put in to carry that water; it was sloughy, I have gone in up to my knees in it before the ditches were there.

Q. Was not much of that very sloughy ground before the ditches were built?

A. I don't think it was.

The Court: But that does not answer my question yet.

By the Court:

Q. Suppose that the soil were of uniform character would not a ditch drain all the land east of it, at least, as low as the bottom of the ditch, that is, to say, so far as the water coming from the east, or that could be supposed to come from the reservoir; the water from the reservoir could not raise higher than the bottom of the ditch, could it?

A. Well, it depends on——

Q. Of course, the water coming from springs to the east of the ditch would not be affected by the ditch until the water got to the ditch, but if there was a ditch constructed along the easterly bank of this dam would not that intercept all the water from the reservoir up to the bottom of the ditch.

A. There is a ditch along the toe of the embankment there now, sir, and it does not intercept the water.

Q. Is the bottom of that ditch as low as the bottom of the cellars of these houses you have been speaking of?

A. No, I do not think it is.

Q. Suppose then, that a ditch were dug as low

as the bottoms of the cellars of these different houses, would not all the water that came out of the reservoir be intercepted by that ditch?

A. That depends entirely upon the sort of ground through which these streams come. If the ditch intercepted the permeable strata through which the water now comes, of course, it would catch it, but if the permeable strata was beneath the bottom of that ditch on an upgrade, and finally came up so as to deliver water in this other area here (indicating on map) the intercepting ditch would not provide for it.

Q. It is a matter of observation I suppose where that permeable strata is; if the permeable strata is so placed with reference to this land as that the water would come up below the level of such a ditch as I have described?

A. I think possibly some of it might pass underneath that ditch your Honor and come up——

Q. Would it be likely to in your judgment; you know the character of the soil and I suppose you know the character of the strata to a certain extent; in your judgment would it be likely to.

A. I can only tell from the surface and the indications and from the ditches as they are dug, that is all I can judge by. But the ditch that was dug along there, along the toe of the bank did not appear to meet the case and all these other ditches have been put in subsequently.

Further Cross Examination.

Q. Are you not aware and have you not heard that these cellars in which you saw water after rain, in fact become entirely dry in dry times?

A. I do not know anything about them, sir.

Q. Did you not observe, on the map you produced, that these ditches are already lower—the bottom of these ditches is lower than the bottom of these cellars?

A. I have not examined the levels there at all.

Q. If they are lower than the bottoms of the cel-

lars, and if water is found in the cellars only after rain, being dry at other times, you would not attribute the wet cellars to the reservoir, would you?

A. I hardly would, no, sir.

Q. If there be seepage from under the dam, is it not your experience with such structures that the seepage gradually decreases year after year, is not that the tendency?

A. I think the tendency would be to decrease, by the filling in of the underground channels.

Q. It is not possible to build any dam absolutely tight, is it? a stone dam or other dam?

A. Well, I have heard of them, but——

Q. You never saw one?

A. They are very rare.

Q. There is seepage even through the great stone dam at Boonton, is there not?

A. Oh, yes, there is a little there.

Q. Is there not in every dam you ever saw?

A. Yes, sir.

Q. Do you not consider this Parsippany dam a well constructed dam, with really small seepage?

A. I consider the dam very well constructed, I consider it a good structure. The only criticism I made was made in the past, that if I had had charge of that work as the engineer responsible for it, I would have ordered that core wall deeper than it was put down; I said so at the outset.

Q. Yes, you put a letter in here.

A. Now, I cannot attack the stability of the dam, in my judgment; I am not attacking the stability of the dam, but I think when this question of persistent damage comes up, it is a legitimate thing for the water company to take care of.

Q. You think this water that crops up is due to seepage?

A. Yes, I think so. I would say I have never seen any evidence of any water coming through the bank.

Q. No, It is underneath, you think?

A. Yes, sir.

Q. The bank itself of the core wall appears to be tight?

A. The bank, I think, is a very excellent one, yes, sir.

Q. What is the ordinary run-off of a square mile of country of that sort around Parsippany per day?

A. I do not know that I understand.

Q. The ordinary run off of water?

A. Oh, that would depend entirely on the season; the flow off depends entirely on the rainfall.

Q. But you know what the rainfall is there in New Jersey, you know the——

A. Oh, 17 to 25 inches, in very dry times 17.

Q. Seventeen to twenty-five inches per day?

A. Yes, sir.

Q. That amounts to a million gallons per day per square mile, or more?

A. Well, I hardly know how to——

Q. That is about right, is it not?

A. Yes, sir, about right.

Q. 160,000 gallons of water a day then would be about the average run off during the year of one-eighth of a square mile, would it not—or one-sixth of a square mile?

A. About one sixth, yes, sir.

Q. I see in one of the letters you put in, your letter to Mr. Harrison, dated February 4, 1904, you say "I am advised that the sluice gates were shut down on Monday and Tuesday of this week." Then the impounding of water at the Boonton dam actually began about February 1, 1904, did it not?

A. Yes, sir.

Q. And there has been water impounded in that dam ever since?

A. Yes, sir.

Q. Has there not?

A. Yes, sir; there has been water impounded since, excepting when you were running it away, you know.

Q. And the actual supply of Jersey City from that source began on the 23rd day of May following, did it not?

A. 23rd or 24th, I forget which; I was told it was May 24th.

Q. Why, Mr. Ferris, the water was actually turned on immediately after Vice Chancellor Pitney's decision in Jersey City, wasn't it?

A. On inquiry I was told so, yes, sir. I was told it was turned on the 24th day of May.

Q. They had commenced to turn it on about ten or twelve days before, when you and others made affidavits and a restraint was made against turning it on, is not that so?

A. I haven't heard it was turned on.

Q. But you made an affidavit showing that it was either turned on or about to be turned on?

A. About to be turned on.

Q. Didn't you know that another affidavit accompanied it, showing that it had been?

A. There was water turned on for flushing purposes.

Q. Now as to the tests. The test that you more particularly speak of is with regard to conduit section No. 4, isn't it, that you said you were not present at?

A. What about it?

Q. That was the part that you were not present when it was tested?

A. Well, there was a test made of the whole line, and we supposed that conduit 4 would be included, but there were defects in the observation so that that was not included. I got a report from Mr. Smith of the tests of all the rest of the line inclusive of No. 4.

Q. Now, did you not have several notices to appear at a test of that No. 4, and did you not stay away, giving some times, as your reason, that Mr. Kichling, whom you wanted to be present, was in California?

A. I never had any invitation to be present at any tests. I remember Mr. Harrison wrote me if it would be convenient for me, and I replied that Mr. Kichling was in California and I would like to have him present. That was after my objecting to tests which had been made when I was not present.

Q. Weren't there repeated communications made to you either verbally or in writing, and wasn't the whole summer wasted in waiting for you to come to tests?

A. I do not so consider it, sir.

Q. There was a test on October 22nd and 23rd, 1904, wasn't there?

A. Yes, sir.

Q. And another on October 29th?

A. Yes, sir, at both of which I was present.

Q. And others on November 1st, 2nd and 3rd of that year?

A. I don't know anything at all about them.

Q. Of the pipe line?

A. I wasn't present.

Q. You were notified, weren't you?

A. No, sir, I always came whenever I was notified that you were going to make tests.

Q. Wasn't there a test on June 5, 1905, also?

A. Not that I am aware of, sir; it was made entirely without my knowledge.

Q. Wasn't there a test in October, 1904, of the seventy-two-inch pipe?

A. I have already answered that question.

Q. What did you say?

A. In October, 1904——

Q. Didn't Dr. Leal come to you several times with respect to tests, and didn't you repeatedly put him off, saying that Mr. Kichling wasn't here?

A. No, sir, I don't remember having any conversation with Dr. Leal upon that subject. The only time that I remember any conversation at all was—or anything regarding that, was a letter that I received from Mr. Harrison, and I replied to that, Mr.

Kichling was away and on his return I would take pleasure in going ahead, and last November I went to Mr. Harrison again and told him that Mr. Kichling was here, and we would be very happy indeed to go ahead and make the tests.

Q. You speak of demand about making tests. The city demanded possession of the works, didn't it?

A. Yes, sir.

Q. Didn't say how long they wanted it, did they?

A. Only for the purpose of making tests.

Q. They were refusing to pay for the water at that time, weren't they?

A. Well, I don't know as I am a witness on that question. I think so, sir.

Q. Were claiming they had a right to have the works and pay for neither water nor works, weren't they?

A. That was the only reason for our making the demand, as I understood it, I didn't know whether there was any other material reason or not.

Q. You refer to resolutions passed by the Board of Street and Water Commissioners?

A. Yes, sir.

Q. You don't know anything about their reasons except as expressed in their resolutions?

A. There were no reasons that I was aware of, sir.

Q. You speak of tests—your going to look at some tests in 1904, and you didn't see all that you thought you ought to see. You missed one in the reservoir site, didn't you?

A. Yes, sir, there was one in the reservoir site that we did not have.

Q. What was the name of that, Van Duyne?

A. No, D. L. and W.

Q. I show you a deed from Morris and Essex Railroad and the Delaware and Lackawanna Railroad to the Jersey City Supply Company, dated

September 12, 1905, see if that covers the property you referred to, in the reservoir site?

A. Well, I would have to refer to the map.

Q. You spoke of several places where a railway property was involved and you saw no deed, Erie Railway, Greenwood Lake and Delaware, Lackawanna Railroad, that means the crossing of railroad rights of way, doesn't it?

A. I didn't examine the deeds. They were produced by Mr. Harrison, and Mr. Vredenburgh looked at the deeds and I kept the record of every deed that was produced, and those that were not produced I also had a record of.

Q. But you have testified here explicitly, and gave the exact stations to the hundredth of a foot where the titles were lacking, and have told the owner's name, that means railroad crossings where it refers to Greenwood Lake, Delaware, Lackawanna, etc?

A. I presume so, I don't know, I am not sure. I didn't examine it, I was merely keeping the record.

Q. In this reservoir site, this piece of Morris & Essex land that you intimated we hadn't title to, that was cleared for reservoir purposes at least as early as 1900, wasn't it, right at the dam?

A. It might have been, sir.

Q. And the dam and the water have been there for more than two years, haven't they?

A. The deed was not produced.

Q. But the water was produced.

ADJOURNED, until Thursday, May 17, 1906, at 9.45, in the forenoon, at the Chancery Chambers, Newark, N. J.

GARWOOD FERRIS recalled.

Further Cross Examination. By Mr. CORBIN.

Q. Mr. Ferris, in your direct examination on March first, you said you considered the Boonton dam complete on November 21, 1904, that being the day when it had its maximum test by water passing over the spillway. Now the city had in fact been receiving water from that dam for six months previously, that is, from May 23, 1904, had it not?

A. I understood the water was turned on May 24, 1904.

Q. And the entire supply of Jersey City had come from that source?

A. Yes, sir.

Q. After May 23, 1904?

A. Yes, sir.

Q. That was some thirty to thirty-five millions of gallons of water a day, wasn't it?

A. Approximately, yes, sir.

Q. What remained to be done on the dam when the water was turned on in May, 1904?

A. Why, there was a good deal of construction, what portion of it I cannot recall now, but the dam had to be brought up to the elevation of 310.25, the spillway had to be constructed and other work done in front of the dam.

Q. The coping of the dam had not been completed then, in May?

A. No, sir, it had not.

Q. When did the impounding of water in the dam commence, how long previously to May, 1904? 1904?

A. Well, for a long while, there had been water in the dam, more or less, and that water had been spilled—wasted—of course the level of the water varied in accordance with the rainfall; these two gates were kept open.

Q. What gates?

A. The sluice gates.

Q. In the bottom of the dam?

A. Yes, sir; those gates were kept open in order to prevent the water from rising, and it was not until that letter which I wrote to Mr. Harrison—I think that that fixes the date when the gates were shut down, Mr. Corbin, in order to impound water. That date I don't recall now.

Q. That is the date of which we spoke yesterday on cross examination?

A. Yes, sir.

Q. That was in 1903 some time?

A. Yes, sir.

Q. You say the water at mean tide stood at various heights?

A. Yes, sir.

Q. What is the greatest height to which it had been raised before the time came for turning on the water?

A. I haven't any record of it.

Q. Approximately.

A. I dont' think—I have no record of it here with me; I think that I have at my office.

Q. Well, you can tell us approximately the height of the water at the time it was turned on in May, 1904?

A. Well, I have no data by which I could give you that information to-day. I have it down at my office, however; but it varied.

Q. Now, you spoke in your direct examination of the desirability of a fence around the reservoir. The circumference is some seven miles, as I understand you?

A. Yes, sir.

Q. And the object of that was to keep boys and men out, so that they would not fish there so much; is that it?

A. Would not fish or would not do things objectionable along the reservoir, or contaminate the water in any way. In order, for sanitary reasons,

to preserve the purity of the water as far as possible.

Q. Do you mean that a common barb wire fence such as you described would be at all effective for that purpose?

A. I think it would certainly define very markedly the confines over which there should be no intrusion much better than simply to have a pole with a notice on it. I think that owing to its proximity to the town something of that kind should be done.

Q. Do you know of any storage reservoir in New Jersey that is fenced?

A. I don't know of any that is in such immediate proximity to a closely built up neighborhood, sir.

Q. Well, this one is surrounded by a public highway, is it not?

A. Yes, sir; that is, on one side.

Q. Well, on both sides?

A. Well, the highway is some distance off on the east side.

Q. Even your distributing reservoir in Jersey City, you haven't any fence around that, have you?

A. Distributing reservoir in Jersey City? Why, certainly there is a fence. You cannot get up there unless you pass through a gateway.

Q. Well, the banks themselves constitute the fence, is not that it?

A. There is no access to that reservoir unless you pass through an iron gate, reservoir No. 3, and the other reservoir has a fence around it, reservoir No. 2, a wooden fence.

Q. And No. 3, has none?

A. No, there is a high wall, and you cannot get up on that wall unless you go through a narrow gate; there is no means of access——

Q. Around this Boonton reservoir it is farm land, isn't it, except at Parsippany Dyke?

A. On the far side there—on the easterly side it is farming land, sparsely settled.

Q. Isn't it so, except at Parsippany, where there are about a dozen houses?

A. Well, there is this fine road which you have put in along the west side of the reservoir, and that is admirably located for building purposes, and a number of houses—several houses have been placed along that road, and it undoubtedly will be very closely built up.

Q. Are there not less houses placed on that road than there were houses in the bottom of the reservoir which were removed?

A. Yes, sir; I think that is so.

Q. Some are the houses which were removed out of the bottom of the reservoir, aren't they?

A. I think two of them are.

Q. There are frequent placards all the way around the reservoir warning the people against trespassing upon the property?

A. Yes, sir.

Q. Do you happen to remember what the notice is?

A. Public Water Supply, persons are warned against trespassing, something of that kind.

Q. And signed by the Jersey City Water Supply Company?

A. Yes, sir.

Q. Do you know of any trespassing, as a matter of fact, that occurred in these two or three years, or in consequence——

A. I heard of several; I was not present.

Q. Some people went there to shoot ducks?

A. There has been a good deal of that going on.

Q. The construction of the lake there brought ducks there which did not come before?

A. Yes, sir.

Q. And people have gone gunning for them?

A. Yes, sir.

A. In regard to that there was one occasion that was called to the attention of the inspector—the inspector called the attenion of my men to it,

a most abominable nuisance, created by men who went there and formed a camp or a kind of a camp, and they had cans containing live bait, and the surroundings were filthy. That case was reported.

Q. When did that occur?

A. Over a year ago. That was reported to your man in charge there, and he went over and inspected it and cleaned the thing up and threw the fish bait away.

Q. That was a case of trespass pure and simple, wasn't it?

A. Pure and simple, and I think the fence would have prevented that.

Q. Do you know of any other case of trespass except that?

A. I have heard of several but none as flagrant as that. I have heard of men going down there and washing their dogs in the resrevoir and things of that kind.

Q. Is it not a fact that in all these great storage reservoirs throughout the country there is more or less trespassing inevitable?

Objected to as not within the witness' knowledge.

A. Well, the large storage reservoirs are mainly located in districts where there are very little inhabitants, or very few inhabitants, I should say. I have no doubt that any reservoir that has a reputation for containing good fish or having ducks floating about it, will be trespassed upon if there is no protection.

Q. You heard about a man being drowned in one of Newark's reservoirs, didn't you, and his body lost?

A. I haven't heard of that, no sir.

Q. Didn't you read accounts in newspapers discussing people bathing in the Newark reservoir?

A. No, sir; I haven't seen that.

Q. Isn't the effective way to safeguard a reservoir to have a patrol there?

A. Well, the power of the patrol would be very much increased if you had a fence around the property. I suppose even if you should construct a proper fence of barbed wire, even then persons would go over it, but the minute they would get over it they would be very much in evidence.

Q. You are aware that the Jersey City Water Supply Company has a guard at the reservoir now?

A. I am not aware that there is any patrol there, sir.

Q. Don't you know they have a special police officer there?

A. I have not been informed of it.

Q. Would not you advise that as a proper safeguard?

A. I certainly think that in addition to the fence would be proper.

Q. Are you familiar with the Newark Cedar Grove reservoir lately constructed?

A. I have passed it while it was being constructed, sir.

Q. That is in a park with a park driveway close around it?

A. Well, I saw a road, but when I went through it there was no park there. I went through on a country road, and that is the only time I have been there.

Q. You have seen that sort of construction commonly, haven't you--reservoirs in parks belonging to cities?

A. Yes, sir.

Q. You have seen it at Albany, haven't you?

A. No, sir.

Q. You have seen it at Boston or its vicinity?

A. I can't recall that I have.

Q. Or in Brookline, Massachusetts?

A. I don't think I have ever been to Brookline;

there is a large reservoir in Cental Park, in New York, I know.

Q. You said yesterday that after March 31st, 1902, when the contracts X and Y were made there came in a change of management, Mr. Gardner and others coming in who changed the location of the offices to Paterson, and thereafter the work continued under their direction—is that right?

A. And thereafter—what I stated was that all plans and working drawings proceeded from Paterson, and that all questions came up to Paterson for final decision.

Q. As a matter of fact, had not the work upon the Jersey City water works been practically suspended for more than a year prior to that date with the exception of a little work in the Watchung tunnel?

A. The work, except at Watchung tunnel, had been suspended.

Q. For sixteen months, had it not?

A. Yes, but I believe they always kept up an office location at the dam.

Q. The Flynn management had completely broken down more than a year before, had it not?

A. Yes, sir.

Q. And the city was considering the taking up of the work and completing it itself, was it not?

A. We hardly knew what to do.

Q. And what you did do was to get the East Jersey to come in and make the contracts X and Y, was it not?

A. That is the contract that was made.

Q. And under it the East Jersey did agree to continue its temporary supply for a few years longer, did it not?

A. That was a portion of the contract.

Q. Your right to have a temporary supply was to expire in September of that year, 1902, was it not?

Objected to on the ground that the contract being in writing it is the best evidence.

Objection sustained.

Q. The East Jersey Water Company did in fact continue their temporary supply until the new one was turned on in May, 1904, did it not?

A. Yes, sir; the East Jersey continued to supply Jersey City until the Rockaway was turned on.

A. And they furnished it from the Pequannonk river and from the Passaic at Little Falls, did they not?

A. From the Passaic at Little Falls, as I understood; very little came from the Pequannonk.

Q. You said yesterday that the city had no notice of the turning on of the water in May, 1904, that you learned of it a few days later; the city restrained its turning on for about two weeks, didn't it, by injunction?

A. By what?

Q. By order of the Court of Chancery.

Objected to.

A. I was not present at that application for an injunction.

Q. Yet you made the affidavit on which the application for an injunction was made?

A. I made an affidavit, yes sir.

Q. You were present at the hearing before Vice Chancellor Pitney, were you not?

A. I was not, sir.

Q. But you knew of its result the same day the decision was announced?

A. I did.

Q. And the next day you heard that the water was turned on, did you not?

A. No, sir; I think it was two or three days

after when I was first informed, when I asked Mr. Harrison about it—that was my only way of ascertaining; I think it was two or three days afterwards; I said, "You turned that water right on after the Chancellor's decision, did you not?" and he said, "Yes."

Q. Don't you know that in that hearing before the Vice Chancellor it was proved that the Watchung tunnel, before such order was made, had already been partially filled with water, and that the flow was stopped because of the Vice Chancellor's order?

Objected to as incompetent.

Objection sustained.

Q. Didn't you know, pending that litigation, that water had already been turned into the tunnel before the litigation was commenced?

A. Water had been turned into the pipe system for flushing purposes, but not to supply Jersey City.

Q. Was not water running through the pipes at the time you made your affidavit?

A. Only for flushing purposes, cleansing purposes.

Q. When had it first been turned into the tunnel for flushing purposes?

A. The water was first turned in at the upper end in order to flush out and cleanse the different conduits, and the blow off pipes at different stages were opened so as to take care of that; afterwards some of that water went through from conduit number 3 and passed out to conduit number 4.

Q. When?

A. Oh, for two or three weeks prior to—I should think two or three weeks prior to when the water was turned on; it may have been a month.

Q. You spoke yesterday of a conference on January 27, 1905, in which Kitchling, Whippel, Dr. Leal and yourself were present, and you said that Mr. Harrison was also present. Think again, was Harrison present?

A. According to my memory, I think he was present during a portion of the meeting, but I cannot say definitely.

Q. Where was the meeting held?

A. At an office in the Commercial Trust Building.

Q. In the office of Mr. Record, the corporation counsel?

A. No, sir, Mr. McDermott's office.

Q. With regard to the Watchung tunnel and the conduit continuing the same you knew that they had filled that tunnel and kept it filled a long time to enable you to make a test, didn't you?

A. They may have filled the lower conduit, sir, in order to test it, the lower portion.

Q. It was kept filled for about four months for that purpose, was it not—all the conduits were kept filled for about four months for that purpose, were they not?

A. I do not think so, no, sir. I do not think that any of them were kept filled for a very long period because I asked for a test of them.

Q. What I mean by filled is within about a foot of the top, as full as they were ever to run.

A. As to the depth of water you had in conduit number 4 east of the tunnel during that period I cannot testify to now.

Q. Don't you remember their putting in a stop plant at your request so as to carry the level of the water up higher in the conduit and keeping it there some four months?

A. Subsequent to the turning on of the water they did that.

Q. When was it, approximately?

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A. Last year. In compliance with my request you put in—you filled that conduit and put in stop planks there at my request.

Q. That made the water a depth of 7½ feet?

A. Yes, sir, in order to give me a test of the tightness of the conduits where they were filled.

Q. Now, it was kept at that depth of 7½ feet in the conduit for some four months, wasn't it?

A. Yes, sir, approximately.

Q. Why didn't that afford you every possible opportunity to make any test you desired?

A. There was no flow to the water; that was only to accomplish or to serve one purpose, and that was as to whether the conduit would develop an ultimate weakness, or whether there would be any great leakage while the conduits were full of water.

Q. And you expressed yourself as satisfied with it at the end of the tests?

A. I don't know that I ever expressed myself as satisfied, but I am satisfied that they are.

Q. Well, (interrupting)

By Mr. Vredenburgh:

Let him answer the question—are what?

A. I am satisfied there was no leakage there.

Q. There was during that period from 33 to 35 million gallons per day flowing through the conduit?

A. Yes, sir.

Q. What was there to hinder your taking the velocity of the water in the conduit at the depth of 7½ feet and make any calculation you desire to in order to ascertain its carrying capacity? Why would not 35 millions of gallons a day answer that purpose as well as 50 million gallons a day?

A. Because there was an artificial stop plank, and that would throw out the whole calculation.

Q. You could have put that plank at any height you desired?

A. I had no control over it. What I wanted was a continuous flow with the natural height of the water—the whole thing equably.

Q. What would you do with the water at the east end of the tunnel where you only had a steel pipe that would carry 50 million gallons?

A. My idea is that it is impossible with our facilities for testing— physically with any manner of meters that we have, or usual mode of measurements, a flow of 70 million gallons of water through the portion of the line which is represented by the conduits and tunnels, and in order to determine whether those conduits—whether the concrete conduits and tunnels will have an ultimate capacity of 70 million gallons a day, I felt that it was important to run the maximum quantity of water that that 72 inch pipe will deliver at this end—from Watchung to Jersey City, and while it is delivering an equable quantity of water, that the levels of the different concrete conduits and tunnels should reach an equilibrium, and from that we could determine the ultimate capacity.

Q. That is all a matter of mathematical calculation?

A. All a matter of mathematical calculation.

Q. The gradient of the tunnel, the depth of the water in them and the cross sections have all been considered?

A. Everything has to be taken into consideration, taking the hydraulic gradient head and everything of that kind.

Q. You can do it just as well with a flow of 35 million gallons a day as with a flow of 50 million, cannot you?

A. Well, I prefer the 50 millions because we have had tests for a short period with lower quantities, and the whole thing would have to be worked out.

Q. Now you say that these stop planks which were in would somewhat vitiate the result of the calculations that you made. How would that affect them?

A. There will be a dam there that will prevent the level of the water assuming its proper relation.

Q. But when you come to the east end of the tunnel which has a 70 million gallon capacity and come to a pipe which has but a 50 million gallon capacity there is a dam, anyway, for part of the water, is there not?

A. Well, I want to have that pipe run to its maximum quantity, and then see what the level of the water will be in the conduit, and determine it by that.

Q. But you cannot get it as long as the pipe will carry only 50 million gallons?

A. I can get the 50 million.

Q. But then you prefer 50 million to 30?

A. I prefer 50 million under the circumstances, to 35 million, in order to approximate the capacity of that pipe.

BY THE COURT:

Q. As I understand the matter, if this 50 million gallon pipe at the end acts as a dam, then there might be and would be more than 50 million gallons in the concrete conduit and in the tunnels—if it acts as a dam.

A. The way it acts, Mr. Corbin, is simply this, that when you are supplying Jersey City with 33 million gallons of water, the westerly portion of the 72 inch pipe is not under pressure—there is a certain amount where the water simply runs down hill through it.

FURTHER CROSS:

Q. Well, an amount that will pass through a 72 inch pipe can be accurately regulated by gates,

whether it be 33 million or 35 million gallons?

A. It will have to have the capacity of the pipe in order to be full.

Q. Well, that is regulated by the way you open and close the gates, is it not?

A. Well, if it was throttled down at this end, I suppose you could back it up.

Q. Why is it to-day if only 33 or 35 millions is passing through the pipe—why if it is not carrying its full capacity of 50 millions, what checks it off?

A. The control of the gates.

Q. Where?

A. Up at Boonton, sir.

Q. You can control by any of the gates on the line, cannot you?

A. Where?

Q. Any of the gates on the line, either at Jersey City or anywhere east of the tunnel?

A. Of course you can shut it off and regulate it at any point, but the main point is at Boonton.

Q. Well, if you let in 35 million gallons a day at Boonton, and only that, and then put in your stop planks so as to raise your conduits which are on the hydraulic gradient to their full seven and a half feet level, why haven't you all the conditions you want for a test?

A. Well, I would prefer, without going into the question, I would prefer that the test which I have suggested—and that is in accordance with the wishes of the city.

Q. But you could make the test, with the quantities as I have indicated and the conditions I have indicated, could you not?

A. I think at one time I did think so.

Q. Now, Mr. Ferris, the full carrying capacity of the steel pipe——

By the Court:

Q. Do you think so now?

A. I prefer to have the test made the other way.

FURTHER CROSS:

Q. The steel pipe, you have already said, will carry somewhat more than fifty millions?

A. Yes, sir.

Q. Its full capacity is not accurately ascertained, is it?

A. Well, we have had a number of tests, and they have all been over 50 millions.

Q. Did you by your test intend to estimate that they carried just fifty millions?

A. No, sir; I intended to have that pipe run full.

Q. Then you would first have to ascertain how much it carried, wouldn't you?

A. Yes, sir; and then I would determine the different levels of the water in the different conduits and the difference in the head under which the different conduits were delivering this quantity of water.

Q. Have you any doubt in your own mind that that tunnel would carry 70 million gallons to-day?

A. The Watchung tunnel?

Q. Yes.

A. The disputed reports of the tests which were sent to me, at which I was not present, one of those as I work it out would show that the capacity of that conduit line there was less than 70 millions of gallons a day.

Q. I am asking you another question in that, I am asking you now, with your present information, if you have any doubt that it would carry 70 millions a day?

A. Yes, sir.

Q. Suppose you knew that the increased area of the cross section of the tunnel by reason of the enlargements was two and six-tenths square feet, and it is finished with gravel as you said, have you any

doubt it will carry as much as it would carry as you design it?

A. I haven't my figures with me, but I can tell you this, Mr. Corbin, that figuring up the width of the tunnel between the vertical sides as two inches greater and the depth two inches greater, making the number of the solid contents with this nine feet of rough invert at the base, that it would more than counter-balance the increase in space.

Q. Have you got the figures by which you arrived at that opinion?

A. I think I have them down at my office, but I haven't them here, but I can state the reasons for it, Mr. Corbin. The nine feet is very rough, that water does not travel on a water surface, the water travels on this frictional base, and that creates a great deal more friction. That portion I figured —the friction on that—the co-efficient for roughness for that portion of the conduit, that nine feet, I figured as .02, while the co-efficient for the rest of the wet—which is only about thirteen feet, according to the specifications is .014, and I have worked that all out, and I should not be surprised to see the capacity of that conduit a little bit less than the 70 millions.

Q. How much less do you hink?

A. I think, as my memory has it, about sixty-nine millions, I won't be positive about that.

Q. You say at the bottom of this conduit as finished is rough; have you ever seen it?

A. I have walked through it, sir.

Q. After it was finished?

A. After it was finished I walked through it.

Q. How deep was the water when you walked through it?

A. It was about up to my knees, in a great deal of the distance.

Q. Didn't you observe that a good deal of it on the bottom was on a rock without any gravel at all, smooth rock?

A. I did not so observe, and I had on rubber boots and of course I could feel underneath very distinctly, and instead of being on gravel I thought there was a great deal of dirt and mud in it.

Q. That was before the water was turned on?

A. Just a few days. The conditions did not change, I believe.

Q. Was any water turned on at the time you walked through it or only such water as came from the ground?

A. I think it was only the water that came from the ground; I don't think there was any water coming from above, or if so it was very little.

Q. Have you ever seen it since?

A. Never been in it since.

Q. It was muddy when you walked through it?

A. Very muddy, sir.

Q. You know that it was clear afterwards so that if a penny was dropped in it it could be seen at the bottom?

A. I was out there that day, sir, and saw it.

Q. Did you see it clear?

A. I saw it, yes, sir.

Q. Clear?

A. Yes, sir.

Q. When was that?

A. That was three days afterwards.

Q. So the flow of water through it very quickly cleansed it?

A. The flow of water through was not the flow that would be the Jersey City supply, it was merely the seepage that came into the tunnel, the ground water that came into the tunnel that was flowing out, and that ground water was coming out clear.

Q. This second time when you saw it clear so that a penny could be seen in the bottom, how deep was the water then?

A. Well, I think about a foot and a half.

Q. About how far did you go into the tunnel at that time?

A. I didn't go in at all, sir.

Q. Just at the mouth of it?

A. Yes, sir.

Q. And the gravel was clean and clear?

A. Gravel?

Q. Didn't you go in as far as the gravel was?

A. I didn't go in it at all, sir.

Q. That day when you walked through when the water was muddy, how many were there in the party walking through?

A. Well, quite a number; I don't know; I know Mr. Kichling and I were there, and Mr. Harrison.

Q. Well, it was impossible to see down into the water at that time, was it?

A. It was very dirty. It was explained to me that they had dirt dams in there, and they had taken down those dirt dams and that was the occasion of the water being muddy.

Q. So far as the condition of the bottom is concerned, you can only tell it by the feeling under your rubber boots?

A. That is all, sir; I couldn't see it at all.

Q. You say according to one set of figures made, and on certain data returned to you, you think the capacity would be about 69 millions of gallons per day, that is with the water flow to the theoretical crown?

A. Yes, sir, seven and a half feet depth.

Q. One foot below the crown of the arch?

A. Yes, sir.

Q. One foot below the theoretical crown of the arch?

A. Yes, sir.

Q. Did you figure to see what it would be one foot below the actual crown of the arch as it is?

A. No, sir; I took it as I was informed it was constructed there might have been variations in the arch that I did not take into account.

Q. You took the theoretical crown of the arch as the height, didn't you?

A. Yes, sir.

Q. Are you not aware that the real crown of the arch is two inches higher?

A. Never was informed so. Above the side walls?

Q. Higher than the theoretical crown?

A. I hardly understand you. I understand that the greatest distance from the crown of the arch to the bottom was that shown on that blue print of the dam as constructed—of the conduit as constructed.

Q. Do you not know, Mr. Ferris, that the engineers of the Water company constructed and caused the arch to be built—the actual crown of the arch to be built about two inches higher than the theoretical crown?

A. The only change that was made, that I knew of, during construction was that the side walls should be two inches further apart, but I supposed that the crown of the arch was turned as shown on their plan approximately, with any little variations that there might be.

Q. Don't you know that the Water Company in giving out their specifications to subcontractors required that actual arch to be about two inches higher than the theoretical arch?

Mr. Vredenburgh: I object to that.

Q. Don't you know that the sub-contractor built the tunnel with the actual crown of the arch two inches higher than your theoretical crown?

A. I was not aware of it, sir; if I was aware of it I have forgotten it.

Q. Didn't you approve the specifications for the sub-contractor under which it was made?

A. Approve them, no, sir.

Q. Did you disapprove them?

A. I did not disapprove them, no, sir.

Q. They were submitted to you, were they not?

A. I do not think the sub-contract for this tunnel was submitted to me, no, sir.

Q. Did you ever give approval to any single item of work from beginning to end?

A. No, sir.

Q. You always declined to do so, didn't you?

A. I declined to do so, yes, sir.

Q. For the work running through four years?

A. Yes, sir.

Q. When the stone was submitted to you, you declined to approve or disapprove?

A. I do not remember what stone it was.

Q. Stone for the big dam.

A. I do not think it was ever submitted to me to approve or disapprove.

Q. You did not approve or disapprove of the cement, did you?

A. My functions——

Q. Just answer that, did you approve or disapprove of the cement?

A. I did not disapprove of it, sir.

Q. You did not approve of it, either, did you?

A. I did not sign any written acceptance of it, no, sir.

Q. Did you ever once express yourself as satisfied with any item of the work?

A. I felt my duty was limited to express dissatisfaction with any working plans that were filed with me, and if I did not express that dissatisfaction I tacitly, though not for the city in the end, because the right to test its use was reserved by the city, I tacitly approved it if I did not disapprove it.

Q. And you reserved the right to order anything taken out that was not satisfactory at any time?

A. Yes, sir, because of the final test at the end.

Q. You saw that dam being built for three years and you never gave approval of a single piece in it until it was done, did you?

A. I never was asked; I certainly volunteered expressions at different times of my pleasure with it, but I never gave my—(interrupted)

Q. And detailed plans were filed from week to week with you from beginning to end, were they not?

A. Yes, sir.

Q. And you never as much as approved one thing?

A. I always filed them so that the contractor could proceed, unless I rejected them or wished them changed, in either of which events I was perfectly frank to come to the company about it.

THE COURT: Did the contract require the inspector to approve or disapprove?

MR. CORBIN: The contract required everything to be submitted to him.

THE COURT: If the contract did not require him affirmatively to approve then he was merely doing his duty.

(Further discussion occurred between Court and counsel on this subject.)

Q. Did you ever approve the steel that went into the conduits?

A. We had all the steel inspected by technical experts and all that did not come up to the standard was rejected by him and those that passed that standard were used in the manufacture of steel pipe; certainly you had an endorsement there.

Q. How did you endorse it?

A. I did not do it, but necessarily my inspector endorsed it.

Q. All you did was to reject things, was it not?

A. All I did was to inspect narrowly—well, I won't say all I did—but I felt it my duty as the

engineer of the city to live up to the specifications of that contract; if I saw any faulty work, Mr. Corbin, I called the attention—if my inspectors saw any faulty work they called the attention—of the men in charge to it; if there was anything going on that was wrong I called attention to it, but you had to assume from the specification that when I did not object I tacitly approved; but there was still reserved to the city the test in use, and if at the final test anything was found to be defective, why, you were bound to replace it. Now, I could not come in and accept it prior to that test; if you expected me to do that you expected me to do something outside of my duty under the specifications and the contract.

Q. You took the position of reserving to yourself the right to reject any piece of work after completion?

A. If it proved to be defective.

THE COURT: That is a matter of contract; we are now considering the contract liability and if the contract gave that right he had the right to exercise it.

Q. Did you call attention to everything you thought was not right?

A. Yes, sir, always.

Q. You continued to do so until the end, did you?

A. Always.

Q. Then what went in that you did not criticise is right, is it?

A. I infer that it was right; of course it was a pretty large piece of work, and I could not be all over it; I was around a good part of the time.

Q. Did you make up this specification entitled "Conduit Capacity," appended to the contract, or did you approve it after it was made up (handing witness paper)?

A. That specification was prepared—worded—by myself and Mr. Vermule, and the main idea of it was my own idea, represented my views.

MR. VREDENBURGH: I suppose we are bound by what your Honor thinks that contract means, not what this witness thinks it means.

THE COURT: Undoubtedly.

Q. You said that one of the set of data submitted to you, you figured out, in view of the rough bottom of the tunnel to show a capacity of a little less than seventy million; what did the other set of data figure out?

A. There were tests made in October which unfortunately were defective, as regards conduit number 4.

Q. October of what year?

A. 1904—was it not? When I discovered or when I noticed that a—I did not receive those tests, the calculations until some time next year, and when I saw them of course I called the attention of Mr. Harrison to the very important missing element as regards conduit number 4; thereafter, a month or two after, a test was made by your company and finally—without my knowledge—and the digest of those two tests was sent to me and I stated, in order to make myself clear, that from one of those tests, there were two tests made—from one of those tests I could only argue that the capacity of that conduit was a little bit less than 70 million—that is irrespective of roughness of surface or anything of the kind.

Q. That is assuming it has a smooth bottom?

A. I took the thing just exactly as it was, without anything else, the test which was furnished me by your company.

Q. Then that would indicate that your original

formula was not correct, to carry 70 million, would it not?

A. It would indicate that there was something wrong in the construction, because, I think—from the prior tests that were made, I should infer that the other conduits were capable of delivering 70 millions of gallons. Now, what we want, Mr. Corbin——

Q. You have answered my question; you need not tell me what you want. Did not some of these data show carrying capacity of over 70 millions?

MR. VREDENBURGH: What data?

MR. CORBIN: These data submitted to him.

MR. VREDENBURGH: He said there were only two.

A. I think that some of them would indicate the ultimate capacity of some of the sections was greater than 70 million.

Q. Did not one set of data of the Watchung tunnel indicate a carrying capacity of over 70 million.

A. In which series of tests?

Q. Those submitted to you; you know, I don't.

A. I had no data at all; the only data I had from your company with regard to Watchung tunnel was the supplementary tests which were made when I was not present, and were made without my knowledge, and to those two tests I refer.

Q. They were data of two separate tests were they not?

A. Yes, sir.

Q. And one of them, you say, figured up a little less than 70 million?

A. Yes, one was very close to 70 million, and the other was a little bit less than seventy million, the way I would figure it.

Q. The one that was very close, was it a little over—you say one of them was very close to it.

A. I think it was just a little bit over, the way I would figure it; my figuring might be erroneous, I can't tell.

Q. How close to 70 million was the one that went a little over?

A. It was very close to it, just a little bit over, hardly enough to make any very strong claim about it, and I merely mentioned it.

Q. In a meter for measuring water like the Venture meter, or other approved meters, there is possibility of error of 2 per cent, is there not?

A. Well, I should think that one or two per cent would be an extreme variation; they are about as close as Weirs, and *they* will vary.

Q. In other words it is not possible to measure large quantities with absolute accuracy, is it—flowing water?

A. Not with mathematical accuracy; not by any means that we have yet discovered.

Q. This section No. 4, which you were speaking of, includes not only the 7400 feet of the Watchung tunnel, but also some 2000 feet of the conduit in connection with it—does it not?

A. Yes, sir.

Q. The whole thing was tested together?

A. Yes, sir.

Q. After you have made a test of pipe at different quantities and different heads so as to determine the value and co-efficiency of friction, cannot an engineer determine just what a pipe will carry under any head or quantity by applying well known formula?

A. Some pipes?

Q. Yes.

A. Yes, sir.

Q. Then is section No. 4—(interrupted).

A. Flowing under pressure.

Q. Yes; then in testing No. 4 any given, known quantity flowing through would suffice as a basis for testing, would it not?

A. Well, I think that more than one quantity should be taken into consideration, but you see in the test we are talking about which the city desires, is a test of the whole line under a capacity of 50,000,000 gallons. You see these different conduits are not laid on the same level; they are laid upon the same hydraulic plane, but at different elevations. It is a complicated system.

Q. That requires a separate test for each, does it not?

A. No, sir, I wish a test of the whole. I want a continuous test through the whole.

(At this point the Court and counsel discussed the question of tests as provided for in the contract, and at the conclusion of the discussion Mr. Corbin said Mr. Vredenburgh has charged us with scrimping the work. He says we have cut everything down, conduits, pipes and tunnels to the lowest point. I desire that he shall make a statement of what he proposes to prove in that regard so that we may be prepared to meet it.

MR. VREDENBURGH: I will state some of them now if the Court asks me to.

THE COURT: It is not worth while for you to do that now.

MR. CORBIN: Well, have I got to meet such statements without his putting in his pleadings? He says the work is not complete up to full measure, and I would like to know what is omitted.

THE COURT: You may go on with your cross examination of this witness.

Q. Mr. Ferris, if you should know that the dimensions of the area of that Watchung tunnel are increased two and six-tenths square feet or over

four per cent, and that the hydraulic gradient has been increased two per cent, would you still think that that tunnel won't carry as much as originally designed, because of the roughness of the pebbles?

A. I think that the area that he spoke of is very close to what I figured it.

Q. That don't answer the question.

A. I think that it would be possibly just a little bit less than the seventy millions, but that is a question for test. I can only give you my deductions.

Q. Why didn't you test it when the water was kept up to seven and a half feet depth for four months?

A. I had no intimation that there was any readiness to co-operate with me in any test.

Q. And yet those planks were in by your direction?

A. No, sir.

Q. By your suggestion?

A. No, sir.

Q. Didn't you say so just about an hour ago?

A. No, sir.

Q. Who did suggest it?

A. That was put in against my suggestion.

Q. Didn't you want the planks in?

A. No, sir.

Q. Didn't want the water raised to seven and a half feet?

A. Wanted the water raised seven and a half feet, but without the intervention of those planks he would have to give us additional head here in Jersey City.

Q. Yet you said they were put in for the purpose of testing the thickness of the tunnel?

A. Mr. Smith, I believe, directed that they should be put in, but not by my direction.

Q. Did you ever go near the tunnel during those four months to observe the conditions?

A. I couldn't get in if I did.

Q. Well, did you go near it?

A. During those three months I was over the whole line repeatedly, watching to see if there were any leaks. I wasn't in the tunnel, and I wasn't in any of the gate houses—oh, yes, I was in several of the gate houses.

Q. You made no examination of the condition of the tunnel during those four months?

A. I couldn't get in.

Q. You didn't ask to, did you?

A. I couldn't get in if I had, unless I could swim.

Q. What is the object of raising the water in it if it did not give you any information?

A. It did give me information.

Q. What information did it give you?

A. It gave me information as to the tightness of these different conduits, and whether there was any danger of troublesome leakage with the conduits running full. During the first part of that test there were no stop planks in the east end of the Watchung conduit, and the water assumed a pressure, under those conditions of 226.7 feet elevation in Jersey City, and the planks were put in in order to decrease that pressure, and it was cut down to 216. That was the only object of putting in those planks, it wasn't put in at my request. Planks had to be put in there in order to hold up the water.

Q. Now this roughness in the bottom, is it favorable or unfavorable to the collection of deposits—this roughness by reason of the gravel?

A. I think it is an inducement to the collection of deposits.

Q. Isn't it just the contrary?

A. I have already stated that I have thought it was an inducement, so it could not be to the contrary.

Q. You find deposits on smooth cement pipes, don't you?

A. Well, there were very little deposits on cement pipes that I have noticed, where there was a

velocity compared with the velocity here. Probably there might be some.

Q. You say this conduit is about two inches larger than designed. Did that not add something to its cost?

A. It would add something to the cost of the arch and also something to the cost of the invert.

Q. And if it is two inches higher than designed, it would add something to the cost of the sides, wouldn't it?

A. Well, I am not aware that it was two inches higher, excepting that it was two inches deeper. That the arch itself was two inches higher I am not aware of.

Q. Have you made any calculation of the additional cost by reason of greater size?

A. No, sir, I haven't.

Q. In one of your exhibits sketch, which you produced March 1st, of tunnel, you said the hydraulic grade line was shown, won't you point it out on your exhibit, we cannot find it?

A. What was the exhibit marked?

Q. The cross section of the tunnel that you had there? Here is Exhibit C 52 substitute. Now I want C52 also.

A. There is the original.

Q. Is there any hydraulic grade line shown on those?

A. Hydraulic grade line, of course not, sir.

Q. Now, as to the drain which was built at Boonton on the plane of the Morris Canal, have you any criticism to make of that?

A. It was not put in as I expected, sir.

Q. Well, most of the flow of the Brook street brook goes into it, doesn't it?

A. Yes, sir, except in time of floods, then it overflows and goes into the upper level.

Q. Have you ever seen it overflow?

A. I have not, sir.

Q. If you were satisfied that the water shed of

the Brook street brook was 200 acres, and that the carrying capacity of that pipe is 50 million gallons, would not you say that is enough for a flood?

A. Well, the way that it operates—I have seen evidence that it does overflow. Where it empties it debouches from this brook into this drain, and I have seen evidence that there has been overflow, and parties have told me that they have seen it overflow.

Q. Now, will you answer my question, please. Read it to him.

(The stenographer read the question.)

A. I should think it was.

Q. If there was any overflow, it was probably due to some temporary stoppage, wasn't it?

A. Well, while the pipe would carry out, the construction of the receptacle of that build as it came in might overflow that place—the place that was constructed for that purpose.

Q. What is the arrangement for the reception of the flood?

A. There is a basin there and the flood comes into it from the side; then the drain runs down the plane on that basin.

Q. That plane is quite steep?

A. The plane itself is quite steep, and undoubtedly the pipe would carry all the water that would come through, or the drain would carry all the water that came through the brook.

Q. You saw that while it was under construction, didn't you?

A. Yes, sir, I have no fault to find with the method of construction.

Q. And it was located where you requested it to be located, was not it?

A. Partially so.

Q. What part, if any, was not?

A. I understood that it was to have been con-

tinued all the way to the bridge up by the Cooper-Lord dam.

Q. Do you mean to take in some other drainage area beside the brook?

A. Yes, sir, beyond the brook.

Q. But the part that was built was built according to your expectation?

A. The part that was built I have no fault to find with the construction of.

Q. You spoke of the results of some experiments made in June, 1905, of tests of conduit, I think, but you were not present when the tests were actually made. If those tests were conducted and made from beginning to end in precisely the same manner and under similar conditions and by the same men who made the tests in 1904 would you not feel confidence in the result of them?

A. I have every confidence in the integrity and the capability of the men who did the work, as far as I know; I do not know who they were, but I have every confidence in the men that I know were connected with the prior tests in October, every confidence in the world, but as the representative of the city I felt that I ought to be present.

Q. You were aware that when the tests of 1905 were made the conduits were running full, were you not?

A. I don't know anything at all—I cannot tell now what the conditions were at that time.

Q. Why didn't you attend those tests?

A. Because I was not invited and knew nothing about them.

Q. Do you say that seriously?

A. I say it emphatically, I was never invited and felt unpleasantly about it.

Q. You got there, arrived on the ground late, while the tests were being made?

A. No, sir, I knew nothing about them, and I thought it was hardly the proper thing, after I had called attention to it and desired those tests to be

made, that I should not be invited.

Q. During the tests of 1904 you made a number of observations and readings yourself, did you not, with your own eyes?

A. Oh, I fully co-operated in that, sir, and I was intensely disappointed that the tests was not complete.

Q. But the number of observations you personally made was very small compared with the whole, was it not?

A. I had representatives, sir, at the reservoir in Jersey City all the time that Mr. Kerchline and I were along on the line and noticing how the observations were being made, and we were satisfied they were properly made.

Q. At what point did observations have to be made, to make that test of 1904, besides at Jersey City?

A. At a great many points.

Q. Name them?

A. At each end of the different conduits and at intermediate points, and also on the pipe line this side of Brookdale, I think that was included.

Q. You did not have anybody on behalf of the city whom you could have trusted to make those observations except Mr. Kerchline and yourself, with you?

A. I did not have with me.

Q. Why didn't you have a sufficient number of competent observers of your own present on behalf of the city, why did you leave it to the observers of the water company.

A. I had every confidence in the gentlemen who were making that test, every confidence in the observers, and when I took an active part in the matter as I did and put the necessary men to get the pressure and delivery at this end I thought I had complied, under all the circumstances, with all that was required.

Q. Didn't you purposely throw that on the

water company so that the city would not be committed to anything?

A. I did not, no, sir.

Q. Has not that been your policy throughout?

A. No, sir.

Q. To shift the responsibility on the water company for everything?

A. I have tried to be very frank and very fair with the water company right straight through, and I do not think any one ought to know it better than yourself.

Re-Direct Examination.

By Mr. Vredenburgh:

Q. You spoke in your cross-examination about the 76-inch pipe not being in the contract or specifications?

A. I do not remember that I was asked about the 76-inch pipe; as I understood it I was only asked about the 72-inch pipe.

Q. The answer which you made was: "Its size was not specified in the contract and specifications, except by formula; did you mean to say by that that the 76-inch pipe was not required by the contract?

A. Oh, no, sir, the 76-inch pipe is specifically tendered in the original bid. As I understood the question was as to the 72-inch pipe, and there is nothing in regard to the 72-inch pipe—(interrupted).

Q. With regard to the water coming into the Watchung tunnel, I understood you to say there were about two million gallons of water which came into that tunnel at the present time, am I correct about that?

A. I never have had the opportunity of measuring it, but from all the information I could gather

it was about two millions of gallons of water a day.

Q. And that comes from the outside of the tunnel and goes into the tunnel or conduit?

A. Yes, sir.

Q. Is the meter which measures the water and by which the city pays for it below that point or above it?

A. The meter is near the reservoirs in Jersey City.

Q. Is it below that point or above it?

A. Towards Jersey City, of course.

Q. Below it?

A. Below it.

Q. Therefore the city is paying the Jersey City Water Supply Company for that two million gallons, bills are rendered by them for that two million gallons of water or whatever it is?

A. Of course.

Q. Is there anything in the contract or specification that you can refer to which permits them to put any water into that tunnel?

A. No, sir, there is nothing in the contract or specifications regarding it.

Q. That water could have been taken care of by a drain, could it not?

A. Yes, sir.

Q. Have you traced from what sources that would come?

A. It is impossible to follow that five or six hundred feet above it; it comes in through the rock.

Q. How does it enter the conduit?

A. It comes in through fissures in the rock.

Q. How does it enter the conduit, how does it get in?

A. At the sides and bottom.

Q. How through the sides?

A. Through the tunnel excavation.

Q. You say water comes into the tunnel through

the sides. How does it get through the sides into the tunnel?

A. Pipes at different locations were put in the masonry through which a good deal of the water comes, and some also comes in through the floor.

Q. Is there anything in the specifications which permits the placing of such pipes in the tunnels?

A. Nothing either pro or con in the specifications regarding it.

Q. Does it enter all at one place or are there several pipes along that tunnel by which water from the outside is introduced into the tunnel?

A. There are a number of locations where the water comes into the tunnel.

Q. Now, I would like to ask you about the analysis of water which Mr. Corbin spoke about. Who informed you that they had made any analysis of this water?

A. I learned that, my impression is, from Mr. Harrison.

Q. Oh, Mr. Harrison told you. Do you know where Mr. Harrison took any water from to have analyzed?

A. I don't know, sir, I don't know anything about it. But the water itself is (Interrupted).

Q. Well, for what purpose are the pipes through which the water comes from the outside of the tunnel and goes inside in the tunnel?

A. In order to prevent pressure on the masonry.

Q. Could that be accomplished by building a drain for that purpose?

A. No, sir.

Q. It cannot?

A. No, sir, the water would have to come in at first during the construction.

Q. Would there be any trouble in putting this water into a sub-drain by pipes behind the wall instead of through the wall?

A. Well, it would be a little bit more elaborate.

Q. It would be only a question of expense, would it not?

A. I don't think it would be any more desirable.

Q. Suppose the water had been polluted, what then?

A. If the water had been at all bad, of course I should have objected to it, and insisted upon having every one of those pipes blocked up with cement, after the masonry had set I should have insisted upon some sort of construction there to insure that polluted water could not get in. I certainly would have done so, but the water was good to all appearances, and I believed it to be good.

Q. The plugging up, as I understand you, is the stopping of the water from entering through these pipes into the tunnel?

A. Into the tunnel proper—the water-way.

Q. Then the pressure that you spoke of on the masonry, is that only during the building of the wall?

A. During the early construction of the wall, yes, sir, before the masonry has set properly.

Q. If it has set, the pressure of this water would be of no importance?

A. No, not if properly constructed, and there were bulkheads also put in in order to carry this water.

Q. Why was it that the tunnel conduit was built wider than the contract and specifications required?

A. To provide for any possible contraction of area by settlement while the materials were green so that there would be no constriction of area.

Q. Why was it constructed deeper, the bottom lower?

A. I presume that the theory——

The Court: You have gone all over that very thoroughly, I think.

Mr. Vredenburgh: Very well, I won't insist, if it is in, I had forgotten that it was in.

Q. Now, just one question as to the fence around the reservoir. You spoke of the people, but I didn't hear you say anything about cattle, is there any danger to the reservoir from cattle?

A. Of course there is nothing there to prevent cattle from going along and going into the reservoir.

Q. Now this Exhibit C 64 shows the Parsippany dyke and the Parsippany Turnpike; now is there any fence between the Parsippany dyke and the Turnpike there?

A. There are remnants of a fence in places, but there are openings that you can get in.

Q. Is there anything to prevent cattle from wandering from the Turnpike up on the dyke?

A. Not a thing.

Q. Or dam?

A. Not a thing.

Q. You spoke of the houses being built along or near this reservoir?

A. Along the new road constructed by the company.

Q. Do you know whether those houses are built on land owned by the company?

A. I have no means of knowing that, sir, but I think that they are.

Q. Do you know whether they advertised the sale of the property there in lots?

A. I know that they have advertised the sale, because I have seen the signs out on the furthest side of the road—the westerly side of the road.

Q. From those houses——

A. They have advertised none that I am aware of on the east side of the road.

Q. From those houses what is the descent of the land, is it towards the reservoir or away from it?

A. Of course it is on the hill and the reservoir

is on the low ground, which ground descends towards the reservoir.

Q. How much higher are they than the reservoir?

A. Well, some thirty, forty or fifty feet.

Q. What distance are they from the reservoir?

A. Quite a long distance, perhaps twelve hundred—fifteen hundred feet or more.

Q. Mr. Ferris, you were asked by Mr. Corbin if the drain at Boonton was built according to your understanding, and yesterday you testified about an intercepting sewer at Boonton. Now, is this in accordance with your understanding of the intercepting sewer at Boonton?

Mr. Corbin: Is what?

Mr. Vredenburgh: This drain.

A. No, sir, not what I would—that is a very difficult question for me to answer, because it brings up what I would regard as a proper intercepting sewer there.

Q. Well, he asked your understanding, I want you to tell us your understanding now?

Mr. Edwards: I object.

A. I didn't understand Mr. Corbin's question that way, I would like to have that question read.

The Court: I understand Mr. Corbin's question to be limited to the drainage of two hundred acres that he spoke of in his hypothetical question. The only question Mr. Corbin asked was whether this was not a proper drain to carry off the water which fell upon an assumed area of two hundred acres. Now that was a very different question from the question whether this water supply should be protected from the whole of Boonton by an intercepting

sewer. I didn't understand that it had any relation to that.

Mr. Vredenburgh: But he put it in such a way and I took it down on my notes immediately, because the "understanding" struck me at the time.

The Court: Well, you can examine as to that.

Q. (Question read.)

A. There are two very different questions—two very different constructions. A drain constructed and an intercepting sewer is two different things.

Q. That don't answer the question?

A. It is not what I considered, what I have always considered in my mind, I never have had any drawings of it, but it is not what I have considered as an intercepting sewer, of course it does intercept back off of Brook street.

Recross Examination.

Q. The plan of this Brook street drain was submitted to you before it was built, wasn't it?

A. The actual plan of construction?

Q. Yes.

A. I think it was, yes, sir.

Q. And that drain does intercept the sewage from that district known as the Brook street brook district?

A. Yes, sir.

Q. And no other plan was submitted to you, was there, for anything more in Boonton?

A. No other plan was submitted to me.

Q. Now Mr. Ferris, there is no sewage system in that part of Boonton, is there?

A. There is not what we would call a sewage system.

Q. No public sewer?

A. Not that I am aware of.

Q. An intercepting sewer would be a sewer that intercepted other sewers, wouldn't it, intercepted and took the flow of other sewers?

A. Well, as to that question I was ready to tackle it, but it never has come up before me in any definite form or shape.

Q. Now, what you suggested a few minutes ago was that this Brook street drain should have been continued further up, is that it?

A. No, not the Brook street drain, I mean this drain that runs along the plane, according to my original understanding with Dr. Leal, was that that should be ditched and thoroughly protected all the way up.

Q. How far up did you think it ought to be extended further than it was extended?

A. Certainly beyond those pipes that bring in drainage from the streets. I thought that the whole thing was to be properly taken care of all the way up.

Q. What you had in mind was the street washers or gutters?

A. Street washers, yes, sir.

Q. Now one other question as to pipes in the wall of conduits, did not you and Mr. Kuichling expressly devise that such pipes be put in to conduit No. 4 when that was under construction?

Objected to.

Q. Didn't you and Mr. Kuichling expressly advise the pipes to be put through the wall of conduit No. 1 about the time its construction was complete, and were they not put in under that suggestion and by your instructions?

A. I believe that they were, yes, sir.

Q. Conduit No. 1 is the one nearest to the reservoir?

A. Yes, sir.

Q. And beginning at the reservoir, is it not?
A. Yes, sir.
Q. That is all.

Re-Direct.

Q. They asked you about your understanding of the intercepting sewer, and we haven't heard you say yet what your understanding of the intercepting sewer was?
A. My understanding (Interrupted).

By Mr. Corbin: I object to that. All I asked was in regard to the Brook street drain, and I did use the expression whether it hadn't been built according to his understanding, but what I meant was according to the general scale of it.

By the Court. You can put your statement on the record, and that may obviate asking any further questions about it.

By Mr. Vredenburgh: My understanding was that Mr. Corbin asked him in regard to whether there had been any intercepting sewer built—whether it wasn't an intercepting sewer, and whether his plan wasn't to extend it up above, and in that way he has got it confused worse than it was before. Now the witness was speaking about an open drain and an intercepting sewer at the same time, and he has got it mixed up, and I want to have it cleared up, if your Honor please.

By the Court. You want to know whether when he spoke of an open drain he was considering that in the light of an intercepting sewer?

By Mr. Vredenburgh: Yes, sir.

Q. When you were speaking of a drain and of its intercepting the Brook street brook and continu-

ing further up, had you any reference to the intercepting sewer that you spoke about yesterday?

A. No, sir, nothing in connection with it.

Q. That is all.

EMIL KUICHLING recalled by Complainants.

Further Direct Examination by Mr. Vredenburgh.

By Mr. Vredenburgh: I asked the former witness in regard to the house in the water shed, and it might be well for me to say now what I shall insist upon with respect to that. I am going to read from the contract X, page 77, the 6th clause of that contract.

By Mr. Corbin: That is not contract X.

By Mr. Vredenburgh. Now, this is the contract of 1901. Your Honor will see, that it is agreed, in consideration, &c., that said contractors shall convey to Jersey City, upon the purchase of the plant, and supply to Jersey City without additional compensation, all their rights in the waters of the Rockaway river water shed, and my insistment is that they should relieve us from any danger of any pollution over any of the land that they bought in; that they should make provision to prevent any danger arising to us from water pollution on the property that they have purchased and are about to sell to other people.

By Mr. Corbin: What property?

By Mr. Vredenburgh: All the property owned by you in the Rockaway region.

By Mr. Corbin: They have sold no property, nor do they contemplate selling any.

By the Court: There is no proof yet that they have.

By Mr. Vredenburgh: My purpose of saying it now is to inform the Court of what I shall claim, as well as to inform the other side. It is for their information.

Q. Now, Mr. Kuichling, you were sworn before, I think?

A. Yes, sir.

Q. And you testified with respect to the core wall in the dam or in the dyke?

A. Yes, sir.

Q. When were you employed by Jersey City?

A. I was first employed by Jersey City about October, 1902.

Q. For what were you employed?

A. To investigate the stability of the Boonton dam—masonry dam—that was the first employment.

Q. Did you examine it at that time under that employment?

A. I did so far as had been planned and built.

Q. Were you subsequently employed by Jersey City in any other capacity to do anything else.

A. Subsequently there came up the question of the Parsippany dyke and the core wall therein, and I was asked to examine the location of the core wall relatively to the earthen embankment adjacent to it on each side thereof as proposed by the water company.

Q. When were you employed to investigate the water supply generally?

A. The following year, I think, 1903, the question of the water supply in general came to my notice.

Q. Now, from the time you were employed up to the present time what part of your time have you given to the investigation of this work for Jersey City?

A. I think I have given more than one-half of my whole time to this subject and its study.

Q. Have you visited the water shed often?

A. Yes, sir.

Q. Made yourself familiar with all the questions you thought were important to Jersey City?

A. Yes, sir.

Q. What was the question about the core wall?

A. Its location in the earthen embankment that was proposed at Parsippany.

Q. If the core wall had been located as it was when you first saw it, when you first saw the plan, could the capacity of the reservoir have been increased from fifty million to seventy million by building up that core wall.

Objected to as not pertinent to the issues.

Objection sustained.

Q. Have you computed the stability of the present masonry dam at Boonton, dam No. 1, the lower dam?

A. Yes, sir.

Q. If that dam were raised 19 feet and 2 inches by adding masonry of that height on the top of the present dam, and the flow line of the reservoir were also raised 19 feet 2 inches, would the masonry structure be safe according to the usual methods of computation.

Objected to as not pertinent to the issues.

The Court: I will permit that question.

A. No, it would not be safe.

Q. In order to make this dam safe by carrying up masonry on the present top of the dam to what height would such masonry have to be carried in order to raise the present flow line 19 feet 2 inches?

Mr. Corbin: The same objection.

A. It would have to be carried at the middle, where the height of the masonry is now greatest, to an elevation one hundred and nine feet higher than the present top, 37 feet at the end of the dam where the present height of the wall is least in order that it shall be safe, according to the usual methods of computation.

Q. How much masonry would this involve and what would it cost?

Objected to as not pertinent to the issues.

The Court: Suppose I should come to the conclusion that the dam was not built in accordance with the contract and specifications, and that it had not been so built in the particulars now mentioned, then I suppose it would be necessary to ascertain what the additional cost of construction would be and that would be a question for a master after I had settled the principle. It seems to me that is a matter of detail, and I do not think it is necessary to go into it now. I think that question should be reserved.

Mr. Vredenburgh: I do not desire to show the cost so much as to show it is impracticable.

The Court: I do not think it is worth while to go into that.

Q. Would it be practicable, both because of the cost and from the fact of its height, in connection with the wind, to raise that dam that number of feet?

Objected to as not pertinent evidence.

The Court: You can put it in that general form.

A. I should not regard it as a practicable thing in the ordinary sense of the term; it would certainly be inexpedient.

Q. If the masonry dam had been proportioned to the higher flow line, and stopped at the present height, how much additional masonry would it require to raise the flow line 19 feet and 2 tenths.

Objected to as last stated.

Objection overruled.

A. It would have been about 26,900 cubic yards.

Q. To what height?

A. That would have been for a height of 19 feet and 2 tenths, and a length of 2,150 feet, the latter being the length of the dam, that in the masonry portion of it, as I understand it.

Q. Can the same result be accomplished now at anything like the same cost?

Objected to as last stated.

The Court: I will let that question be answered.

A. It cannot.

Q. Are you prepared, if the Court permits, to give the cost of the elevation to the height that you have spoken of, if raised at the present time, and also the cost of raising that same brick work if the masonry dam had been proportioned to the higher flow line and stopped at the present height.

Objected to.

The Court: As I said before, that is a matter to be considered possibly before a master, and the question would then be how much should be taken from the contract price to provide for the raising of this dam the proper way.

You can show generally now that the cost of construction now would be much greater than it would have been in the beginning.

Q. (Question read.)

A. Yes.

The Court: The Court thinks that it is not necessary to pursue this subject any further at the present time, that enough evidence has been given to raise the question which the city desires to present, and that the details of the cost on either side are to be given hereafter if it becomes necessary to do it.

Q. Could this masonry dam, as built, be given the required stability to hold this additional amount of water—the water at this additional flow line pipe, by adding to the present dam the same thickness or amount of material now that would have been required if the dam originally was of the thickness proportionate to the high flow line?

Mr. Corbin: Objected to as not pertinent evidence and not competent.

(Admitted.)

A. They would require a larger quantity of masonry to accomplish the same result.

By the Court:

Q. You mean it would now require?

A. Yes, sir. I may add to it—I will say, to thicken the dam as built to an equivalent strength that it would have to be, if built originally to the greater additional thickness, would require more masonry, and it might posibly be done with a little more than the same masonry, but at very much larger additional cost, because the union between the old and the new masonry must be made in an

expensive manner, therefore there would be a question of the value of the additional work as compared with additional masonry.

Q. I think this brings me within the permission that your Honor allowed me, and I will pass on to some other subject. Now, turning to the invert in the tunnel, known as conduit No. 4, Watchung, will you please tell us what it would cost to make that invert of Rosendale cement and facing it with Portland cement, as mentioned in the contract?

A. It would have cost about $2.50 per lineal foot exclusive of the cost of caring for the water during construction.

Q. Now, are you familiar with the building of tunnel conduits for water?

A. Yes, sir.

Q. Will you tell us what is the usual method of taking care of the water that is found in these tunnels?

A. If the water is of bad quality, unfit for use, for domestic purposes or manufacturing purposes, this water which filters into a tunnel excavation is removed by sub-drainage.

Q. Is there any difficulty about doing that in this Watchung tunnel conduit No. 4?

A. There would have been no particular difficulty during construction.

Q. Did you consult with Mr. Ferris with respect to the amount of water that this conduit would convey—No. 4?

A. As at present built?

Q. Yes.

A. I was asked to consider the matter by Mr. Ferris, yes.

Q. And what did you do?

A. I made a variety of computations before a test had been made, and found that it would not deliver the required quantity of water on the given grade line if constructed without a smooth invert,

and I will say even by adding the additional cross sectional area that Mr. Ferris testified to.

Q. Did you go through the tunnel?

A. I did, on one occasion.

Q. What is the proper way, in your judgment, to ascertain definitely how much that conduit will convey—water that conduit will convey?

A. I would determine it by actual experiment instead of by theoretical computation.

Q. What do you mean by actual experiments?

A. I would measure the quantity of water that flows in the tunnel and would measure it at different stages of depth.

Q. What would that necessitate as to the amount of water that passed through it, as to whether 30 millions or 35 millions or 50 millions?

A. I should desire to measure it at a variety of different depths and quantities in order to draw an inference as to its capacity at a greater depth or stage, which could not perhaps be attained by not having available the requisite quantity of water, that is the proposition that is before us here.

Q. Mr. Kuichling, have you calculated what would be the difference in cost between a 72-inch pipe and 76-inch pipe, laid as this 72-inch pipe is laid?

By Mr. Corbin: I object to it as not pertinent.

By Mr. Vredenburgh: The contractor offered to put in 76-inch pipe. Your Honor will find it on page 657, plain No. 1 (Counsel read from same with reference to pipe being 76-inch.)

Admitted subject to objection.

Q. (Question read) I will add—laid when this was laid, or as near as you can come to that time?

A. I have made such a computation.

Q. What was the saving to the contractor?

A. The difference in cost was $1.56 per lineal foot, and the only question is as to the number of lineal feet to be taken into consideration. If it was laid in accordance with plan No. 1 there was something over 100,000 lineal feet; according to the present line of the pipe there is about 90,000 lineal feet; whatever the distance chosen is should be multiplied by $1.56 per lineal foot to make the difference in cost to the contractor.

Q. What would be the amount if the distance was 90,000 lineal feet?

By the Court: That is a matter of calculation.

Q. Now, Mr. Kuichling, have you made yourself familiar with the water supply of Jersey City—with *this* water supply—have you made yourself familiar with it?

A. Yes, sir.

Q. The rainfall, so far as any have been taken—have you taken those?

A. Yes, sir.

Q. Have you examined the stream from the Parsippany bridge over the Rockaway some 5 or 6 miles below the dam to above Dover?

A. I have.

Q. Been there more than once?

A. Yes, sir.

Q. About how often would you say?

A. The portion of the river below the Boonton dam I have seen perhaps four or five different times; but the portion of the river above the dam, through Dover and beyond I have seen much oftener—a much larger number of times.

RECESS.

AFTER RECESS.

Q. Speaking of the Rockaway river below the reservoir dam, will you please describe in a general way the character of the banks of that river, commencing with the dam and going south?

A. At the dam and for a mile or so below, the river flows through a relatively narrow valley with high banks; at a point below the first bridge the banks begin to widen out and become flat with quite extensive plats on each side of the river, and these plats increase in width as we go down the river, until finally we get near the mouth of the Rockaway river with the Passaic, and then it becomes swampy. The river itself has a rather rapid flow—steep flow, from the dam for a distance of about a mile, and then the fall becomes less within the next two miles, but still being relatively great; but at that point it is more uniform, the ripples are fewer in number and further apart, making a more uniform slope.

Q. What do you mean by the word ripples?

A. Ripples in a river are formed by a bar of some kind, such as a deposit of gravel or a projecting ledge of rock, over which the water flows with more or less commotion.

Q. How much power can be produced by a flow of 70 million gallons per day per foot of fall?

By Mr. Corbin: I object to that as not pertinent.

By Mr. Vredenburgh: I want to show that these owners of lands below the reservoir may have claims for the diversion of water to the amount of 70 millions of gallons a day of flow.

By Mr. Corbin: Since the hearing in February, in the light of a suggestion made by the Court, the defendants have taken steps to procure releases from the various owners of land from Boonton dam

down to the mouth of the Rockaway river, where they had not previously been obtained, and by far the greater portion of them have already been obtained and will be submitted to the Court and counsel if desired, and if possible all will be obtained.

By the Court: In view of this statement by Mr. Corbin, I will not require the counsel for the complainant to go into any further evidence on this subject at this time, but if it becomes necessary to do it hereafter, the right to take further testimony upon this subject is reserved.

Q. Now, Mr. Kuichling, have you examined the sources of pollution in the Rockaway river above the reservoir in question?

A. I have examined a large number of them.

Q. Will you please state which one is nearest to the reservoir; tell us about that first?

A. The first one I examined was the silk mill in Boonton, half a mile possibly above the point where the river enters the Boonton reservoir. In this mill, which I understand is owned by or known as the Ingraham & Meyer Silk Co.'s works, with the main office at Paterson, New Jersey, I learned from Mr. James Rayner, the superintendent, that from two to three hundred operators were employed, and that they had two sets of water closets in this large mill building, which is a brick structure, I think four stories high, with additions; the excreta from the first or main set of water closets—the large building, is collected in a small cesspool dug into a bank of cinders on the surface of the ground, next to the river bank.

The water and liquid wastes from this cistern percolates through the cinders and flows then on down underneath the cinders into the Rockaway river, which is only two or three rods distant, some 20 feet or so below the surface of the ground at this point. It is stated that some of the solid mat-

ter is collected on the surface of this shallow leaching cesspool.

By Mr. Corbin: I object to the witness stating that unless he has personal knowledge of it.

I can say I saw some of the solid matter that had collected on the surface mixed with some papers and scraps of wood and then ignited, so as to consume and destroy the matter. I consider this disposal of excretia eminently unsatisfactory and dangerous for the pollution and contamination of the water of the Rockaway river. Another set of water closets are in the rear building of this mill, which are connected with a similar small cesspool, and I think that this overflows because it is not in a cinder filling. I did not see these closets in use because they were used only occasionally by a few operatives. That is the first source of pollution.

Q. When did you witness what you have just described?

A. I witnessed that on July 7, 1904, in company with Messrs. Ferris, Doctor Leal and Mr. Gibson, Doctor Leal's assistant. I saw the burning of some of the papers and bits of wood at several times thereafter. We were also promised at that time a betterment of conditions, no betterment has yet been obtained, the conditions are substantially now as they were nearly two years ago, and the last time that I saw them I think was on the 9th of this month.

Q. Now the next source of pollution?

A. The next source of pollution is that which comes from the Morris & Essex Canal, Morris Canal at Boonton. Pollution is here possible from the two levels of the canal, the lower as well as the upper. The lower level of the canal is polluted, visibly from drainage sewage excretia, street washings and refuse from the town. The water is simply filthy, and is so nearly at all times. It has been up to my last visit on May 9th possible for the water

in the lower level at times to flow back directly into the Rockaway river. In February, when I went up with Mr. Whipple, we saw a back flow of slight extent, and for a short duration, taking place, this was through the new structure which the Jersey City Water Supply Company has put in at the foot of the inclined plane and prevents just this sort of thing, namely, back flow from the lower level of the canal directly into the Rockaway river.

Q. Now the open drain that is spoken of at Boonton empties where?

A. The open drain on the inclined plane of the canal at Boonton empties into the lower level of the canal.

Now what does that open drain drain?

A. That open drain receives the sewage from the Brook street sewer and a small amount of house wastes or slops and surface water from a small pipe or ditch on one side of the upper level of the canal; it also receives the leachings from a number of houses adjacent to the canal and adjacent to the inclined plane.

Q. Now is that drain an open drain or covered drain, the drain that runs down the incline?

A. That is an open semi-circular channel formed of concrete with Portland cement and broken stone, semi-circle, approximately in sections.

Q. The Brook street sewer empties into that?

A. Yes, sir.

Q. Does it take at all times the sewage that is brought to it by the Brook street sewer?

A. Not at all times.

Q. Will you explain why not, and where the portion that is not taken by this drain goes?

A. In times of heavy rain fall the Brook street sewer carries more water than this semi-circle channel on the inclined plane can deliver or receive, the surplus of water thus delivered from the Brook street sewer flows transversely across the inclined place in a channel provided for the purpose and also

over the surface, thence down the surface of the ground in a little gulley into a raceway, which carried water from the upper level of the canal to the lower level; this raceway also supplies a number of mills on the Cooper-Lord estate which discharges their water after being used in their water wheels into the Rockaway river directly.

Q. I show you a deed and ask you whether that refers to either of the sewers you speak of?

Mr. Corbin: I object to the question. If the deed is offered in evidence that is another matter.

Mr. Vredenburg: I am going to offer it.

A. This deed does not refer to either the open channel on the inclined plane or to the Brook streeet sewer.

Q. What does it refer to?

A. It refers to the right to drain water across certain premises which connect at the junction of Main and Liberty streets in the town of Boonton and is a deed from Charles A. Hagan to the Mayor and Common Council of the town of Boonton.

Q. Do you know where this empties into the canal?

Mr. Corbin: What is that paper?

Mr. Vredenburg: It is a deed from Charles A. Hagen to the Mayor and Common Council of the town of Boonton, in the County of Morris and State of New Jersey; it is dated the 6th day of January 1905, and recorded in V-17 of deeds, page 274, January 17, 1905, at 10:34 o'clock.

Mr. Corbin: What is the purport of that deed?

(Mr. Vredenburg read from deed in question.)

Mr. Corbin: I object to it as not pertinent evidence and not competent evidence against us.

The Court: (After hearing counsel) I do not think the foundation has been laid for that deed yet. The evidence under any circumstances must be supported by proof of the facts as they appear on the ground, so that had better be reserved.

Q. You don't know where this empties do you?

A. No I do not except as I was told by Mr. Ruggles.

Q. Have you stated all with respect to Boonton?

A. No sir. I simply ended with the lower level canal and stated that that is a source of pollution.

Next we have the incline plane and this channel, that is the Brook street sewer—which receives the Brook street sewer and its contents, and the other items mentioned, and at the head of the inclined plane we have pollution from the upper level of the Morris Canal and from a variety of drains and sewers in Boonton that empty into the canal either directly or indirectly by overflow over a narrow strip of surface ground.

Q. Into what?

A. Into the canal.

By the Court:

Q. You mean the upper or the lower?

A. The upper level.

There are several such drains that come from the inhabited portion of Boonton adjacent to the upper level of the canal.

Further direct examination:

Q. Just there I will ask you, the water from the upper level of the canal, does that flow down to the lower level of the canal or does it flow to the Rockaway river?

A. A large portion of it flows directly to the Rockaway river, because the water rights on the Cooper-Lord estate are paramount to those of the canal and all water that is not needed for navigation of the lower level of the canal therefore passes

into the Rockaway River at a point about three quarters of a mile or a mile above the point where the river enters the Boonton reservoir.

The witness: I have seen these drains or sewers that I have referred to discharge house waste, slops; the ditch into which some of them discharged shows the same effect. Formerly there were some extensive manure heaps which leached into the canal, but these I think have been removed.

By the Court:

Q. Do I understand you to say that there is a certain portion of the water in the upper level of the canal that constantly flows into the Rockaway below these water ways?

A. Yes, sir, in times of low water, the canal carried the entire flow of the river. The river bed adjacent to the upper level of the canal is practically dry; the water power rights of the Cooper-Lord estate are paramount to those of the canal, and they have the first claim upon the water.

Q. I was not speaking of the legal rights of the parties, I was asking you for a matter of fact, whether the water flowing into these water-ways went into the Rockaway river?

A. I believe that to be the fact for the reason I have never seen those water-ways dry, and was informed that they were in operation all the year around.

Further direct:

Q. Now proceed up the river. I call your attention to the rag mill?

A. The next source of pollution I found on the river, were the rag works at Powerville which are in a condition at any time, to discharge water that is almost indescribably filthy, into the river directly. There is no safeguard of any kind against the discharge of such water; it is wholly within the good will or power of the operatives of that establishment

to do anything in the way of purification. There is an attempt at purification by filtering this fluid,—a liquid so thick that it can scarcely be called a fluid, it is almost rather a semi-fluid, by filtering that through a shallow bed of cinders about 20 feet in diameter and 8 to 10 inches deep surrounded by little sides or embankments not more than on the average a foot thick, and I have seen the effluent extend from 50 to 60 feet and beyond the alleys flowing directly towards the river, and towards a little gully in the natural soil that had been filled partially by cinders, and I considered those conditions unsatisfactory and unsanitary.

Q. What is this that is surrounded by these little banks you saw, these little sides?

A. A little bed of cinders formed by holding up things, a little bank. In this mill there are a large number of bales of rags, some exposed to the weather, most of them I think exposed to the weather and the rain fall on these rags and bales of rags produce leachings and these leachings go directly into the river. There are also places where—

By the Court:

Q. What about these rags, are they clean or soiled?

A. The rags—what I saw of them, were very much soiled.

Q. Are they imported?

A. I understand that they are called domestic rags, but I will give a sample of what I saw. I saw two or three old felt hats so greasy that they were nearly a quarter of an inch thick and almost putrid. I have seen fragments of bread in there, old sandwiches and putrid pieces of meat in these very bales, and other matter that is almost —of course that I could not identify.

Further direct:

Q. I show you Exhibit C 45, in this case, and ask you whether that is the rag mill to which you refer?

A. Yes, this represents the mill as I saw it this year.

Q. Did you see it in that condition at that time?

A. Yes, sir, I have a similar picture of it taken a few days before, which I took myself, and I have seen it in similar condition to this dozens of times before.

Q. Are the bales of rags such as you refer to shown in that picture?

A. Yes, sir, those that are exposed to the weather, right on the river bank, immediately in the fore ground of the picture.

Q. Now the next place above I think is Rockaway, the Town of Rockaway?

A. The Town of Rockaway with the Lyondale—

By the Court:

Q. Are you referring to condition of things which you saw during the present month, or have you been referring to condition of things which you saw some time ago?

A. In the case of the Powerville Rag mill, the condition that I described is that which obtained last January and February, also previously, at various times. At Rockaway we have as chief source of pollution the mill known as the Lyondale Print Works, which is an establishment where cotton cloths are bleached and dyed. Here some two or three hundred operatives are employed, and the mill have a system of its own water works, so that water closets are available. When I inspected the mill last—

Further direct:

Q. When was that, give the date, that would be more satisfactory, I think, if you give the date when you last inspected it, about?

A. July 13, 1904 when I entered the mill and examined the water closets and their arrangements I found these water closets discharging into the raceway which is used for waterpower from the mill. I have been told by Doctor—

The Court: No, you better not state what you have been told.

A. Yes. This condition of water closet discharge going into the raceway and thence almost directly into the river was, in my opinion, eminently unsanitary and unsatisfactory from a sanitary point of view. Along with the wastes of the mill, the dye liquor and the chemicals used for bleaching, an attempt had been made to partially purify these wastes in the lower portion of this raceway, just before entering the river. This attempt at purification was eminently unsuccessful from a sanitary point of view. It struck me as grotesque. It was an attempt to do something in the way of septic treatment of sewage with tanks made of cobble stones and boulders, through which the water poured in jets anywhere from half an inch to two inches in diameter. The sludge collected in the bottom of these basins or little tanks was dark and black and offensive to both sight and smell. No attempt seems to have been made to remove this sludge or sediment from the premises. Occasionally when these little banks of cobble stones would become so stopped up that the water would flow over them, they tried to cause them to do something in the way of straining by raking out some of these deposits, mud-like deposits or sludge, and these were then thrown upon the surface of the land. This land is over-flowed in floods and it is washed by freshets and freshet water that comes down the

hillside, it is then carried directly into the river,—may be carried, I should say, directly into the river. As a system of purification to safe-guard the water supply of a City of Jersey City's magnitude or any magnitude I should say it was simply a burlesque.

Q. Passing on to Dover you have visited that place for the purpose of ascertaining the sanitary conditions there more than once?

A. Yes, sir, I have been in Dover perhaps 10 or 15 times or more.

Q. Do you recollect the last time?

A. I think the last time I was at Dover was in February of this year; I was there once in January and once in February of this year.

Q. Did you examine the character of the soil along the river at Dover?

A. Yes, sir, I examined the character of the soil at various places in Dover and along the river below Dover, with particular reference to discovering whether it was of a permeable character and adapted to either the leaching or cesspools or the purification of sewerage by filtration.

Q. While you were there did you observe the conditions of the police station in Dover?

A. Yes, sir.

Q. Will you describe that—how near the river was it?

A. The building called the police office or police station at Dover is a small two story affair with two cells of concrete or ruble masonry on the ground floor, and those are distant—one of those two cells is about 16 or 18 feet distant from the shore of the river, and about 5 feet above the surface of the river at that time. From this cell—the nearest cell there is a 4 inch tile drain extending to within about 6 or 7 feet of the river's edge and at a point about 18 inches or three feet above the water surface of the river; and at the mouth of this drain was an accumulation of human fecal matter with evidence of having been deposited there but a few days previous

possibly because the ground was then covered with a little snow and ice, and this matter had become frozen onto the surface. Direct communication between the cell and this mass of matter at the river's edge was seen and proven. In this cell which was about 6 feet wide, perhaps 7 feet wide, and 10 feet long there was a channel groove or gutter leading to the next cell adjoining, so that any liquid poured into this gutter would find its way directly to the river.

Q. Now did you see the sewers which enter the stream of the Rockaway river, a short distance down from the police station?

A. Yes, sir, I saw those sewers, and one run just a little above the police station.

Q. Did you see anything coming out of those sewers?

A. I saw repeatedly coming out of those sewers matter which resembled fragmentary human excrement, and papers resembling toilet paper in appearance.

By Mr. Corbin: What sewers were they? I did not catch that.

A. A little below the police station, they are known as the two iron pipes referred to in the testimony of Mr. Whipple and known as the Morris street sewers I think; the other one comes in at the bridge above which I think is called the Sussex street sewer, and the bridge and the police station was between those two.

Q. These sewers—did you notice closets—water closets along the bank of the river below there?

A. There were a number of privies, outhouses, not what could be technically called water closets. Those were seen on numerous premises along the river.

Q. How far would that be from the river—the bank of the river?

A. In the east portion of the city the river banks are formed of stone masonry, and these priv-

ies are located from 4 to 6 to 8, and possibly ten feet from such stone wall at variable distances.

Q. In that character of soil what, from a sanitary standpoint, is the least distance that a privy can be from the river.

Mr. Corbin: What character of soil?

By the Court:

Q. Did you examine the soil at the point to which Mr. Vredenburg now refers?

A. Not at these privies directly.

Q. Did you examine the soil along the river bank in that locality?

A. Yes, sir, wherever excavations were in sight.

Further direct examination:

Q. Can you tell us the general character of the soil there?

A. I should describe the sub-soil of this portion of Dover as a very porous, permeable gravel through which liquids will flow quickly.

Q. (Former question read to witness as follows: "In that character of soil what, from a sanitary standpoint is the least distance that a privy can be from the river?")

A. In such a soil as that I should demand a distance of at least one hundred feet.

Q. Has there been any standard fixed among scientific men with respect to the distance that a privy or human closet can be built with safety from a river used as a water supply for a town or city?

A. The only standard that I know of is the one that I fixed some years ago and which was approved by the officers of the State Board of Health in New York and has been copied by various other state boards of health; that standard called for a distance of fifty feet in soil that was of a much closer grain

than what appears to be, or what I saw, existing anywhere in Dover.

By Mr. Corbin:

Q. Why don't you tell us what the soil was in which your fifty feet standard was established?

O. It is what is called ordinary garden earth, what is technically known among sanitarists and by hygienists as garden earth.

Y. You do not claim to be a sanitarist do you?

A. Oh, yes sir, yes.

Further direct examination:

Q. You have studied this subject also in the city of Paris have you not, in France?

A. Yes, sir, I have studied the subject in this country and in Europe in France, England and Germany.

Q. While you were studying in Paris was there any example there of the nearness that the privies were built to a watershed?

Objected to as incompetent.

(After some discussion Mr. Vredenburgh withdrew the question.)

Q. Is it a matter of any serious expense to prevent the sewage in the city of Dover from entering the Rockaway river?

A. I should not regard it.

Mr. Corbin: Hold on, I object to that.

The Court: (After discussion) I presume the contention of the complainant will be that it was the duty of the water company under the contract to keep the Rockaway river pure.

I think you have a right to show by this witness, who says he is an expert on this very subject, whether it would be possible to establish a system by which the water in that river flowing through Dover could be kept pure.

Mr. Corbin: I have entered my objection.

Q. Is it possible, to substantially prevent the contamination from the city of Dover entering the Rockaway river as it passes through that point?

A. Yes, I should think it was from the scene of the interception of sewage and the privies on the river banks.

Q. Have you made an estimate of the cost of building such a plant?

A. Yes, sir.

Q. Just tell us the plan that you have made the estimate of, and what the estimate is?

A. I have estimated that a line of sewer pipe should be laid on each side of the river down to a point—well, at the lower end of the Town where there is a bridge and where the houses seem to be entirely on one side of the river, I don't know the names of these places, these two lines of sewers, one on each side of the river would be a mile long, each Then they would,—one of these lines would be carried across the river to the line on the opposite side, the latter being on the left bank of the stream going down. Then the joint flow, taken in a single pipe to a locality where the sewage could be filtered, could be purified by intermittent filtration of some kind.

Q. Did you find such a locality?

A. Yes, sir, I found some land there which I believed to be suitable for the purpose and well adapted. The length of pipe that I have estimated is, and for the purpose of an approximation would be ten thousand five hundred feet of twenty four inch, and about five thousand feet of thirty inch pipe to-

gether with eight acres of land for intermittent filtration, and then this land would have to be prepared for this filtration, buildings and tanks and other accessories would have to be provided; the liquid would probably have to be pumped, but on that point I am not clear, because I have not definite levels to know whether it could not be delivered by gravity, so I have not estimated for pumping, but if pumping were not required then the cost of such a plant and its capitalized maintenance or operating expenses would be about $105,000, and if pumping were required it would be considerably more, depending upon the lift. I have not the data for this purpose. This plan that I have indicated would be adapted to a pollution of about six thousand people, which is the present population of Dover.

Q. That then includes—the $105,000 includes the building of this plant complete and the maintenance of it, of that size forever?

A. Yes, sir, provided pumping is not needed.

By Mr. Corbin:

Q. How much for construction, and what—

Mr. Vredenburgh: Well now wait, you will have a chance to cross examine.

Further direct:

Q. Now the cost of pumping you have left a little indefinite, can you give us an estimate of what it would cost for pumping?

A. That would depend entirely upon the quantity of liquid to be dealt with, and in a Town where there is no general system of sewers as yet it is difficult to make an estimate of what would be expected. The only thing that one could do would be to assume a future system of sewers there with a certain number of people tributary to it and base the estimate on that; the lift in this case would probably

not exceed six feet and would probably cost somewhere in the vicinity of about $25.—say a million gallons, about four dollars a million gallons per foot of lift.

Q. As a sanitary expert, what have you to say of the sanitary condition of the Rockaway river at the present time, in the city of Dover,—which flows through the city of Dover?

A. I would regard the water as contaminated or polluted and as requiring purification before it becomes adapted to drinking purposes or domestic purposes.

Q. Now proceeding to the Town of Hibernia, have you examined the sanitary conditions there?

A. I have.

Q. Will you state them shortly to the court? When did you examine them last?

A. I think I was up at Hibernia last year—no, I was up this year with Mr. Whipple, and I think in February or January. Previously I examined it more at length.

Q. Had there been any substantial change from the time you had previously examined it until in January or February when you last saw it?

A. No, sir.

Q. Now, will you give us, briefly, the sanitary condition?

A. The village or settlement of Hibernia is essentially a mining camp, contains numerous small houses occupied by the miners, and there are about twelve hundred to fifteen hundred people there. Of that number from one thousand to twelve hundred work under ground in the mines during the day. While they are under ground their wastes mingle with the mine drainage water which is pumped to the surface and flows into the brook that runs through this little settlement or village. The village is in a narrow valley with steep hillsides, these houses are not of a high class of construction, they have, many of them privies adjacent to runways

for water, what would be called a water course or depression in the ground not containing running water; some are only running brooks and rivulets, pig pens and hen coops and stable yards generally are located so that a drainage flows off readily. The water in the Hibernia brook is discolored and visibly and palpably polluted both from what surface water there is as well as from the mine drainage. One of the mines deliver water that is as discolored and opaque as almost any city sewage. From another the water comes out clear. In this latter case the water is used for condensing the steam of the mine engine, the hoisting engine at the surface; in the other case it cannot be so used because it is too dirty for that purpose. I am informed by the superintendent at the mine, access to the same having been refused, that there are no sanitary conveniences for the miners underground.

Mr. Corbin: I object to that sort of evidence.

Adjourned until 9.45 Friday the 18th day of May, 1906, at the Chancery Chambers, Newark, N. J.

Emil Kuichling resumes the stand.

Further direct examination. By Mr. Vredenburgh.

Mr. Corbin: Counsel says that we did not make a tender because the easement in the lands below the dam was not tendered. Yesterday, at the request of the Court I put upon the record a statement that we had during the progress of this suit. in the light of observations that had fallen from the Court's lips, proceeded voluntarily to obtain releases from various owners below the dam and thence down to the mouth of the Rockaway river. We did it not because we believed it to be our legal duty, or were

under any obligations to do it, but because of the suggestion made by the Court, and because it was a very simple and a very inexpensive matter, but we don't concede at all that we were bound to do it as a matter of law.

Q. Now Mr. Kichling, when we adjourned you were telling us of the sanitary condition of the village or settlement of Hibernia. Can the contamination of the Hibernia brook from this village of Hibernia and from the Mines be prevented?

A. Yes, sir, it can be, in a large degree.

Q. Will you please tell us about how it can be done, and at what expense?

A. The streets and roadways of the settlement of Hibernia which receive the foul washings from the adjacent inhabited lands can be graded and the drainage concentrated in ditches or gutters which may then be led to a filtration works down the valley—filtration or purification works down the valley. The objectionable features of the domiciliary conditions, such as the privies, pig pens, chicken coops, yards, stables,—those can all be remedied by removal of embankment or other simple process, so that drainage from them in freshets or heavy rain storms will not go directly into the stream but will pass into these lines of drainage in roadways that I have mentioned. The foul mine water to which reference was made may be conducted by a pipe to a separate purification works or to the same general one down the valley, and there treated in some suitable manner. The total cost of dealing with the pollutions at Hibernia that I have estimated is including about $900 a year for operating expenses, capitalized at five per cent, a total amount or the principal of $46,000. The actual work done, constructions made, betterments on domiciliary conditions, $28,000, and the capitalization of $900 at five per cent, $18,000, making a total sum, representing the maintenance of these conditions of $46,000. The item of $28,000 consists essentially of three

parts, the first being six thousand lineal feet of twenty four inch pipe sewer at $2.50, $15,000. Four acres of land prepared for intermittent filtration, including the necessary buildings, that is straining tanks, $10,500. Third item being the grading of gutters in streets and making culverts at crossings, improving the privies, stables, hen coops, etc., $2500, total $28,000.

Q. Did you examine the camp at Mt. Tabor?

A. Yes, sir.

Q. When did you examine it?

A. September 3, 1904.

Q. Will you please state what you found?

A. There are at Mt. Tabor, which is a Methodist camp meeting settlement, 225 cottages, mostly frame buildings; also a number of barns and stores. In these cottages, the population during the summer ranges from 1000 to 1200 as was stated to me by the superintendent of the grounds, a Mr. Cox. The maximum number of persons that came to the grounds during about two weeks of the camp meeting is estimated to be upwards of 1500. The settlement has its own water supply derived by pumping from some wells and springs in the flat at the foot of the long ridge called Mt. Tabor. There is as yet no system of sewage there and all the house wastes go into the leeching cesspools which are 6 feet about in diameter and extend several feet down into the porous gravelly sub-soil. The wells which were formerly in existence and in use by the cottages have become so polluted by the in-filtration from these cesspools that their use has been forbidden by the authorities of the camp or settlement, and a system of water supply has been introduced as a consequence. This statement of the use of the wells being forbidden, I received from the superintendent of the grounds. The porous character of the sub-soil is clearly indicated by the fact that these cesspools and leeching privies seldom require cleaning; they are cleaned at long intervals. Dur-

ing the year 1904, only two out of 225 required cleaning, thus indicating extensive leeching. The contents of these cesspools are mainly solid and are excavated by the ordinary pail or barrel system and is dumped or are dumped upon manure heaps or near the manure heaps connected with the general barn or livery stable of the camp meeting grounds. This is on the flats at the foot of the hill at one end of the settlement, and within at least 100 feet or less than 100 feet of a water course or ditch which finds its way ultimately into Den brook, which is a tributary of the Rockaway river. The surroundings of these dumping grounds are offensive to both sight and smell. The water course is discolored and the water was found on analysis to be impure, highly polluted.

Q. Can that contamination be prevented?

A. Yes, sir.

Q. In what way?

A. I should require the ditching of all this surface flow to some place nearby where the leeching can be filtered.

Q. At what expense? Have you made an estimate of the expense that would be incurred to accomplish this purpose?

A. In my judgment the maximum cost of the betterment would be about $7000 not including any operating expenses, because in this case the superintendent stated to me that the community would cheerfully bear those.

Q. Now, what would be the expense of preventing contamination from the waters from Rockaway town or village?

By Mr. Corbin: I object to that because there is no evidence of any contamination from that source.

Admitted subject to objection.

A. The main work at Rockaway village would

consist, in my opinion, of grading the gutters and streets and carrying the surface wash of a number of localities where it may be more simple to purify than to deal with all the objectionable individual features to some one place where it can be filtered or treated for frequentry. There are a number of features in the village of Rockaway that require close examination, leaching cesspools that may go into porous ground or into water courses that lead directly into the river or its tributaries. In my opinion $5000 expended in such remedial work will be ample to take care of most of the objectionable features in Rockaway.

By Mr. Corbin: I object to the whole of this. There is no evidence that there is anything there which contaminates the water of the Rockaway river in any respect.

Q. Now as to Liondale Print Works, have you made any estimate or plan for the prevention of any contamination from those mills or works so as to prevent the contamination of the water supply?

By Mr. Corbin. That is objected to on the same ground, there is no evidence of any contamination from that.

Same ruling.

A. The improvements to the Liondale Print Works would consist, in my judgment (Interrupted)

By Mr. Corbin. I object to this kind of evidence. The witness ought not to be permitted to give us a rambling dissertation of his views. He is asked what is necessary to prevent it, which is quite a different thing. He ought not to give us his theoreti-

cal propositions as to what he thinks is best to be done.

Same ruling.

A. The work required to be done at the Liondale Print Works in my judgment consists in the cleaning out of the channels and old rudimentary septic tanks which have been constructed there and to which I referred in my testimony previously and replacing these rudimentary works with another construction of proper character that would give adequate insurance of effective purification of the wastes coming from the mill.

Q. Will you give us your estimate of what that would cost?

Mr. Corbin: I think we ought to have something more definite than that. If the Court please, I object to any such general statement.e

The Court: What is the plan?

Q. What was the plan by which you proposed to accomplish the result?

A. The plan I have in mind is the concentration of the mill wastes into a single channel and conducting these mill wastes through a pipe to a purification station on the grounds a few hundred feet below the mill where they can be properly treated. This treatment to consist of either chemical precipitation in cases of mere mill wastes, or if these wastes also contained the excretia of the two or three hundred operatives in that mill then I should consider another method of treatment.—

By Mr. Corbin:

Q. You mean to say they do?

A. I mean to say, sir, that at the time that I in-

spected that mill thoroughly it did contain those, I mean to say that at the present time the sludge in those tanks is in a putrid condition. I was going to state, if you will permit me—

By Mr. Vredenburgh:

Q. Did you finish your answer?

A. I have not sir, I was interrupted before I got half through.

Q. The suggestion of the Court is that you need not go into very much detail at present. What we want is a brief statement of what it would, in your judgment, cost, according to this plan, to accomplish this result?

A. Not to exceed $10,000.

Q. Now, Mr. Kuichling, will you tell us about the intercepting sewer at Boonton—have you made any plan for such an Intercepting sewer for Boonton?

A. I have made a general plan such as I would consider.

Q. By your plan would the contamination of the waters of Rockaway river be substantially prevented?

A. Yes.

Mr. Corbin: I object to that as not a proper question.

Q. Will you please tell us what your plan was for this intercepting sewer at Boonton?

A. My scheme would be to build an intercepting sewer along the main street of Boonton and just immediately adjacent to the upper level of the canal and the incline of the canal, and intercept by that sewer all the local drains or pipes, public and private that are now discharging into this canal or on the incline; then to carry those waters thus collected in another pipe, probably cast iron pipe laid

in the bed of the canal to some point about 3000 feet I think it is, below the foot of the incline plane where there is a natural water course leading to the river below the main Boonton dam, and by those means the discharge would then be brought into the river below the dam, and all by gravity. This would require about a total length of 5800 feet of pipe and sewer, and 3000 feet of open ditch, and the total cost would be about $25,000. There would be no operating expenses because it would be a gravity plant.

Q. From your observation of the source of contamination of the Rockaway river and its tributaries as described by you, can you say whether the water as now running into the reservoir—the Boonton reservoir, is contaminated?

By Mr. Corbin: I object to that. The only knowledge of that is obtained by absolute tests. His observation won't qualify him to speak as an expert and tell whether the water is polluted or not.

By Mr. Vredenburgh: My contention I might as well state now is that the best test is by sight and then by smell, and then if you see fecal matter entering into the river, you can tell whether the reservoir it enters will contain contaminated water or not. This witness's sight is far better than any analysis that may be made, in my judgment, and that is the test to which I am now appealing.

By Mr. Corbin: Will your Honor have the question read?

(The Stenographer read the question.)

By the Court: I think you had better put your question in a different shape. He may state what observation he has made in that respect.

Q. What observation have you made in that respect?

A. I have seen what I believed to be fecal matter entering the stream at Dover. I have seen offensive matter which I believed to be partly fecal matter and partly mill wastes entering the stream at Rockaway, at the Liondale Print Works. I have seen leechings—mill waste and leechings of the rag mill entering the river at Powerville, I have seen offensive looking mill wastes from the Cooper-Lord estate entering the river at Boonton. I have seen polluted water from the lower level of the canal on its way to the river at Boonton.

Q. And at Hibernia?

A. I have seen polluted water on its way to the river at Hibernia, and at Mt. Tabor.

Q. Do you know the distance from Dover to the Boonton reservoir, and from Hibernia to the Boonton reservoir, and from Mt. Tabor to the Boonton reservoir, and from the Liondale Print Works to the Boonton reservoir, and from Powerville to the Boonton reservoir, and from Boonton to the reservoir?

A. I did at one time know them in detail, but I haven't the record here and I don't recall them accurately, I can procure them though.

Q. What experience have you had upon the question of what distance this fecal matter will contaminate water, what experience have you had in that during your life?

A. The observation of contaminated streams in the vicinity of the city of Rochester, New York, and in a number of other cities in this country, and in a number of prominent cities abroad, such as the river Seine, in France, the river Thames in London, and the Mersey at Liverpool, and the Passaic river at Paterson and the Schuylkill, at Philadelphia, and a variety of other streams that it is not necessary to mention.

Q. How long did you have experience at Rochester?

By the Court. It is not worth while your going into that unless the other side desires to cross-examine as to his competency to testify as an expert, and they may do so if they desire.

Q. Well, I would like to ask him one other question, if it is not already answered. What position did you occupy in Rochester in connection with the water there?

A. I was for a time the principal assistant engineer of the Rochester Water Works, and then I became Commissioner in charge of the water works and other public works of the city. Later I became the chief engineer of the works and was also the consulting engineer for the New York State Board of Health for about ten years.

Q. How long were you in Rochester, did you say?

A. From the spring of 1893 until—with a few interruptions until the 1st of January 1900.

By the Court: Do you want to cross-examine the witness with reference to his qualifications to testify as an expert?

By Mr. Corbin: I have no doubt he is competent as a water engineer, but I don't think he is an expert as to the sanitary conditions of water by observation.

By the Court: He says he is.

By Mr. Corbin: Shall I cross-examine him now, sir?

By the Court: You may, if you desire, but your cross examination must be confined to his qualification, and to Mr. Vredenburgh's right to ask for his opinions.

Cross examination by Mr. Corbin:

Q. You are a civil engineer, are you not?

A. Yes, sir, educated as such.

Q. And particularly have given your attention to hydraulic engineering?

A. Hydraulic and sanitary engineering, sir.

Q. Have you made any laboratory examinations of sanitary conditions?

A. Yes, sir.

Q. Where was that, and when?

A. In my own house at Rochester.

Q. What work did you do?

A. I made analysis of the Rochester Water Supply and of a large number of sewage effluents.

Q. What kind of analysis?

A. Qualitative and approximately quantative.

Q. Any bacteriological examinations?

A. Yes, sir; I also worked bacterio logically personally. I studied the subject in Germany, at the Imperial Board of Health Laboratory at Berlin in January and February, 1884.

Q. Did you ever make any analysis of soil?

A. Only qualitative. I have had to do that with reference to church yards and drainage from church yards and cemeteries, and a great many private wells, where the water was suspected of being polluted.

Q. Well, that is analysis of water you speak of?

A. Yes, sir, water.

Q. I am speaking of soil?

A. They were with reference to the soil, and also to determine whether the organic matter that was contained in the water was derived from the soil.

Q. When did you make these bacteriological examinations?

A. I made them during the year 1885, a number of them, and also in the year 1886, and then at various times between 1890 and 1899.

Q. In 1886 bacteriological analysis was then in its infancy?

A. I should not say it was; there has been little added to the knowledge that was available in 1888 or 1884 I should say,—it all dates to—the practical knowledge of it dates from the method of analysis invented by Professor Koch.

Q. You haven't kept up that line of your work personally?

A. No, sir; I have only made these analysis with a view of knowing what was going on at Rochester in my own work for which I was responsible. I make no pretence of being an expert bacteriologist.

Q. Has not that whole subject developed a complete change within the last few years?

A. No, sir, it has not.

Q. You haven't attempted to keep up with it?

A. Yes, sir, I have; I have seen no particular changes except in a few details. There have been changes and changes, but they don't even know to this day how to isolate absolutely and certainly, for instance, the typhoid bacilus, and they knew that as well in the year 1884 as they do to-day.

Q. Have you had any employment in sanitary matters, except as you say you were consulting engineer of the State Board of Health,—have you had any since. in a sanitary way?

A. Not in connection with public water supplies.

Q. These observations of foreign rivers, the Seine, Mersey and Thames were casual observations of the river?

A. No, sir.

Q. Were you employed by anybody?

A. No, sir, I went there on my own initiative, in order to learn what I could not learn in this country.

Q. When was that?

A. In the years 1883 and 1884, and also in the year 1889, I made two trips abroad for that purpose.

Q. Do you belong to any Sanitary Society?

A. The American Public Health Association, sir, and I have been a member of such since 1883, I think, for twenty-three years, and have the transactions at home—used to be an active member of it.

By Mr. Vredenburgh:

Q. Now I will repeat the question. From your observation of the source of contamination of the Rockaway river and its tributaries, can you say whether the water as delivered in the Boonton reservoir by the Rockaway river is contaminated?

Mr. Corbin: I object to that, in the first place as not pertinent, the point of delivery of the water—the condition of it at that point, in that season is not pertinent, and because the witness has not shown an expertness to speak as to that, and that it should be from observations there and not from observations at other places.

The Court: I will allow the question.

A. I can say that it is contaminated.

Q. In your opinion is that water liable at any time to become infected?

Mr. Corbin: Objected to as not competent evidence, there is no foundation laid for any such question.

Question over-ruled.

The Court: You can ask him what the source of the danger was, of course.

Q. What was the source of danger from that water?

A. The source of danger to the water was essentially the introduction of fecal matter or general human excreta.

Q. What danger is there from that—from the fecal matter?

A. These discharges may contain the germs of infectious disease.

Q. Such as what?

A. Such as typhoid fever, such as cholera, such as diphtheria and such as diarrohea.

Q. From your observation of the source of this contamination of the Rockaway river and its tributaries, can you say whether the water as delivered in the out-let at Jersey City is also contaminated?

Mr. Corbin: I object; there is no evidence that he has made any observation or examination at all with reference to the water in Jersey City, and he has not been shown to be competent to speak as to the water in Jersey City.

The Court: I will allow it.

A. In my opinion it is also contaminated.

By Mr. Edwards:

Q. Now?

A. Yes, sir.

Further direct.

Q. Is it liable at any time to become infected?

Objected to for the same reason.

The Court: You better put the same question that you put before.

Q. What danger is there from the water as delivered now in Jersey City, in your opinion?

Mr. Corbin: I object. The witness has shown no competency to speak, not having examined it he shows no knowledge respecting it.

The Court: You can ask the witness what is the source of danger.

Q. What is the source of danger?

A. The danger is that disease germs that find their way into the Boonton reservoir may at low stages of this reservoir, and in times of freshet be conveyed directly into the intake of the conduit and thence pass on down to Jersey City.

Q. Now I will ask you one other quesstion. Have you observed the rate at which water will pass down the stream in times of flood?

Mr. Corbin: What streams?

Mr. Vredenburgh: Streams such as the Rockaway.

Mr. Corbin: I object unless it is confined to the Rockaway and its tributaries.

(The stenographer was requested to read the question and read the same as follows: "Q. Now I will ask you one other question. Have you observed the rate at which water will pass down the stream in times of flood?")

Mr. Vredenburgh: And made a study of it?

The Court: You can ask this witness whether he has observed the flow of the Rockaway.

Q. Have you observed the flow of the Rockaway?

A. I have in a general way.

Q. At what rate of speed, in your judgment, will the water of the Rockaway river run in times of flood?

Objected to as a matter of opinion.

By the Court:

Q. Well, have you observed it in times of flood?
A. I have not observed it in times of flood.

Further direct:

Q. Have you studied the subject and have you seen reports upon it by public officials, etc.,—have you studied it?
A. I have.

By the Court:

Q. Well, have you had data showing its flow, under varying conditions?
A. No, sir, not from point to point. I have a few observations which were available as to its discharge at some particular point. The records, for example, at Old Boonton and a few at, I think, Dover, but not a continuous record.

The Court: I do not think the witness is qualified to testify, on this subject.

Further direct:

Q. Have you any data as to the speed with which the Rockaway river runs between Dover and Boonton or the Boonton reservoir?
A. I have observed its speed at a few places, but I have no data that will tell the total time between Dover and Boonton reservoir.
Q. Do you know the general course of the Rockaway river between Boonton and Dover?
A. I do.
Q. Do you know all the dams in the river there?
A. I do.

Q. And generally as to the fall of the river?

A. Yes, sir.

Q. And you have made observations of the speed with which the water runs at two points in the river?

A. At several points where bridges cross the river I have taken some observations.

Q. In what condition was the river then as to its being in a flood or otherwise?

A. It was not in flood,—ordinary stage.

By the Court:

Q. Well, have you gone from Dover down to the river bank, along the course of the river, as far as Boonton?

A. I have not followed the entire course of the river but have been at most of the bridges that cross the river or public highways.

Q. Now describe if you will the shape of the reservoir. I hand you exhibit -C65.

A. According to this exhibit the Boonton reservoir is in the shape of an irregular long parallelogram or rectangle in which the prominent feature or rather the important feature in the configuration of the land is the promontory that constitutes the former right hand bank of the Rockaway river at a point where this river enters the reservoir.

Q. What is the length of the reservoir proper?

A. Measured along the longitudinal axis of the reservoir its length is about two miles, a little less than two miles. It has an average width of probably three thousand feet, approximately three thousand feet. The Rockaway river enters at a point about 1900 feet above the dam, about the middle of the dam, that is to say the general direction of the Rockaway river at its entrance into the reservoir intersects the longitudinal axis of the reservoir at a point about 1900 feet above or upstream from the intake of the conduit. From this longitudinal axis to the point of intercession—to a point where there is no appreciable flow of current in the river

when the reservoir is at spillway level, the distance is about 3900 feet. On the other hand, when the reservoir is drawn down to the lowest level or contour 260, the distance is then, from this point of intersection to the slack water in the river about 2300 feet.

Q. What is the distance from that point to the gate house when the water is at level 260?

A. About 4700 feet.

Mr. Corbin: What points are you speaking of; from where to where?

Q. What point do you refer to?

A. A point where contour or elevation 260 intersects the surface of the Rockaway river when the reservoir is drawn down to the intake of the conduit at the masonry dam, on the upstream side of the masonry dam it is there about 4700 feet.

Q. What did you notice at elevation in the reservoir about 3000 feet above the dam?

A. There is a ridge which extends nearly across the reservoir—partly across the reservoir.

Q. From which side?

A. From the west side of the reservoir, or north side, I don't know which.

Q. North, is it not?

A. Yes, it comes aproximately from the north or west side of the reservoir; there is a promontory there extending partly across the reservoir. This promontory is at present submerged and extends by the point of the compass in a south easterly direction. The distance from the flow line at elevation 325.25 directly across the reservoir in south easterly direction is 2400 feet according to this map. This promontory or feature of importance forms the former right hand bank of the river at the present stage of water and will form such bank if the reservoir is drawn down to elevation 260.

Mr. Corbin: I object to this entire line of evidence as not pertinent. The location of the reservoir was agreed upon by the city and there is no allegation here that it is not a proper location.

The Court: I do not know what point of view Mr. Vredenburgh is offering this evidence in.

Mr. Vredenburg: I will explain what we are doing, and will read from the specifications on page 38.

(Counsel read same.)

The Court: I understand this evidence was introduced for the purpose of showing that by reason of the peculiar contour of this reservoir as now built it does not act with the same degree of energy that it would have done if built according to the original plans.

Q. Now at what time of the year is the water lowest in the reservoir?

Mr. Corbin: The witness should show some knowledge before being permitted to testify to that. It has never ceased to go over the spillway as yet.

A. The lowest water in the reservoir may be expected in the fall of the year. I would like to make one correction in my former statement in regard to distances; I misspoke myself when I said 4700 feet. It is 3700 feet.

Q. What distance is that?

A. That is the distance from the intake of the conduit on the upstream side of the masonry dam to a point where the contour 260 intersects the surface of the Rockaway river when the reservoir is drawn down to the elevation of that contour. I said it was

4700 feet before and I should have said 3700. I got it just a thousand feet too much, by error.

Q. Why do you speak of elevation 260, what is that?

A. Elevation 260 feet is that elevation which corresponds to the lowest draft—lowest depth of draft of which the reservoir is capable.

Q. By 260 feet you mean 260 feet above the state datum?

A. The state datum, yes, sir. The same datum used upon the surveys and maps of the reservoir.

Q. I think you have answered this question, when the flood waters may be expected.

A. The records show that one of the severe floods of the Rockaway river occurred in October, 1903, there was one about October 10th or in that vicinity, the fore part of October, but it may have been from the 10th to the 12th, I don't remember.

Q. Have you a record of how much water the Rockaway river delivered at the time of flood, or is there no record of that?

A. The State geologist of New Jersey in his report for the year 1903 gives a statement of the amount of water that that flood carried both per hour, and during the entire time of high water and from those statements in that report I estimate or compute that the delivery of the Rockaway river during 108 hours was 9,855 millions of gallons or more than the entire capacity of the Boonton reservoir, including its unavailable storage below elevation 260.

Q. How much of the total capacity of this reservoir lies between the dam and this submerged ridge that you have described?

A. By taking a line across the reservoir in the general direction of this ridge and computing the area and contents of the reservoir between such line and the masonry dam I find that when the water is at elevation 305.25 the contents or the storage capacity above elevation 260 is 2,627 million gal-

lons, approximately, and when the elevation of the water is at elevation 260 there is no capacity of storage space, simply a surface without thickness.

Q. Now have you computed the number of million gallons delivered in the flood of October, 1903, to this reservoir?

A. I have, and I stated that.

By the Court:

Q. How far is this ridge or the crest of the ridge below the level of the water in the reservoir when the water is flowing over the spillway?

A. The highest point in the ridge is about twenty feet above the present water surface, the present water surface being at elevation 305. It forms a small island there and from that point—(interrupted).

Mr. Edwards: You say it forms an island?

A. It is an island when the reservoir was receded to 324 elevation, but it is not now an island. It is a ridge or promontory that projects out into the reservoir.

Mr. Vredenburgh: The question I understood your Honor to ask is what was the elevation.

The Court: I thought it was submerged.

Mr. Corbin: So it is. It is a promontory from the shore extending out into the reservoir.

By Mr. Edwards:

Q. There is an island in the reservoir?

A. Yes, sir.

Further Direct Examination.

Q. At elevation 305, the water runs over the spillway?

A. Yes, sir.

Q. Now at that elevation how much water is over the ridge you spoke of, within the lines of the reservoir?

A. The ridge extends from elevation 325 to 260 where it strikes the bed, approximately of a former tributary to the Rockaway river which came from the upper end of the reservoir so that this is a sloping ridge or crest.

Q. What is the distance across the lake from the elevation of this ridge at about elevation 305 to the contour line which you suoke of as 260.

A. The length of this submerged promontory from elevation 305.25 to contour or elevation 260 is about 1,400 feet.

Q. Then at elevation when the flow line of the water is at 260, the whole of that ridge for that distance is above water?

A. Yes, sir, exposed—in fact, the elevation of nearly all of the reservoir bottom above the ridge or towards Parsippany will be exposed and dry.

Q. When the water is drawn down to elevation 260, what is the distance from that point?

A. The width of the lake will then be barely three hundred feet at its narrowest point, the distance between contours 260 on the two sides of the reservoir is three hundred feet approximately.

Q. That is on a line with this ridge that you speak of?

A. Yes, sir.

Q. And about at right angles to the length of the reservoir?

A. Yes, sir, about at right angles to the general direction of the reservoir.

By Mr. Corbin:

Q. How much acreage will be exposed when it

is drawn down to 260, and how much will be covered by water?

Mr. Vredenburgh: Oh, well, I object.

By the Court:

Q. How deep is it at its deepest point?
A. It is less than five feet, but the exhibit shows no data for an estimate; it is less than five feet deep.

By Mr. Corbin:

Q. Where?
A. At this point.
Q. What point?
A. At the point where the reservoir will be only three hundred feet wide when drawn down to contour 260, the depth will be less than five feet, but there was no data on the map to show.
Q. That is opposite the promontory?
A. Yes, sir.

Further Direct.

Q. That is across the lake opposite this ridge that you speak of?
A. Yes, sir.

By Mr. Corbin:

Q. That is when the reservoir is drawn to exhaustion?
A. When the reservoir is drawn to elevation 260.

Further Direct.

Q. Have you calculated, in the flood of 1903,

how long it would take to fill up that space which is between the dam and the ridge you speak of, if the water was at elevation 260 when the flood commenced?

Objected to.

Overruled.

Q. Mr. Kichling, have you made a computation of at what speed the different portions of that reservoir, and by portions I mean that which is on each side of the line of this ridge, would have been filled in a flood such as occurred in October, 1903?

Objected to.

Admitted.

Q. If that question is intelligible to you will you answer it?

Mr. Corbin: I object, it is the same question that was asked before and excluded.

(Admitted.)

A. I have not been able to make just such a computation, because I haven't a knowledge of the condition of the reservoir in October, 1903, but I can only state this—that during eighteen hours of that period of the flood, when it was at its maximum rate it would have delivered something like two thousand million gallons in eighteen hours out of the one hundred and eight hours, that is more than one-fourth of the flow, about one-third of the total flow come in a period of eighteen hours.

Q. Now, from these calculations and from the position of the Rockaway river in this reservoir, relative to the head gates of the conduit, what, in your judgment, was the character of the water

which was delivered in the conduits at the end of eighteen hours?

Objected to as not competent.

Objection sustained.

Q. Under the conditions of which I have spoken, would there be any material improvement by reason of the reservoir, in the quality of the raw river water that came and went into the conduits at the gate house?

Objected to.

Over-ruled.

Q. Now, Mr. Kichling, have you acted as advisor for the City with respect to the test that should be made of the works?

A. I have.

Q. And so far as you have heard of the city's acting, has it been such as you had advised?

Objected to as incompetent.

Mr. Vredenburgh: The question I have asked is directed to a certain point, I have partially explained that point. If your Honor think it is not proper may I explain it further?

The Court: I don't like the form of the question.

Mr. Vredernburgh: Then I will change the form of it.

Mr. Corbin: I should like to say a word, if your Honor please. The defendant claims that it has afforded the City ample and repeated opportunities

to make all the tests required by the contract, but in the light of the evidence of Mr. Ferris on the stand, and of the Court's suggestion with respect to conduit No. 4, the defendant now offers, if the City will put in writing a detail of what it wants with respect to conduit No. 4, it will co-operate in another test of that conduit with the steel pipe running to its full capacity, the whole line, that is, fifty million gallons or approximately that, so that the City may make the test which Mr. Ferris says they want to make on conduit No. 4, with varying quantities in it up to the full capacity, and we are ready to make the necessary preparations so that that can be made any day, as soon as possible, which I suppose would be the latter part of next week, but we want the City to declare itself in writing as to what they desire, in the way of a test to be made, definitely, before we begin.

Mr. Vredenburgh: I see no objection to our making such a statement. Of course we cannot make it suddenly, we will have to consider it a little, but I want to show what tests are prepared in this case by this witness. I haven't shown except that one test by Mr. Ferris and partially by this witness, but it has developed in this case that he desired the possession of these works. I want to show why he desired possession of the works.

The Court: Well, they ask for a proposition on your side.

Mr. Vredenburgh: As to conduit No. 4.

The Court: Well, make your proposition in writing, I think that is only fair, I think they ought to know just what you want. Make your proposition in writing and submit it to them, and if any controversy arises over it why it may have to be decided here, but I think all examination on this point bet-

ter be postponed until we know just what the matter of difference is.

Mr. Vredenburgh: Very well then, I will put the proposition between now and Monday, in writing.

Q. In your answer with respect to the character of the water delivered to Jersey City at the present time did you take into account the effect of the new reservoir?

A. I did.

Q. Have you computed the element of safety in the 72-inch pipe which you have spoken of?

A. Yes, I have computed what the probable factor of safety used in the design of this pipe is.

Q. What is the ordinary figure of safety for an iron pipe of that size carrying this quantity of water from the point of its intake to the point of its discharge?

Objected to as not pertinent.

Objection overruled because it is not within the issues made by the pleadings.

Q. I will ask you the same question as to the thickness of the concrete conduits.

Same objection.

Same ruling.

Cross examination by Mr. Corbin:

Q. In the beginning of your testimony on March 1st you spoke of your observations of the concrete work in the core of the Parsippany dyke and that you had observed where the different sections had adhered together, and then by the action of the

frost or the temperature or otherwise they had pulled apart leaving some cracks. They were overlapping sections were they not?

A. Partially overlapping.

Mr. Vredenburgh: That reminds me of something that I didn't ask the witness, but which I intended to ask this witness about.

Re-direct examination by Mr. Vredenburg:

Q. What do you say as to the seepage under this wall, Mr. Kuichling, you have examined the subject, haven't you?

A. Yes, sir.

Q. What have you to say as to the water which appears on the opposite side of the dyke to the reservoir, as to that water where it comes from?

A. I believe that a large proportion of the moisture that is found there in dry weather is due to subterranean percolation or seepage from the reservoir.

Q. When you say subterranean, do you mean through the wall or under the core wall.

A. I should give the greater amount of the leakage to that which passed underneath rather than through the core wall. There might be some throu the core wall.

Q. What would have prevented that seepage?

A. Carrying the core wall down further to an impermeable stratum in the sub-soil.

Q. Now his Honor spoke of digging a ditch—for correcting the evil by excavating a ditch along parallel to and near the toe of this dyke, and in that way catching the water which did seep and preventing it from effecting the land that was on the further side of the ditch?

The Court: A ditch whose bottom was as deep

as the depth of the lowest cellar in that surrounding property.

Q. A ditch as deep as the lowest cellar in that surrounding property, what have you to say as to that?

A. That might be feasible if the soil were all of of the same a uniform permeable condition, but the soil actually is of varying composition and character. At one point it is an impermeable hard clay, at another point, at the same distance below the surface it may be sandy or gravelly in character.

By Mr. Edwards:

Q. May be or is?

A. Is sandy and gravelly in character, carrying water. The composition of the soil along the Parsippany road or Turnpike seems to be of varying character. The only question that occurs is to what extent do these permeable strata which appear on or near the surface at different points between the dyke and Troy brook extend into and communicate with the water in the reservoir.

By the Court:

Q. Now, as I understand it, the core wall extends merely across the lowest part of the land there, as soon as the banks are high enough to themselves contain the stream that core wall stops,— the core wall is simply a cross—

A. The core wall, as I understand it extends along the cross of the embankment until high ground is reached, considerable above the surface of the flow line contour 305.25.

Q. Well, how long is that core wall, do you remember, about?

A. I think it is upwards of 2,000 feet long, the dyke being about the same length. The map doesn't show the whole of the dyke.

By Mr. Edwards:

Q. Twenty-nine hundred feet?
A. Yes, sir.

By the Court:

Q. If the bottom of the reservoir was not impervious to water then the water would continue going down at all events until it struck rock and could not get any further?
A. Yes. sir.
Q. Now suppose you had dug it eight or ten feet deeper at the core wall, the water might still permeate to the lower level than the wall and might come up by gravity at some considerable distance the other side of the embankment. Now that being so how can you say that a core wall ten feet deeper than this will be any more effective than the core wall as it is at present?
A. One cannot say, sir. I mentioned that the seepage would be reduced but not entirely stopped by carrying the core wall down to an absolutely impermeable strata.
Q. And that might be three or four hundred feet down?
A. Yes sir, wherever it might be.
Q. (By Mr. Edwards:) Then that might not be practical?
A. It might not be expedient.

The Court: There is no evidence to show what the stratum below the bed of the present wall were.

Mr. Vredenburg: Yes, sir, that is in Mr. Harrison's letter, he made test pits.

Cross examination by Mr. Corbin:

Q. You were presnt while the work was being

done at one time were you not? On the Parsippany dyke?

A. Yes, sir.

Q. Did you ever go there afterwards?

A. Yes, sir, I went there several times afterwards.

Q. When?

A. I cannot specify the date exactly, except the last visit which was on May 9th I think.

Q. Now on March 1st were you asked by the court (interrupted)

Mr. Vredenburg: What year?

A. I meant May 9th, of this year.

Q. (Further direct) 1906, then?

A. Yes, sir.

Q. Now on March 1st were you asked by the court this question, "Well is it your theory then that the leakage in this case, assuming that there is leakage, is due to percolation through these cracks you have described? And your answer was "No sir, I don't say that sir, at all, I assume that these cracks that I have described contributed little if any seepage that has been described by the previous witness, Mr. Ferris." Are you still of the same mind?

A. Yes, sir, but I would qualify that simply by saying that there is evidence at only one point where there may be a little leakage through the cracks in this wall.

Q. You closed your testimony March 1st with this, "So I don't attribute any particular significance to the cracks that I have described. It is only fair to state that," you are still of that mind?

A. Yes, sir.

Q. It is the presence of water below the dyke which you think may partially come from seepage underneath the dyke itself?

A. Yes, sir.

Q. You didn't make any weir measurement or other accurate measurement of the amount did you?

A. Yes, sir.

Q. You, yourself?

A. Yes, sir, that is to say I saw the measurements made.

Q. By the weirs that the water company had installed?

A. Yes, sir, Mr. Ruggles held the rule and I saw that the reading on the rule was practically correct.

Q. Would you agree with Mr. Ferris that the amount of water flowing there was somewhat less than you previously spoke of?

A. Yes, sir, Mr. Ferris' testimony, I would corroborate.

Q. Did you go there at any dry time?

A. Yes, sir, I was there on one of two occasions when it wasn't raining and had not been raining for some time and there was some water seen in this ditch and pipes.

Q. You didn't go into any cellars at that time?

A. No, sir.

Q. Now with regard to the stone dam at Boonton you gave evidence yesterday to the effect that to raise the water 19 feet 2 inches if it were done by simply raising the top of the dam, you would have to pile up stone one hundred and twenty feet high?

A. One hundred and nine feet.

Q. That would be to get weight would it not?

A. Yes, sir.

Q. Did you examine the plans of the dam as it has been practically constructed as against the plans as originally drawn?

A. I examined the plans which I received from Mr. Ferris I saw them in his office and they were said to be the working drawings of the work under construction.

Q. Were you aware that the dam was considerably thickened and strengthened by the Water Com-

pany itself and was made much heavier than originally designed?

A. No, sir.

Q. You were not aware of that?

A. No, sir.

Q. What did you calculate the weight per cubic foot or yard of masonry to be which is in that dam?

A. If I remember correctly it was a hundred and fifty pounds per cubic foot, specific gravity 2.4.

Q. I may rely upon that accurately given as the basis of your computation?

A. I will look at the computations and see.

The Court suggested as it was near recess the witness could look over his calculations during recess and answer the question at the coming in of the Court.

Q. If the masonry is heavier than you supposed then less weight need be added to make the dam safe for its higher level?

A. Yes, sir, in a general way.

Q. If you could find material sufficiently heavy to pile on top of the dam to add nineteen feet you could raise the dam by simply adding 19 feet to it couldn't you? Suppose, for instance, you took gold or something five or six times heavier than stone, you would not have to go so high?

A. No, sir, you would have to go to a height in proportion to give the equivalent strength.

Q. It is a matter of weight?

A. Yes, sir.

Q. And if you cannot get the weight on top you must make greater thickness to get the weight below?

A. Yes, sir.

Q. Did you observe, with regard to this dam, that it has earth wings, so that a considerable portion of the dam is of earth, like the Parsippany dyke?

A. Yes, the masonry dam is continued on each side of the valley by means of an earthen dyke with a concrete core wall.

Q. Similar to the construction of the Parsippany dyke?

A. Yes, sir, the extensions are similar to the construction.

Q. Did you observe that these earth banks are made wider than necessary so that they can be raised without disturbing the water side of the dam?

A. Yes, sir.

Q. So that by merely piling earth on top of them or reinforcing them at the back there will be no disturbance at the water side?

A. As I understand it, yes, sir.

Q. To raise the stone dam, as I understand you, there would be but two methods, one would be to pile stone enough on top of it to give the necessary weight, if that be practical, the other would be to make it thicker from the bottom up at the down stream side of the dam?

A. Yes, sir.

Q. And either of those could be done without interfering with the draft of water?

A. Yes, sir.

Recess.

AFTER RECESS.

Q. Referring to conduit number four which includes the Watchung tunnel did you make a computation or ascertain the capacity of that tunnel if of the size of construction specified in the contract?

A. I did sir.

Q. What did you estimate its carrying capacity to be if it had been of the size and constructed in the manner specified, that is with a cement bottom?

A. On the grade given the dimensions should have been eight feet and a half high by eight feet and a half wide according to the contract, that is to say those dimensions would have met the contract or specification requirements on a given grade; but the contract I should state doesn't give the size, it gives simply a formula.

Q. Mr. Ferris has spoken of the contract as practically figuring it eight feet six inches as the perpendicular and cross diameter of the tunnel?

A. Yes, sir.

Q. Assuming that to be so and the work to be done with a cement bottom what do you figure its carrying capacity would be?

A. I figure its carrying capacity would be, flowing with a depth of seven and a half feet and on a grade of one foot in 10,559 feet it would discharge a 108 and 1-3 cubic feet per second which is seventy million gallons per day.

Q. Exactly seventy millions?

A. Yes, sir, so near exactly seventy millions that I have not given the hundredths or thousandths of cubic feet but I can give it to you if you wish it.

Q. Now taking it 2 inches wider, 2 inches deeper you still say it would fall a little short of seventy millions, because of the unevenness which you assume the gravel to have?

A. Yes, sir. I have made another computation with a width of 8.66 feet.

Q. That is eight feet eight?

A. Not quite, it lacks one-eighth of an inch of it, and with a depth of 7.66 feet those being the depths given in the blue print submitted to me by Mr. Ferris who received the same from the water company as being the official dimensions.

Q. What would it carry if the bottom was smoothed with cement?

A. If the bottom was made smooth with cement it would carry more than seventy million

gallons per day, but I have not computed the amount because it was not so built.

Q. Well, if there was 2.6 added to the cross-section also it would carry a great deal more than seventy million gallons?

A. No, sir, it would depend entirely upon the character of the bottom.

Q. With the bottom as it was specified?

A. With the bottom smoothed with cement it would carry considerably more.

Q. Now about what percentage more?

A. I am unable to state.

Q. Would it be as much more in percentage as the percentage of area of cross sections?

A. No.

Q. If the depth was increased accordingly would it not? More than that wouldn't it?

A. Not necessarily.

Q. If you made the pipe larger even though you kept the same shape it would not have that carrying capacity in proportion to the added cross section?

A. Not quite in proportion; that area becomes a factor but there are other factors that enter into that.

Q. It would increase rather more rapidly?

A. No, sir.

Q. Then you didn't figure out how much it would carry with a smooth cement bottom?

A. Not on the enlarged dimensions.

Q. What percentage did it take off because of the gravel bottom?

A. As I did not figure the capacity I could not take any percentage off.

Q. Well, you took something off because of the gravel bottom, how did you get at that?

A. I took what the discharge would be if it had a gravel bottom.

Q. That you don't know exactly from calculation do you?

A. No one else does either.

Q. You have some sort of a rule of deduction because of this gravelly bottom, what was it?

A. I am going to state. For the gravel bottom I assumed as most favorable for the conduit a co-efficient of roughness in the Kutter formula of 0.018. For the sides and the portion of the semi-circular arch which is in contact with the water I took the specification requirements of this factor 0.014. I assumed, as is usual in hydraulic computation, that the influence of these two factors was in proportion to the length of surface or circumference to which these two apply. This would make a resultant factor of 0.01556.

Q. As your co-efficient of the roughness of the wall?

A. Yes, sir.

Q. What co-efficient did you take for the bottom in calculating the capacity of the small conduit as it was to be?

A. I took the specification requirement that the conduit as it was to be 0.014.

Q. As it was constructed you took .0156?

A. Yes, sir.

Q. You assumed a great deal more roughness than you assumed in the other case?

A. No, sir, not in this particular instance; I assumed the full roughnes for that portion of the invert which, in my judgment, is required. I made four different computations.

Q. Had you ever tested a conduit of that sort with a gravel bottom before? Or ever calculated one?

A. Yes, sir, I have computed quite a number of conduits.

Q. With gravel bottoms?

A. Yes, sir, streams, channels and canals with gravel bottoms, I have both measured and computed them and compared the computed results with the measured results.

Q. They do make the bottoms then with gravel at times?

A. Not in any water works conduit that I know of.

Q. Where did you ever find one to compare it with them?

A. With open canals and race-ways for mills.

Q. They had no prepared bottoms, gravel had they?

A. The bottom was covered with gravel.

Q. Natural gravel?

A. Yes, sir.

Q. With all the inequalities of nature?

A. There were no particular inequalities in those cases, it was truer than anything that existed in this Watchung tunnel as I know of my own knowledge.

Q. You never walked through the Watchung tunnel when the gravel was in there did you?

A. Yes, sir.

Q. But that was when the mud was in there, you had on rubber boots?

A. Yes, sir.

Q. But you know that for 7,400 feet this tunnel was cut through with inequalities filled in with gravel?

A. I didn't know this tunnel was dug to a graded line, it would seem to be extremely irrgular on the bottom, the rock was very irregular and to my knowledge this gravel ranged in there from one foot to six inches in depth.

Q. But I am asking you as to the finished result,—the sides were brick were they not?

A. Yes, sir.

Q. And the top was brick?

A. Yes, sir.

Q. Then you couldn't see anything about any unevenness of rock there?

A. We could on the sides.

Q. But you were walking through mud and wa-

ter with rubber boots on with water six inches to one foot in depth?

A. Yes, sir, six inches to a foot and a half and two feet deep.

Q. Varying depths according to the water flowing in and flowing out?

A. According to the position at the invert so much so that I had to walk on each side of the water because it was too deep to walk in the center.

Q. That is the only observation you got of the depth.

A. Yes, sir, and it was a very good observation too.

Q, A good observation?

A. Yes, sir, and suggested a very much higher co-efficient than I have mentioned.

Q. You don't know how high the highest point came at the bottom as compared with the hydraulic gardient?

A. Yes, sir, I do approximately.

Q. By feeling it with your feet in rubber boots?

A. Yes, sir.

Q. There was a good deal of mud in there when you went through wasn't there?

A. The water was muddy.

Q. There were bags still in there with material in them?

A. Only some cement bags that I saw put in there in one or two places but the dams had been removed.

Q. But there was enough material in there to fill in in some places deeper than in others?

A. No, sir, not that I could attribute to the artificial dam.

Q. Would you consider that walking through there with rubber boots on is of the slightest value in making an accurate computation?

A. Yes, sir, it is the best method of finding out in dirty water where you cannot see the bottom because you could feel it with your feet.

Q. You were trying to get at a result of what this would carry after it was filled up?

A. This was material that is probably in there now, I never heard of it being removed.

Q. Didn't you hear the testimony the other day that it was perfectly clean and that you could see down to the bottom of it?

A. No, sir; any tunnel with a foot of water flowing in it might have the water clear but I have yet to hear of having water at six feet deep which would be clear enough to see a pin at the bottom.

Q. Well your assumption of roughness was founded on your observation in walking through with rubber boots?

A. Yes, sir.

Q. And before the water had been turned on?

A. Yes, sir, but it was at a time when the conduit was pronounced satisfactory by the water company as I understand it and it was offered to the city for inspection.

Q. Well, it hadn't been rinsed out with the flow of water at that time?

A. I understood it had.

Q. And the dams of mud in it had not yet been removed?

A. I never saw those dams of mud in it.

Q. You saw dams made of cement bags?

A. That was where they had been plastering the defects in the brick wall.

Q. But there were dams in various places across it where there not?

A. They say there were, I don't know, I didn't see them, presumably there were.

Q. Now you said yesterday that in a test of this kind you would determine its carrying capacity by actual experiment instead of theoretical computation. Tell me how it is possible to measure the quantity of water flowing through that conduit now.

Must you not of necessity reckon at least part of it by computation?

A. No, I see no reason for doing that. I believe that with the over-flows that are available on this conduit and the blow-offs in the steel pipe, a device can be applied to measure the exact discharge by weir, which is the standard method of measuring the flow of water, so far as we know now.

Q. The steel pipe to the east of it will carry not more than fifty million gallons as you understand it?

A. Yes, I so understand it.

Q. And how would you measure the remaining twenty?

A. I wouldn't measure the remaining twenty in this case, because I could not measure more than I received.

Q. Then you would measure fifty by the carrying capacity of the steel pipe and compute the remaining twenty?

A. Yes, I would measure from the characteristics of this conduit by flows ranging from say twenty to fifty million gallons at different stages, getting at least three measurements within those limits, preferably four.

Q. When you say characteristics you mean velocities at different depths?

A. Velocities and gradients, yes, sir, and cross sections.

The Court:

Q. The difficulty that would arise from the unevenness of the bed would be entirely eliminated by the experiments, because in each one of those experiments the bed would be covered with water, and the water would be flowing over?

A. But the influence of the bed and its roughness is much greater when the flow runs up on the side walls only one foot, say,—the relative influence

is greater then than when it is two feet up, three feet and so on up to finally seven feet up; for that reason I, in justice to the company and its work, I should say—try to eliminate as much as possible of unfavorable influence of that bottom roughness by a large number of experiments, at least four in the range between, say, twenty million gallons and fifty million gallons per day rate, so that an inference might be drawn as to the influence of this bottom roughness on it when it claimed to be seven feet deep, and seventy million gallons a day.

Q. Would there be any possibility of error arising from the fact that the brick work as completed was not of uniform width and height?

A. There might be a slight amount, in that respect.

Q. But the liability of error there would be very slight?

A. That would be small, because the brick work has been laid generally to line and grade; the bottom does not appear to have been laid to line and grade.

Further cross examination.

Q. Each portal of the tunnel for two or three hundred feet into the tunnel has a smooth bottom, constructed, has it not, of brick or cement brick, I think?

A. I don't remember definitely about that.

Q. Well, if it is there you have an opportunity to take an accurate cross section of the tunnel and to observe velocities and to make computations, haven't you?

A. No, sir, the distance is altogether too short, two hundred feet is beyond the reach of determining a slope.

Q. How much distance do you want?

A. A thousand feet at least.

Q. If you took that two or three hundred feet

with the conduit which continues the tunnel you would have your thousand feet to show?

A. Ne, because the continuation of the tunnel in the form of the conduit is of different dimensions.

Q. If it brings from the tunnel and gets from the tunnel seventy million a day, the tunnel must furnish it to you?

A. It doesn't follow that that will determine the depth at which the water flows into that tunnel.

Q. And if the tunnel furnishes you seventy millions a day, and gives it to you in the conduit which forms its continuation, it has done its duty then?

A. Not fully, because the specifications call for the water surface to be one foot below the top.

Q. That computation can be made, can it, in that conduit which makes the continuation of the tunnel?

A. Yes, observations can be made in there.

Q. Well, you cannot get velocity in there unless you have velocity behind it in the tunnel, can you?

A. I can measure the velocity in the continuation of the conduit at each end.

Q. Won't that give you all the data you need to compute the carrying capacity of the tunnel?

A. Not all, no, sir, I need something further, I need the grade of the tunnel.

Q. If you find one conduit has a capacity of carrying into it seventy millions and the other bringing out seventy millions, you have seventy millions through it, haven't you?

A. Yes, but not necessarily within the requirements of the contract.

Q. You mean it may be seven and a half feet deep in there?

A. Yes, and less than one foot below the top.

Q. So that when you express doubt as to its carrying seventy million gallons through the tun-

nel, you mean that when it carried as much as that it may be more than seven and a half feet deep, or it may be less than twelve inches,—the surface of the water may be less than twelve inches from the top?

A. Yes, sir; that is the only point that I want to make.

Q. Well, suppose that were so, that there was a fractional difference, and to get seventy millions through you had to raise the water so that it was only eleven inches from the top, would it be a matter of any actual consequence in the utility of the work?

A. It would be of consequence in the utility of the work when we came to deliver the seventy millions in the future, then the pipe that would—the additional pipe that would be required would have to be larger than would be necessary.

Q. You mean the pipe below that then?

A. I mean the pipe that brings the water to the upper end of the Watchung tunnel section.

Q. It would have to deliver it under one inch greater head?

A. A less head, because you raise the water one inch.

Q. It would have to deliver it to the tunnel at one inch greater head—the tunnel would receive it one inch greater head?

A. No, less head, because the water is higher and the pipe would have to be somewhat larger, and that would mean more expense.

Q. The pipe would bring it down, and in that case it would have to deliver so that the level of the water in it would have to be one inch higher?

A. Yes, sir.

Q. Well, that is hardly an appreciable proposition of several miles of conduit. It would take a very fine survey to find that difference twice alike, wouldn't it?

A. Yes, it would take rather a close observation to detect in ten miles a difference of one inch.

Q. Is it a matter of any materiality?

A. Yes, it is.

Q. How is it material?

A. In effecting the size of the pipe required in the future.

Q. That is, that portion of the line above the Watchung tunnel which is of steel pipe and must ultimately be reinforced, would have to be a trifle larger to deliver one inch less here?

A. Yes, sir. The gradients are so slight and flat now that an inch or two inches might make an inch or two difference in diameter.

Q. That would only apply to the first piece of pipe above Watchung tunnel before you get to the second tunnel?

A. Yes, applied to that length of pipe between conduits No. 3 and No. 4.

Q. This piece of pipe about thirty-six hundred feet, a short way above the tunnel?

A. Yes, sir.

Q. You referred yesterday to what you called the silk mill in Boonton, Pelgram & Meyers Silk Company.

A. Yes, sir.

Q. When did you last examine that?

A. I stopped at the doors to see the method of disposing of the wastes in either January or February of this year.

Q. I understand you to say that there is one system of closets there which is but little used?

A. Yes.

Q. Which you made a little comment about, and the other one as a vault of cinders in which the droppings go, is that right?

A. A shallow open pit of cinders.

Q. Is cinders proper material for use in such vaults?

A. I should not consider them so.

Q. How deed is that vault?

A. I saw no vault, I saw nothing but a shallow pit.

Q. Well, how deep was it?

A. It was about, I should say, three feet or four feet in its deepest place, below the surface of the ground.

Q. Did you know that there was a vault under that pit?

A. No, sir.

Q. You didn't ascertain that fact?

A. I never heard of it.

Q. How big is the pit?

A. I don't know—oh, the pit was I should say, about ten feet long and about five or six feet wide, bowl shape, maybe eight feet wide in its widest place.

Q. Is not what you saw the caving in of a vault which was very much deeper, that was there?

A. I think not. The proprietor of the mill, or the superintendent of the mill never called my attention to the fact that there had been a vault there.

Q. To what extent did you examine it?

A. Simply by looking at it and standing over it.

Q. How far is it from the Rockaway river?

A. Horizontally I should say not over thirty feet, vertically about twenty feet, it is on a steep bank of the river.

Q. You spoke of seeing some paper and other solid matter collected on the surface and being burned, with pieces of wood, had that anything to do with this vault or pit?

A. Yes.

Q. What?

A. It had this to do—that the solid excreta that remained on the surface of the bottom of the pit was incinerated by this burning.

Q. You saw them taking it out and burning it?

A. No, sir, I didn't see them taking it out, I saw the fire in operation.

Q. Why do you assume that was the method?

A. Because that is what the superintendent told me was done. I also understand that Mr. Gibson—

Q. Isn't it a fact that they took out waste paper to burn, and is not that all there was to it,—they had the waste paper to burn?

A. They took out waste paper and some wood and then raked upon this the solid matter that had collected on the bottom, and burned the whole mass.

Q. Well, do you mean to say that burning is not a proper method of disposing of the paper?

A. It is a perfectly proper method to dispose of the paper, but this is paper plus excreta.

Q. You mean they would rake out of the bottom of the vault excreta and put it on this fire?

A. I say I don't know of any vault being there, I said on the surface of this pit.

Q. Do you mean to say they raked the solid matter out of the bottom of the pit and put it on the fire?

A. Yes, they mixed it with the paper and burned it in that way, so as to get rid of the whole stuff.

Q. Did you see an inlet pipe which goes into this pit or vault?

A. Yes—there was no vault, I should say.

Q. Did you see the pipes?

A. Yes.

Q. Was any sewage coming down through them into it?

A. Yes, at one time I saw some liquid waste coming in.

Q. Suppose they had disposed of excreta by burning, is not that the proper method of doing it?

A. That is one method.

Q. Do you know of any better?

A. Yes.

Q. If the burning is effective there is no better purification than that, is there?

A. If the burning is effective the purification

thus accomplished is good. My criticism is that it is not a regular procedure, and that large amounts of liquid wastes can filter through an improper filter, a filter that is too coarse.

Q. And the complaint you made is that possibly after filtering through the cinders it may filter through the intervening earth and so on down the river?

A. It filters directly over the portion of these cinders and to the earth and gets into the river directly.

Q. How do you know?

A. I saw some moisture there at the bottom on one occasion.

Q. At the bottom of what?

A. The bottom of the river bank where the cinders came out.

Q. And would you expect to see no moisture there?

A. If it went through the earth there would be no moisture coming through this mass of cinders, therefore it does not go through the earth but goes through the cinders and finds it way to the river.

Q. You are assuming a good deal now, Mr. Kuichling, when you say that because you saw moisture there that excreta finds its way directly into the river?

A. No. sir, I mean exactly what I say.

Q. You saw no moisture?

A. I saw what I believed to be excreta, I saw moisture there and moisture coming in the contents of water closets.

Q. You saw on the bank of the river—thirty feet away—you saw moisture on the bank?

A. Yes, sir.

Q. And from that you are concluding that it came from those water closets?

A. Yes, sir, because I saw moisture go in on the top.

Q. You saw it go into the cinder bed?

A. Yes, sir.

Q. But you could not recognize the water?

A. Couldn't trace the same water or identify that, but the inference is legitimate—unavoidable.

Q. Did you make any such statement or claim at the time of your inspection, that there was any fecal matter going into the river?

A. I objected to it to Doctor Leah—

Q. You are speaking of 1904?

A. Yes, sir.

Q. Didn't you say that if the wall was built up which had been washed away by the flood that the place would be satisfactory at that time?

A. If the wall were backed up with proper filtering material, yes, but not with cinders; the doctor knows that I objected to such coarse filtration, and that was the whole burden of my argument with him.

Q. The lower level of the canal you spoke of as having filthy water in it; that carried the water past the dam down to Mountville and below, doesn't it?

A. I believe it does, yes, sir.

Q. And what gets into the lower level of the canal then ordinarily and properly should be carried on by the dam, should it not?

A. It should probably, yes, sir.

Q. You say in February you went there with Mr. Whipple and you saw a back flow of slight extent and for a short duration taking place. For how long a duration did you see that?

A. The back flow lasted, I think, about four or five minutes when some one turned on—

Q. That is sufficient.

A. —the water and increased the flow and made it go the other way.

Q. How long were you there observing conditions?

A. Over a half hour.

Q. What caused the flow to reverse itself for those four or five minutes?

A. A larger drainage on the part of the mill just above this dam or barrier than the raceway supplied, thereby drawing the water down and reducing the head.

Q. Who was in your party besides Whipple?

A. Whipple and I were there alone on that occasion.

Q. Anybody else along?

A. Not that I am aware of.

Q. Anybody else standing about?

A. Yes, sir.

Q. Didn't somebody monkey with those gates?

A. Not that I know of.

Q. Why did that natural flow down the lower level of the canal for those four or five minutes reverse itself and make, for a short duration and to slight extent, a back flow; how is that possible, unless somebody monkeyed with the gates while you were there?

A. Well, I don't know what you mean by monkeyed, and secondly, I don't know what you mean by gates. I don't know those two terms.

Q. Well, you were familiar with it, you have just spoken of gates, and I will leave you to explain.

A. Very well, if you will let me explain it will be very easy. In this structure, to which reference is made here, built by the Water Supply Company across the mouth of the raceway which brings water from the upper level of the canal into the lower level and to one side of the inclined plane, there are two sets of gates, one a series of four or five check or flap gates at the top; these are about six inches or eight inches, possibly, high, and then there are two larger gates, regular water work stop valves in the body of the structure that are entirely submerged and invisible.

Q. You are speaking of what point now?

A. I am speaking of this structure, or dam or bulkhead.

Q. The new one that was put in?

A. Yes, sir.

Q. What you call the new structure?

A. Yes, sir; those are the gates to which I refer. Now, then, there is visible from the surface the tops of the two stop valves that are imbedded in the body of the structure. I believe that on this day of the inspection one of these valves was open.

Q. Why do you say that—what knowledge have you of that?

A. Mr. Whipple poured into the canal blueing, which is a little heavier than water, and it gradually settled down, and we poured it in purposely because we had no means of determining whether the gates were open by mechanical means. We poured in blueing and in a short time we found the blueing working out from the structure towards the middle of the lower level of the canal,—

Q. Is that what you—

A. —indicating sub-surface flow.

Q. Never mind, I want facts.

A. Well, that is a fact.

Q. Is that the evidence you have of the slight flow backwards you speak of?

A. No, sir, that is the positive flow forward. Now, then, the slight flow backward was—

Q. Was that blueing put in the lower level or upper?

A. Lower level.

Q. And stayed in the lower level?

A. Yes, sir.

Q. How did that show in the passage through the gates?

A. If it moved in perfectly still water that had no jet or otherwise, apparently going into it, you would look for a concealed jet.

Q. The lower level is never still, always flowing?

A. No, flowing because it has to have some water admitted,—there is no water admitted except as it came through these lower gates, or through the upper set of gates. Now the intention is—

Q. I object to the intention, I want to know what you observed?

A. That is the observation, I want to give it.

Q. This back flow of slight extent and short duration, what evidence of it did you see?

A. I saw it.

Q. Saw what?

A. Saw the back flow, saw the water flow from the lower level of the canal back into this raceway for a short period of time and to slight extent, exactly as I have stated and testified.

Q. How far did it flow back?

A. I am unable to say, I should say it went back perhaps six or eight feet, maybe ten feet.

Q. That was by some chips or something on the surface?

A. No, it was discolored water coming in, fragments of filth, if you like.

Q. From where?

A. From the lower level.

Q. Going through what?

A. The passage way between the ends of these flaps that I am trying to describe, the upper set of flaps and the side of the structure adjacent to these flaps, there was a passage way of say about eight and a quarter of an inch in width, and through that some of the water passed.

Q. These flaps are designed to close if there is any back flow and open with any down flow?

A. Yes, sir.

Q. Well, then, is that why they did not close absolutely tight?

A. That is one point.

Q. That new structure was put in at your suggestion, wasn't it, by the Jersey City Water Supply Company?

A. It is not fully in accordance with my suggestion, I asked for something a little different.

Q. It is not quite as you would have it?

A. Not quite.

Q. But it was put in upon your suggestion?

A. Yes, sir.

Q. Made in 1904?

A. Yes, sir.

Q. Did you not state at that time that if those gates were put in the condition of the lower level would be satisfactory?

A. I stated that if the back flow were prevented then it would be satisfactory, and I still say that.

Q. You don't pretend that you saw anything of any substantial quantity or account at all in the way of back flow that day, do you?

A. Not at that time, sir, because at that moment there was no opportunity to test the case fully, because some one else interfered with the observation.

Q. Coming to the upper level you say that it receives the leechings from a number of houses adjacent to the canal and to the inclined plane, what do you mean by leechings?

A. The house slops, water that is thrown on the surface of the ground.

Q. Kitchen water, for example?

A. That might be, yes, sir, that is slop water, that is one kind of slop water—wash water.

Q. There are houses on higher levels. Now why do you say the leechings are there, did you see where they had thrown out water?

A. Yes, sir, the surface of the ground shows discoloration.

Q. That the people had thrown out on to the ground their dish pans or whatever leechings there might be?

A. Yes, sir.

Q. Do you mean to tell us seriously that that

practice is a menace of any account to the water supply of Jersey City?

A. If confined to only dish water the menace would be small, but there are other wastes that come under the head of slops that become a positive menace.

Q. What do you have in mind?

A. Excreta—liquid excreta, in plain English urine.

Q. You assumed by seeing this discoloration that these householders have thrown out such slops upon the surface of the ground?

A. I assume that it is possible for them to do so, and I claim that that should be stopped.

Q. Because it is possible for them to do so, you present that as a menace to this water supply, do you?

A. Yes, sir.

Q. That is true of every square mile of that water shed?

A. Yes, sir.

Q. And of every inhabited portion of this State?

A. Yes, sir.

Q. Is it possible to leave the water shed inhabited and to make any effective provision against such a thing as that?

A. Not wholly, but the great points of pollution can be controlled and stopped.

Q. Now the next thing you mentioned was the Brook street sewer, what do you mean by sewer—and right here I will ask you, you have used the term many times in your testimony, you also used the word drain. I want to know what you meant by sewer and what you meant by drain?

A. A sewer, as I have used the word, is a covered channel that carries the liquid wastes from households, also from manufacturing establishments and surface water. On the other hand, a drain is supposed to be a channel which carry simply water that

percolates through the soil and is clear and not discolored.

Q. Well, a sewer is something that carries sewage, then, isn't it,—what is commonly known as sewage?

A. A sewer carries sewage, yes, sir.

Q. And that would be either excreta and the like or factory sewage, is that right?

A. Or house wastes.

Q. Suppose there was a pipe from the kitchen sink, a pipe leading out from that for a few feet and emptying on to the ground, would you call that a sewer?

A. The kitchen slops come under the classification of sewage. Sewage embraces kitchen slops.

Q. Do you know what is tributary to this Brook street sewer, whether any water closets or what—by the way, what is the Brook street sewer, is it a drain or a sewer?

A. I should regard it as a sewer.

Q. Is it a covered pipe?

A. It is a covered channel about two feet square, all I have seen of it, built of rubble masonry and containing and carrying at all times that I have seen it dirt and discolored water.

Q. Is it a running brook—natural running brook?

A. I should not consider it so.

Q. Haven't you observed it sufficiently to see that it is a natural running brook draining a considerable area,—two hundred acres?

A. I am informed that the drainage, the natural drainage from a considerable territory is conducted into this covered channel.

Q. You haven't followed it up during its length to see?

A. No, sir.

Q. You don't know that for two-thirds of its length it is an open ditch?

A. I know that for a few hundred feet it is a covered channel.

Q. Have you been up far enough to see that it is an open running brook up above where the wastes are received into it?

A. I have gone up to what was known as the Brook street brook, and have seen water there, but when I saw it there was very little running.

Q. There are no water closets emptying into this Brook street sewer, are there?

A. There were water closets at one time.

Q. Name any?

A. The Mansion House.

Q. Any other?

A. That is the only one that I know of now.

Q. That was cut off some years ago, wasn't it?

A. Not that I am aware of, sir.

Q. Don't you know that it is cut off now?

A. No, sir.

Q. Now this Brook street sewer carries the water down into the semi-circular channel which the Water Company provided, does it?

A. Yes, sir.

Q. And you say that in times of heavy rainfall the sewer carried more water than the semi-circular or channel will carry, how do you know that?

A. I took that in answer to a question that was put, I think, giving the statement that there were two hundred acres, and that this Brook street sewer carries the entire stream flow from that territory. If that be true then it may carry in times of heavy storm more water than that semi-circular channel will discharge.

Q. If the semi-circular channel has a capacity of fifty-six million gallons in twenty-four hours, would you still think it would not accommodate the Brook street sewer?

A. Yes, sir.

Q. Though a flood might still overflow it?

A. Yes, sir.

Q. You have never seen an occasion when it has overflowed it?

A. I have seen evidences of overflow numerous times.

Q. You refer now to what you saw down at the inclined plane where at some time water had apparently been emptied on to the surface, is that it?

A. Where water had flown over the chamber which had been built by the Jersey City Water Company for the reception of this water, and then flown transversely across the plane into a channel —natural drainage chanel or artificial, which leads down into the river below or into the canal below.

Q. When did you see the evidences of such a flow across the inclined plane?

A. Last time I was at Boonton.

Q. When?

A. That was on May 9th.

Q. And you assumed that it was an overflow of this semi-circular drain?

A. I assumed that overflow had taken place to some extent.

By Mr. Vredenburgh:

Q. You mean May 9th of this year?

A. May 9th of this year; yes, sir.

Further Cross.

Q. What do you mean by saying that the rights of the Cooper-Lord estate was paramount to the canal company in drawing water?

A. I mean to say that is the statement that I have read in some of the New Jersey State Reports.

Q. You don't mean to pass on that question of law?

A. No, sir, I want to have that distinctly stated.

Q. The Cooper Lord draws its supply of water for its wheels out of a level which is the same level as the upper level of the canal, is that it,—out of a

basin which is the same level of the canal, is that right?

A. The canal,—it is.

Q. And that canal, the level is fed up above Boonton at Powerville, is it not?

A. No, sir, just a little above, about a quarter of a mile above the plane, the river is diverted into the canal by means of a dam which is known as the Cooper-Lord dam, and Powerville is a mile or two above that.

Q. The canal of that level is fed at Powerville, isn't it—that level of the canal is fed at Powerville?

A. No, sir.

Q. Is there a lock between?

A. There is a lock between, yes, sir, there is a lock, just after leaving the Cooper-Lord dam there is a little lock there.

Q. There is a lock there?

A. Yes, sir.

Q. Then the level above that lock sets the water back all the way to Powerville lock?

A. I believe so.

Q. And there is the Powerville intake of the canal?

A. Yes, sir.

Q. Now that upper level that you have been speaking of then is a short level right there opposite Cooper-Lord property, isn't it?

A. It is above the Cooper-Lord property.

Q. How long is it?

A. I think it is fifteen hundred or two thousand feet long, I don't know quite, I have the figures somewhere here.

Q. In that upper level you think there came in pollutions from the leechings of the houses on the bank of the river to the east?

A. Yes, sir, also sewers or drains.

Q. Well, now, sewers, name any sewer that comes into that upper level of the canal?

A. There is a large sewer, I should think something like two feet or twenty inches in diameter that comes into this upper level and appears on the bank,—It appears on the high bank and then discharges down, drops down on the surface.

Q. Well, you call it a sewer,—it is this drain which carries the surface stream water of the streets near there, isn't it?

A. It carries also discolored slop, water house slops, I should say.

Q. Where does any house water get into that unless it comes through the gutters of the street?

A. I presume it comes from the street gutters.

Q. If there is slop water there it is water that the people have thrown out into the street?

A. It may be there is a connection, I don't know, I didn't trace them up.

Q. Do you know or not?

A. I don't.

Q. That is primarily a street surface storm? water drain, isn't it?

A. It was so stated to me.

Q. Now what else—then that hardly comes in under your definition of sewer?

A. It would come in if it receives the slop water, I should call that sewer.

Q. What else in the way of drain or sewer did you find emptying into this upper level of the canal at Boonton?

A. I think now there are two pipes of something like a foot or less in diameter that have also carried discolored water.

Q. Can you definitely locate them?

A. I cannot now.

Q. You are speaking now of something you saw in 1904?

A. Yes, sir.

Q. Do you know of any of them that carries any fecal discharge or anything like that?

A. I don't know of my own knowledge.

Q. Now the drain provided by the Water Company alongside of the canal is below the mouth of these that you have now been mentioning?

A. Yes, sir.

Q. And intercepts them certainly to some extent?

A. No, sir.

Q. Why not, if it is below them?

A. Because between the end of the twelve inch pipe laid by the Water Company or the ditch extended by them and these other drains, there is a barrier by which causes this other water to go into the canal.

Q. Jumps the company's ditch, does it?

A. The company's ditch is filled up, when I saw it at one time there was a foot and a half of earth.

Q. You mean the semi-circular drain?

A. Not this drain, no, sir.

Q. But the ditch they have there?

A. From the top of the incline up to the upper feet level, they have a few hundred feet or twelve inch drain tile laid in ditch on one side of the canal, and it communicates with the channel or semi-circular section channel that goes down the incline.

Q. Along this upper level is there any drain provided by the Water Company parallel with the canal, and extending up to the last house on that level, taking the drainage of even the last house and carrying it down below with a constantly running stream of water through it?

A. I am not aware that there is any such drain; there wasn't any such drain when I inspected that upper level.

Q. With the exception of this silk mill you have mentioned, do you know of any place where there is any fecal matter in Boonton finding its way into the Rockaway river?

A. I have seen, as I stated before, some fecal matter on the sides of the canal, the lower level of the canal.

Q. Dropped there or brought there by drain do you mean?

A. I rather fancy it is deposited there by some drain.

Q. Did you see any drain to deposit it?

A. No, I didn't examine it close enough.

Q. You cannot locate that now?

A. Cannot definitely. The Brook street sewer may contain fecal matter for all I know, it did at one time by demonstration.

Q. When did you last examine the rag mill at Powerville?

A. I think in February, either the last of January or the beginning of February of this year.

Q. I didn't understand you definitely to say that any of the washing from that was traced by you to the Rockaway river?

A. I saw leeching from the exposed piles of rags going into the river directly.

Q. You mean piles of rags standing in the open air?

A. Yes, sir.

Q. Where the rain would fall upon them?

A. Yes, sir.

Q. And the rain water might after falling upon them run into the river, is that it?

A. Yes, sir.

Q. That is what you referred to when you spoke of leeching at that place?

A. Another refrence to leeching I should say is the leeching from this little filter pit that they have with a cinder surface in the rear of the mill and which I saw on one occasion running to within a few rods perhaps fifty feet of the edge of the river.

Q. What do you mean by filter pits?

A. I referred to a pit that they had dug to which they took some of their waste water and tried to purify it in some degree by filtering it through a little shallow bed of cinders; a little shallow exca-

vation made in a bed of cinders in the rear of their property.

Q. Are you now aware that under their method of operating there there is no discharge from the mill but that the material used there is used over and over again?

A. I am aware of the fact that they had got rid of some of their polluted water and tried it in the manner that I have described, and that they don't use this matter over and over again.

Q. You call that a filter do you?

A. An attempt. No, sir, I don't call it a filter, I shall want to qualify that statement by saying an attempt or burlesque at filtration.

Q. What are these manufactured wastes from the Liondale print works which are discharged into the river?

A. There are various dyestuffs depending upon the color produced.

Q. What dyestuffs?

A. They dye cotton cloth as I understand it.

Q. How far can these dyes be observed in the water below the works?

A. Oh, when they come out of there of a certain pronounced color you can discover them all the way down the river. I have found them down the river myself.

Q. The brook which leads to the river?

A. Yes, sir.

Q. How far is that?

A. I should say a distance of four hundred or five hundred feet from the mill, may be six hundred feet from the mill.

Q. When you get that distance from the mill, or a little more, that color entirely disappears as far as the eye is concerned.

A. No, sir, quite the reverse; it continues down the river as far as you can see it.

Q. Have you ever followed it.

A. I followed it a thousand feet, and there was

dirty water going down there for a thousand feet.

Q. Dirty water? I am speaking of dye stuff.

A. Mr. Whipple and I traced it down the bank of the river a thousand feet at least.

Q. It did disappear after a while?

A. I never followed it down to the end.

Q. You did not follow it as far as Boonton?

A. No, sir.

Q. Or to Denville?

A. That is above.

Q. No, it is below.

A. I thought it was above.

Q. Well, these dye stuff, are they at all harmful to the water?

A. Not necessarily, but there are other matters go in too—chloride of lime I understand goes in.

Q. Chloride of lime?

A. Yes.

Q. Is there any harm in that?

A. Not particularly. It is poison by itself.

Q. But going into the water there, under those conditions, it does no harm to the water at Boonton?

A. No, sir, probably not.

Q. Chloride of lime is a disinfectant, is it not?

A. It is a disinfectant.

Q. Is there anything goes in there besides that?

A. A large amount of other foul matter and dirt which become putrid in the septic tanks, or apologies rather for septic tanks, which I have described; it undergoes putrifaction even in cold weather.

Q. What is that?

A. That I don't know, that is a question I have been unable to determine.

Q. And that goes into these burlesque tanks you have spoken of?

A. Yes, sir, they are there yet.

Q. You have not recently examined the water closet arrangements at the Lyondale Print Works?

A. No, sir.

Q. The examination of that part was in 1904?

A. Yes, sir, and I think also once in 1905.

Q. Now you have testified here that you examined the character of the soil in various places, where it was excavated or uncovered. What examination did you make?

A. I looked at the soil and dug into it with a stick and observed where similar soil appeared, etc.

Q. What place was it you dug into it with a stick?

A. Two or three excavations on—well, I don't know the name of the street, it is the main street, I think, as we drove up there. There were some excavations which had been made for cellars, and there was one excavation for a privy bed, where they wanted to change it, and some places where they had dug ditches for drainage purposes, to get rid of some surface water, and in the City itself there are about four or five places where cellars were dug,—there was one right near the railroad station.

Q. Was this all gravelly soil, wherever you observed it?

A. In every instance it was coarse gravelly soil.

Q. Without any garden soil above it?

A. A very slight layer of garden soil above it.

Q. Did you see any clay?

A. No, sir, I saw no clay in any of those places adjacent to the river.

Q. At those places where you say you observed it you saw gravel with garden soil above it?

A. Yes, sir.

Q. Is not fine gravel and sand favorable to disinfecting purposes and filtration purposes?

A. Fine sand is but not gravel. Gravel is used as a collector of the water after being filtered through fine sand; I never heard of gravel being used to filter with.

Q. Didn't you find very fine gravel there?

A. No, sir, all I found was coarse gravel.

Q. How about garden soil, was that favorable for filtration?

A. Well, that would be.

Q. And ordinary farm loam is?

A. Yes, sir.

Q. That is best of all?

A. No, sir.

Q. What is best of all?

A. Probably the most efficient of all would be an under layer of very fine sand.

Q. To oxidize this organic matter?

A. Not to oxidize it but to purify it.

Q. Well, you want soil for that like garden soil, don't you?

A. What, to oxidize it?

Q. Yes.

A. No, sir, not that I am aware of, not to oxidize it.

Q. Now you have given us a suggestion about putting in what you call disposal works at Dover, in the shape of a pipe. What is your idea, to lay it along the river or along the street?

A. I should lay it along the river in the rear of the houses where practical, and otherwise in the street, and then connect the houses with it.

Q. Suppose you had to lay it along the river for the privies along the river bank, what earthly good would it be to them?

A. No good to them, unless the privies could be abolished, having substituted for them water closets

Q. Does your plan include abolishment of the privy system and the substitution of a water closet system with water?

A. In those places where they are objectionable, yes, sir.

Q. And the pipe which you suggested would be sufficient to carry off the drainage of the whole of those six thousand people, if they had water closets?

A. Not the drainage but to cary off the sewage.

A. Well, I don't mean surface drainage, you did not reckon for that, I suppose?

A. No, sir, not in that case.

Q. But if the whole of the six thousand people there had water closets it would take all of their sewage?

A. Yes, sir.

Q. You didn't plan to get them all connected with it, did you?

A. Yes, sir, I planned for it in this way, that by such a sewer, when available, it would not require much effort to cause connections to be made.

Q. You think you could induce one of those people with a Three Dollar back house on the Rockaway banks to convert it into a $150 water closet?

A. I would not expect that. I would expect to perform the work of making these connections for the man, if he would not—if he would not do it himself and could not be compelled by law to do it.

Q. You of course have not examined the legal question of how far that could be enforced?

A. I have examined the act of 1897 to which Dr. Leal called my attention.

Q. Well, that is for the punishment of pollution of waters in a stream?

A. Yes, sir.

Q. Does it say anything about making persons convert their back houses into water closets?

A. No, sir, not directly—the language is not used.

Q. There is no sewage system in Dover, is there?

A. No general system.

Q. Nor yet in Boonton?

A. Not that I know of.

Q. Nor in Rockaway?

A. No, sir.

Q. Nor in Port Oran?

A. No, sir.

Q. Nor in Hibernia?

A. No, sir.

Q. You have mentioned two places at Dover, one near the bridge and the other one at—I don't know but what they were both near the bridge, an iron pipe from one of them, of which you say you observed fecal matter coming?

A. From one fecal matter was seen coming.

Q. When?

A. That was either the end of January or the beginning of February of this year.

Q. Is that the one that Mr. Whipple saw?

A. Yes, sir.

Q. And the incident to which he testified?

A. Yes, sir, he brought the material with him as an exhibit in this case.

Adjourned until Monday the 21st day of May, 1906, at the Chancery Chambers, Newark, N. J., at 9.45 A. M.

Emil Kuichling resumes the stand.

Further cross examination by Mr. Corbin.

Q. What was the date when you went to the silk mill at Boonton?

A. The first memorandum I made was on July 7, 1904. I may have been there before and probably was, but I made no memorandum of the visit.

Q. Who was with you?

A. At that time Mr. Ferris, Dr. Leal, Mr. Gibson and Mr. Honness.

Q. Is that the time you saw the fecal matter there?

A. Not at that time.

Q. When was it?

A. Later, on a subsequent occasion.

Q. When did you go there afterwards?

A. I can't give you perhaps the exact dates, but

on numerous occasions after that when I went to Boonton and to the reservoir, because this mill was right on the road only a few rods from where we turned to go down to the reservoir, and frequently I went to this place.

A. Your visits were all in 1904?

A. Yes, sir; but I can say this, the last visit there was early in February, with Mr. Whipple.

Q. This year?

A. Yes, sir, early in February of this year, January or February, I cannot give you the date exactly.

Q. Now turn to Boonton, this plan of disposal sewer which you have outlined does not involve disposing of any surface drainage, does it, but only house drainage?

A. Yes, it would involve the disposal of the usual light rain surface drainage, not the heavy rain surface drainage.

Q. Do you mean that you would connect all the gutters of the city with it?

A. No, sir, I would connect a number of sewers with this new sewer that would intercept them, taking say 5 to 6 times the quantity of dry weather flow, and allow the remainder to discharge into the Rockaway river.

Q. How would you get the ordinary rains into it unless you connected the street gutters with the sewer?

A. We do that. In an ordinary rain we take the whole of the flow.

Q. You mean that the light street washings go into the sewer?

A. Yes, sir, they go into a regular sewer.

Q. Well, when there came a heavy flood rain the sewer would not be sufficient to carry it all off?

A. No, the intercepting sewer would not be in a condition to carry it all off.

Q. Then you meant just in the condition you found the drain you spoke of there at Boonton?

A. Yes, sir.

Q. That is a very usual condition, is it not?

A. Not very usual; intercepting sewers are not very common.

Q. Well, there are two systems of building sewers, one for taking the whole surface drainage, or such as is in use here in Newark and in many parts of New York, and the other system of sewers which takes simply the house drainage and perhaps a little added flushing from the rain?

A. Yes, sir, that is the general sewer system of the towns, but for an intercepting sewer and disposal works something different is done.

Q. Well, with a disposal sewer you would not expect to take care of the whole street washings of the town?

A. No, sir.

Q. Yet they do it in Newark, Jersey City and New York?

A. Not that I am aware of.

Q. Is there any provision for taking off the wash from Broadway, for instance?

A. Yes, sir, it goes right into the rivers on each side.

Q. It goes into sewers first?

A. Yes, sir, but they are not intercepting sewers.

Q. They are flood water sewers?

A. Yes, sir, storm water sewers esesntially, and there is no attempt at disposal or treatment.

Q. The menace which exists from drainage and sewage is chiefly from human excreta matter, isn't it, that is, the menace which might render waters dangerous to public health?

A. That is generally so regarded.

Q. The surface drainage of the land or of public roads is not usually considered as specially objectionable, is it?

A. The washings of populous streets is regarded

by chemists and sanitarians as fully as objectionable as the house wastes.

Q. Even though it has not any fecal matter?

A. It has fecal matter from animals.

Q. Well, that doesn't cause infectious diseases, does it?

A. Not so far as yet known.

Q. Why then do you call that as bad as the other?

A. Because it furnishes the food for the development of the germs that come from human excreta.

Q. There is food enough for that in any surface water, isn't there?

A. No, sir.

Q. Well, in ordinary conditions there is?

A. Not that I am aware of and never heard there was. There is a difference between existence for a short time and thriving and flourishing; the latter requires food supply.

Q. If then there is danger in the washings of public highways and streets to get an ideal condition you would have to abolish the public highways in the water shed?

A. No, sir.

Q. Well, you wouldn't consider it feasible to take off the storm waters from streets and roads in a water shed, would you?

A. It has been done.

Q. Where was that ever done?

A. There are various places where all of the storm water is purified—partially, and filtered.

Q. It must have been on a rather small scale?

A. On a scale of as large as that of Dover and larger I think.

Q. But you would not suggest any attempt to prevent storm waters of the roads of the Rockaway water shed from getting into the river, would you?

A. I would not attempt it on ordinary country roads, but I would try to exclude the drainage or

surface washings of populous streets like the business streets of Dover, Boonton, etc.

Q. Now you spoke of these germs having come from the street washings,—they don't multiply in water at all, do they,—these dangerous germs?

A. That is not established, sir.

Q. Well, it is not established that they do, is it?

A. The presumption is rather that they do.

Q. Wouldn't you be disposed to agree with Mr. Whipple on that?

A. Not fully sir, I don't remember that Mr. Whipple stated the conditions of the water.

Q. What are the disease germs in water that you consider give danger of infection?

A. The usual ones that are held up for objection are the typhoid, the cholera, diphtheria, diaorrhea. To those may be added, according to some sanitarians, scarlet fever and a variety of other diseases that are not usually mentioned, sometimes, in polite society.

Q. Do you mean to say, Mr. Kuichling, that the learning of the present day attributes the infection of diphtheria to germs carried in water?

A. Yes, sir, I mean to say that there is a very large contingent of sanitarians and investigators, as good as any investigators, who maintain that diphtheria is propagated and can be propagated and often is propagated by drinking water.

Q. You speak of it in connection with the human sewage—human excreta, do you think that the learning of to-day has any such theory as that?

A. No, by excreta in that case, I understand expectorations—that is one of the excreta of the body, not necessarily of the digestive system alone; I had that in mind certainly, I don't think I would be guilty of assuming that diphtheria would come from the digestive tract as a source.

Q. So that, when you spoke of street water carrying diphtheria germs, you mean the spittle?

A. Sputum.

New Jersey State Library

Q. But the disease isn't borne by water, is it?

A. It is so claimed, sir.

Q. Name any authority.

I will mention to you one that I now have in mind, Baldwin Latham. And I think it was also established by the investigator that made the famous investigations for the National Board of Health along about 1880: he has a Hungarian name. His name has just escaped me. More in classic investigations on the subject of diphtheria.

Q. Can you name any more recent authority?

A. I don't have them in mind now; but I find that there are, in reading the subject recently, I find that there are authorities who will admit that view for diphtheria, that it can be borne, transmitted, by water.

Q. Isn't it also true that scarlet fever is not a water borne disease at all?

A. It is not usually so regarded.

Q. Why do you name that, then, as one of the dangers of the water?

A. Because some sanitarians claim that they have evidence to that effect.

Q. Who claims that in these days?

A. I would also mention Latham.

Q. How long ago did Latham live?

A. I haven't heard that he is dead yet.

Q. When did he propound any such theory?

A. He told me of this in 1889, when I had personal conversations with him; and I think I have some papers of his that he read before some Sanitary Congress to that effect.

Q. Practically, isn't it a fact that the diseases to be feared as transmitted through water are typhoid fever and cholera?

A. That is the general popular notion, yes, sir.

Q. It is the scientific notion, isn't it, too?

A. Oh, no. The health officers with whom I have operated and co-operated have feared other things; such as diseases that follow from the bathing in the

water. There have been lots of cases where, for instance, troubles with the eye have been found in consequence of bathing in polluted water.

Q. Now, your suggestions of drains, etc., at Mt. Tabor and Hibernia look simply to the interception of surface flows, don't they?

A. Yes. Well, the surface flows—calling the mine drainage (which flows in a channel, in a masonry channel, and which is part—) calling that surface drainage, I should say that—

Q. Other than mine drainage, it is surface drainage?

A. Yes, sir.

Q. Take the question of the mines. You say the water dumped from one of the mines was dark, and the analysis showed it to be impure. What knowledge have you of that?

A. I saw the water. And I have Mr. Whipple's evidence as to the character of the water. I saw Mr. Whipple take the sample of it, and I believe that he analyzed that sample which he took.

Q. That is what you referred to when speaking of the analysis showing it to be impure?

A. Yes, sir.

Q. Now as to conditions actually existing in the mines, with regard to the droppings of the men who are there, you don't know of your own knowledge, do you?

A. No, sir. Admission to the mines was refused; but I give this on the evidence of the superintendent.

Q. You spoke in one case of all the excreta of the men in the mines being tributary to this water taken out? You don't know anything on that point of your own knowledge?

A. Not absolutely.

Q. You don't know the arrangements in the mines, do you, for taking care of that?

A. Except as the superintendent of the mine told me.

Q. That was in 1904?

A. Yes, sir.

Q. One of the mines, as I understand you, discharged clear looking water, and the other muddy water?

A. Yes, sir.

Q. What color was the muddy water?

A. Dark gray.

Q. It is an iron mine, isn't it?

A. I believe they all are, yes.

Q. Now you said in answer to a question, that you would consider that there was danger in the water as delivered to Jersey City. You base that upon these observations which you have rehearsed to us?

A. Yes, sir, what I have actually seen at the water shed.

Q. Now referring for a moment to this matter of washings on the street, you spoke of a system whereby—or a disposal system whereby ordinary rainfall washings on the street would be carried into a sewer, but that in times of flood, the water from the flood would go off into the river?

A. That is the ordinary sort of thing in some small towns where there is a drainage system—that a small part of the rainfall goes into the sewers and the flood water flow goes into the river. That is practically the system of disposal sewers where the sewage is to be purified.

Q. And is unobjectionable?

A. Objectionable in some respects.

Q. The worst of the danger if there was any in street washing, would generally be carried away by the first flood, before the capacity of your sewer was reached?

A. Yes, sir.

Q. And when the great flood came, those waters would flow out of the sky pure and supposed not to carry any pollution?

A. That is the other assumption.

Q. That is about right, is it not?

A. In some places it is very strenuously denied.

Q. It is so in places, is it not?

A. Yes, sir, for the reason that it has been financially possible to deal with the flow in communities instead of taking all the flow.

Q. Well, taking all the flood water that falls in a city under ordinary conditions would be a matter of prohibitive cost, would it not?

A. I have so regarded it, and engineers generally regard it so, but sanitarians say that is no argument.

Q. The difference between the lowest flow of water and the highest in the year is something enormous, is it not?

A. Yes, sir, it is sometimes one thousand-fold, more or less.

Q. Don't you know in times of low rainfall it may go as low as 50 cubic feet a second, and in time of floods you may have 50,000 cubic feet a second?

A. Yes, sir.

Q. And that is true of a stream like the Passaic river, is it not?

A. Yes, sir.

Q. How are these diseases which are carried in water acquired by human beings?

A. Sometimes by ingestion, that is taken into the digestive tract, and in others by contact.

Q. For example, which?

A. Typhoid fever and cholera are taken by ingestion, and then for instance a syphillitic affection of the eye is acquired by contact.

Q. Did you say diphtheria?

A. Diphtheria is probably also taken into the mouth.

Q. How are they taken in, by ingestion—in what different ways may they be taken in?

A. Well, usually through the mouth and nose.

Q. You can take them in through water, drinking water that is infected?

A. Yes, sir.

Q. Milk?

A. Yes, sir.

Q. Gases?

A. Ordinarily not; it may be, but that is one of the disputed cases.

Q. Sewer gas?

A. That is disputed. One set of investigators insist that sewer gas will convey those germs; others that it cannot be conveyed by the air.

By the Court:

Q. Would a strip of land 50 feet wide, if acquired on each side of the stream going through Boonton, and that land should be fenced and policed, in your judgment would that be a protection against impure germs?

A. In my judgment it would be a very large protection but not a complete one; that is to say, it would be a protection for possibly 360 days in the year, but on the five days there might be an extraordinary rainfall, which rainfalls we have and which last only for a few hours, but in the aggregate for say five days there might be excessive rains, and a strip of land 50 feet wide might not be sufficient to prevent infection and contamination.

Q. From what source?

A. Surface washings ordinarily.

Q. Well, you have just said that the same thing will happen if there is a sewer system which in cases of extraordinary flow would be overflowed?

A. Then we have the advantage which was indicated by Mr. Corbin, namely, that the first washings carry off all the objectionable matter and the land is purified, and all the flow that comes after the first few minutes of storm, is simply muddy water, containing harmless mineral matters or plain

dirty matters, which does nothing more than discolor the waters and contains nothing of contamination; that is the usual theory.

Q. Is that your view?

A. It is in a large measure true from my observation. It is rather that I have found from the heavy storm washings no appreciable quantity of organic matter, and that has been the experience of most of the engineers who have given this matter close study.

Further cross examination by Mr. Corbin:

Q. You spoke of the rag mills at Powerville; that is a manufacturing of roofing paper out of rags, is it not?

A. I believe so.

Q. That is all they do is to make thick roofing paper to be tarred and put on roofs?

A. I think so; I think that is all I have seen.

Q. Are not the rags with all their dirt and grease and whatever else there may be with them made into what is called stock without washing or cleansing on any way, and then rolled into thick paper. Is there any washing of them at all—any designed washing from them at all to go into the Rockaway river?

A. They are washed to this extent, that they are torn apart into shreds, and then immersed in water and kept immersed and agitated with water for a long while and voncerted into a kind of pulp, which pulp is then pressed and rolled into sheets.

Q. And that same water is used over and over again without the vats being emptied at all, but simply added to as occasion may require?

A. The same water is used over a certain number of times, and then in these vats in which it is received, after the second or third use there is ultimately an accumulation of sediment so thick that

the pipes get clogged up, and then the tanks are emptied.

Q. Emptied of what?

A. Of its contents, a semi-liquid thick black fluid.

Q. Well, that is the black stuff that goes into the paper, itsn't it?

A. Oh, no, sir, they save some of this by straining it through burlaps which they spread upon the surface of the filter bed, but the burlap strainer is a good deal like the cobble stone strainer at Lyondale, not a very efficient filter.

Q. All the rest of its gets back into the tank by gravity except such as is lost by evaporation?

A. It does run by gravity into the different vats.

Q. Is there a single drop of it that gets into the river?

A. Oh, yes, tanks full—in the course of a year thousands of gallons.

Q. How?

A. In this manner. I have described when these tanks become so thick that the liquids will scarcely run, the contents are then strained, and 8,000 or 10,000 gallons of water and liquid does get into the river.

Q. How does it get into the river?

A. After straining through the filter.

Q. Do you mean it gets down through the earth?

A. No, sir, I don't believe it gets through the earth; I think it is too thick to go through the earth.

Q. How far from the bank is it to the river?

A. A direct line I presume, not over 100 feet.

Q. Are there any pipes or conduits to carry it to the river?

A. There is one natural gulley there, a photograph of which I attempted to take and have here with me, that leads directly from this place where they filter or partially filter this thick liquid, and this surface is graded over with cinders so that the

gulley has been to some extent obliterated on the surface.

Q. That is the gulley you spoke of as the gulley that carried the condensation water from the boiler room down to the river, is it not?

A. No, sir, that is another one; that has I think a pipe in it.

Q. Well, you will have to locate that second gully. We have never seen it. Did you ever see anything of the kind? You have been there several times in a year. Have you ever seen any of that water find its way to the river?

A. I did on one occasion. I had access to the works only twice, once when they were not in operation, and the second time when they were.

Q. What and where did you see it?

A. I saw in the first case when the works were not in operation, I saw the tanks into which the required washing liquid was pumped for re-use, and I heard the foreman describe how this filtration occasionally took place; and the second time, the only other time I was allowed access to the works, was when Mr. Whipple and I came there, and they were doing this filtering, emptying the contents of this elevated tank upon it, onto the shallow cinder bed, and on this occasion the liquid percolated through the thin walls of these shallow banks of cinders and extended 50 to 60 feet towards the river from this bed.

Q. That is what you mean?

A. Yes, sir.

Q. That it percolated through the walls and bottom of the cinder bed?

A. Yes, sir.

Q. And the object of taking this stuff to the cinder bed is to save the stock in it, is it not?

A. I believe that was the intention, yes, sir.

Q. The process is carried on with just as little water as they can use to accomplish their purpose or to make use of the stock?

A. Yes, sir.

Q. Did Mr. Whipple take samples of the water above and below that mill at the time you were with him, to ascertain the relative quality?

A. Yes, sir.

Q. Do you know the result of those analysis?

A. I don't remember them at present.

Q. Don't you know he found them just as good below as he did above?

A. No, I do not.

Re-direct examination:

Q. Mr. Kuichling, you spoke of Mr. Gibson once or twice in your testimony, who was Mr. Gibson?

A. Mr. Gibson is Dr. Leal's assistant in the sanitary supervision of the water shed of the Rockaway river, and I think the whole upper Passaic valley.

Q. You spoke of the back water, I think you called it, in the lower level canal at Boonton, and my recollection is that you said that you saw it running down toward the river, or running through that dam towards the river for four or five minutes, when the observation was interrupted by somebody. Won't you please tell us what you mean by that—first as to the four or five minutes?

A. The facts of the case were as follows: Mr. Whipple and I came there a little before noon, and we went to this dam and were inspecting it and examining it. While there, and shortly before noon we saw the water flow backward from the lower level of the canal into the raceway through the openings at the ends of the upper set of flap valves, and—

Q. Now there I would like to know how long it had been running there, to your knowledge?

A. Only for a very few minutes, possibly not more than three or four minutes,—

Q. Well, was that—

A.—because the water in the race above this dam or bulkhead was a quarter of an inch lower than the water in the canal.

Q. Wasn't it running that way when you got there?

A. No, sir, it was running the other way when we got there, I think it was running from the raceway into the lower level of the canal, then the motion stopped in that direction and a reverse motion took place which lasted a short time. Then while this was going on, some employee observed us and he disappeared and in a short time after a larger quantity of water came through the raceway than before, thereby giving a feed—a positive feed to the lower level of the canal instead of back flow. Now at that time also it is very probable that one or more of the large stop valves in the lower portion of this bulkhead was open or partially open, because there was evidence shown by the action of the blueing that Mr. Whipple placed in the canal on the down stream side of this bulkhead, that some water was flowing through these large valves.

Q. Something was said to you about the disinfecting effect of chloride of lime, is chloride of lime used to disinfect drinking water?

A. No, sir, not that I am aware of.

Q. You spoke this morning about the diseases which are borne by water; what have you to say as to the opinion of sanitary experts upon the question of very many of the diseases of children in cities, as to their origin?

A. Many physicians ascribe some of these children's diseases to impure water. For instance the ordinary diarrhœal diseases that are called by various names in medical parlance.

Q. Do you know what the effect is as to the result in those diseases, when the drinking water has been filtered before being used?

Mr. Corbin: I object. This witness does not

profess to be an expert physician or expert on the question of diseases. He says physicians say so and so.

The Court: I suppose the witness is an expert on the question of whether filtering water makes it pure,—whether it frees it from organic matter or inorganic matter.

Q. Do you know what effect the filtering of water has upon the health of communities using public water?

A. Yes, sir, it improves the public health, filtration improves the public health.

By the Court:

Q. Well, you mean the filtration of water that is polluted?

A. Yes, sir, or contaminated.

Q. Suppose that the water flowed through a lime stone region, would filtering take out the lime?

A. No, sir, such hard waters are not filtered, they may be softened by extraction of lime artificially.

Q. But what you are speaking of is that filtering frees water from some or all of the organic matter contained in it, is that it?

A. From—yes, that is about it, and especially of living organic matter that is contained in the water.

Q. Well, they say that in some parts of the Rocky mountains for instance, the water is so impregnated with salts that it is poisonous, cannot drink it, it kills anybody that drinks it, well now, that could not be cured by filtration?

A. No, sir, that is another thing.

Q. What you are referring to is the organic matter?

A. Yes, sir.

Re-direct examination:

Q. What effect has the purification of contaminated water, as shown by the statistics, upon the death rate of children in cities?

A. The death rate is largely reduced.

Re-cross examination:

Q. Now, have you examined and studied the statistics of Jersey City, to see how its death rate has been affected by the change of water?

A. Yes, sir.

Q. What do you find the death rate from typhoid fever, for example, as compared to what it was before the change in supply was made?

A. By change, do you mean from the—

Q. Change from the conditions when they took the water at Belleville, or at any other period you see fit to mention, change from the Little Falls water. The first change was in 1896, when they ceased to take water at Belleville and began to take it from the Pequannoc and Little Falls—What did you observe after the change made in the year 1896, which began on January 10, 1896, and the change being completed with full supply about the first of October from Belleville supply to Pequannoc supply, and then state secondly what change you observed partially and at last fully, to the Little Falls supply, about the year 1902, and then the change to the Rockaway supply in May, 1904?

Mr. Vredenburgh: Objected to, because if the question is as to typhoid fever, why then you would want to know what the statistics were of typhoid fever in the water shed, because of course there cannot be any typhoid fever at the outlet of the pipe if there was none at the inlet.

(Admitted.)

A. I have here an abstract of the statistics relating to the public health of Jersey City as obtained from the clerk of the Hudson County Board of Health from January, 1896 to July, 1904.

Mr. Vredenburgh: Well, if we have anything I think we ought to have the original.

The Court: I will let the witness answer the question and if his data are incorrect you can correct them by the original.

A. I find that in 1896, beginning with January, there was a very large amount of typhoid fever and measles and diphtheria and scarlet fever—

Q. Wont' you give us with reference to the number of deaths per hundred thousand population?

Mr. Vredenburgh: If this testimony is to go in in thi sway it must be their testimony and not mine.

Mr. Corbin: Well, I don't care very much about that one way or the other.

The Court: It will go in as Mr. Corbin's testimony. It is not cross-examination of any testimony offered by the city.

Q. Have you got the rate of deaths for typhoid fever per hundred thousand for the different years, say from 1894 or 1895 down?

A. Not per hundred thousand.

Q. Well, how have you got it?

A. I think the total number of deaths is given—

Q. You haven't it reckoned out then with reference to population?

A. I haven't reckoned it out by the hundred thousand.

Q. What were the total number of deaths in 1894 for typhoid?

A. I only began my copy January, 1896.

Q. You began in 1896?

A. Yes, sir.

Q. How many deaths were there in 1896 from typhoid fever?

A. In 1896, there was, in January,—the whole year, there were one hundred and fifteen deaths.

Q. In 1897?

A. 40 deaths.

Q. 1898?

The Court: From what?

Witness: Typhoid fever alone.

Q. 1898?

A. I have here 6; total list of six diseases. I am reading typhoid alone. In 1898, seventy-one; in 1899, thirty; in 1900, forty-four; in 1901, thirty-one; in 1902, thirty-five; in 1903, twenty-nine; and, including July of 1904 when my record ended, there were twenty.

Q. In seven months?

A. For the first seven months of 1904 there were twenty deaths from typhoid fever. I have also the number of cases of sickness reported.

Q. Well, now, have you got any figures for 1905 or 1906?

A. No, sir; I haven't taken those yet. I haven't had time to go into that.

Q. That is all on that subject. Now, you say when at about noon you and Mr. Whipple were at Boonton at the Lower Canal level, an employee observed you and disappeared. Employee of whom?

A. I think, of the Cooper Lord Company.

Q. Don't you know that at noon, the gates are shut down for the noon hour by the factory there, and that the very shutting them down by that mill

causes a larger downward flow from the upper level to the lower level of the canal?

A. Yes, sir; but this took place a little before noon.

Q. You assume, because of the change in the flow which you observed, that this man disappeared and shut the gate?

A. I believe that he arranged things so that more water came. Because it came in such quantity and so violently, that it was evident that it was an abnormal operation.

Q. How long did you stay after 12 o'clock?

A. Oh, stayed there, I should say, half or three-quarters of an hour, or more.

Q. Continued to come violently all the time?

A. No, sir; modified then.

Q. But it came down from the upper level to the lower all the time you remained there?

A. Yes, while we remained there.

Q. You didn't remain until 1 o'clock?

A. No, I don't remember that we did, quite till 1.

Q. Now, your suggestion that one of the stop valves may have been partly opened. That is merely an assumption by you from what you observed of the flow, isn't it?

A. That is an inference from what we observed of the bluing put into the lower level of the canal.

Q. Where was it put, and what did you observe?

A. It was put on the down-stream side of this bulk-head, and as there was no appreciable current in the canal the bluing remained stationary on or next to the bulk-head. Well, it remained near the surface say within a foot in depth. Gradually the bluing settled down into the water and reached a depth of two or three feet. Then we found the bluing appear ten feet distant from the canal, apparently coming from below upwards to the surface.

Q. It remained in the lower level?

A. In the lower level.

Q. It didn't get out of the lower level at all?

A. It didn't get out of the lower level on that occasion. It is fair to state that I don't believe the gate was wide open at the time. But, as I said before, it may have been partially open allowing some water to escape through there.

Q. But you poured bluing into the lower level, and it appeared in the manner you have stated in the lower level?

A. Yes, sir.

Q. There was no evidence it got out of the lower level then?

A. No. But before that we saw the surface flow go back, and there was a thick scum on the water.

Q. And the lower level has its outflow some miles below at Montville?

A. Yes; I believe it has an outlet there.

By Mr. Vredenburgh:

Q. Now, the other five diseases that you mentioned. Will you please state those?

A. The other five diseases are: first, dphtheria; second, scarlet fever; third, membraneous croup; fourth, malarial fevers; fifth, diarrhœal diseases. For the year 1896 the number of deaths reported was 235 for the first—

Mr. Corbin: For diphtheria?

A. For diphtheria; 11 for scarlet fever; 59 for membraneous croup; 29 for malarial fevers; 165 diarrhœal. The typhoid has been given before. For 1897—

A. Typhoid has been given.

Q. Give us that again?

A. Typhoid fever would be 115.

Q. Now proceed?

A. For 1897 the order is as follows: 140-39-45-12-149-41, the last being for typhoid fever, and diphtheria being the first.

Q. Well?

A. In 1898, we have 96, 58, 28, 12, 159, 71; 1899,

83, 34, 26, 22, 140, 230; 1900, 80, 33, 52, 9, 102, 44; 1901, 67, 36, 53, 12, 130, 31; 1902, 89, 34, 30, 12, 105, 35; 1903, 79, 25, 32, 9, 111, 29. The first 7 months of 1904, January to July inclusive, 49, 84, 26, 6, 67, 20. Those are the totals. Now I have the sicknesses reported if they are wanted.

Q. Mr. Kuichling, do you recognize this photograph I now show you?

A. I don't think I recognize the photograph.

Q. You haven't seen it before?

A. No, sir.

WINTHROP RUGLES recalled.

Further direct examination by Mr. Vredenburgh:

Q. I show you this deed from Charles A. Haydon, to the Mayor, &c., of Boonton, and I ask you whether you can tell us where the land described in that deed is?

A. Right at the foot of Liberty street in Boonton, between the Main street and the canal.

Q. How far is it from the brook which is known as the Brook street brook?

A. Three blocks I think.

Q. In which direction?

A. West of the Brook street sewer.

Q. That is all.

By Mr. Vredenburgh: I offer it in evidence.

By Mr. Corbin: I object. Let's see it, please.

(Same handed to Mr. Corbin.)

By Mr. Corbin: It seems to be a copy of a deed made January 6, 1905, conveying to the city of Boonton, the easement and right to drain and discharge surface water which collects at the junction

of Main and Liberty streets in the town of Boonton aforesaid and other water, from any other source in said town, through the two drains or culverts as now constructed across the land and premises of the party of the first part situate in the town of Boonton, and I object to it because it seems to me to be irrelevant to the issue and not pertinent.

Objection overruled.

JOHN SCOTT WILLIS sworn for Complainant.

Direct examination by Mr. Vredenburgh.

Q. You live where, sir?
A. Powerville.
Q. How long have you lived there, Mr. Willis?
A. 61 years.
Q. How near is that to what is known as the rag mill at Powerville?
A. Perhaps 120 to 130 yards.
Q. Have you worked in the rag mill?
A. Not in the mill but around the mill for the last nine years up to within three years ago.
Q. How long has that rag mill been used as a rag mill there?
A. As near as I can recollect it was built in 1888 or 1899, I am not positive which.
Q. What was there before that?
A. An iron rolling mill and a grist mill.
Q. Has the capacity of the works been increased?
A. I did not catch that.
Q. Has the amount of material used in the works been increased at any time recently?
A. It has been increased from time to time since the rag mill first started. They have increased the machinery and used more rags up to within a year or two; I don't know but what it may be a year.

Q. Do you know the quantity of rags used there?

A. No, sir, I do not.

Q. Do you know where the rags came from that were used there?

A. All parts of the country.

Q. In what shape did they come there?

A. In bales.

Q. What did you do when you worked there with reference to those rags?

A. I used a horse and cart and carted out the waste and took in the coal.

Q. Where did you cart the waste to?

A. I carted it down to the lower end of what we called the island, between the river and the canal, and burned it.

Q. How near is that to the river?

A. Well, I suppose the nearest point to the dump is probably 30 or 40 yards, maybe 30 yards.

Q. Did you notice the water coming down the river from the print works above?

A. Yes, sir.

Q. What did you notice with respect to that?

A. I noticed it came down there pretty dark some days; other days it is clear, and it comes from up above somewhere, I don't know where it comes from.

Q. At what point did you see it?

A. We see it in the Powerville pond, in the mill pond.

Cross examination by Mr. Corbin:

Q. What was this waste which you carted up to the lower end of the island and burned?

A. It was garbage and everything that could not be ground up to make pulp—almost everything.

Q. It was things that had iron in them?

A. Oh, there was a great many things.

Q. It had been rejected because it had iron in it?

A. Iron and leather and everything of that kind.

Q. And you threw those things into the fire which was kept on the island?

A. Yes, sir.

Q. Did you cart every day?

A. Every day or nearly every day; once in a while I skipped a day, but very seldom.

Q. How much a day did you cart?

A. Perhaps two or three cartloads.

Q. Did you attend to the fire?

A. I fired it myself.

Q. You burned them as you carted them?

A. I would fire the first load and dump the others on top of it.

Q. How did you fire them?

A. I set it afire with a match; it consisted of excelsior and everything mixed up together, and I would set it afire.

Q. Did it burn freely?

A. It burned freely.

Q. Now you say you saw the water on certain days coming down dark into the Powerville pond?

A. Yes, sir.

Q. You haven't seen it coming down dark lately?

A. I saw it lately, only last week one day.

Q. What did you see?

A. Simply dark water, darker than it should be.

Q. Riley and muddy?

A. No, sir, simply dark colored, a light purple color.

Q. Where did you observe that?

A. Well, I didn't observe it, but I seen it by daylight.

Q. Where, I said?

A. Right in the pond.

Q. In the channel or in any particular part?

A. No, sir, all over the pond.

Q. Dark purple?

A. A light purple color, like as if it had been dyed in some way.

Q. Was the water high or low?

A. Medium stage.

Q. That is all.

Re-Direct.

Q. Was the water in any way different in respect to color than that in which you have seen it for a number of years?

A. Well, I have only seen this coloring for a very few years.

Objtcted to.

By the Court. You better describe what you saw.

Q. When you saw the colored water on former occasions, not the occasion you have last mentioned, how was the water then as to color?

A. Sometimes darker, sometimes little lighter; it was different shades.

By the Court.

Q. You never followed it up to see where it came from?

A. No, sir, I had no business to do that.

Further Direct.

Q. You spoke of print works, did you mean the Liondale Print Works?

A. I did not speak of any print works.

Q. I thought you did?

A. No, sir, I said it comes from towards Rockaway. That is all I can say, I never followed it up.

Q. Rockaway is four miles above there?

A. Five.
Q. Five?
A. That is all.

Re-Direct.

Q. Do you know where the Liondale Print Works are located?
A. Do you mean the Rockaway Print Works.
Q. Yes.
A. Yes, sir, I know where they stand, where the buildings stand.
Q. How far are these works from Powerville where you saw this water?
A. Nearly five miles.

WELDON G. GRIFFIN sworn for Complainant.

Direct Examination by Mr. Vredenburgh.

Q. Are you a photographer, Mr. Griffin?
A. Yes, sir.
Q. Have you taken some photographs at the request of the city?
A. Yes, sir.
Q. In Dover and vicinity?
A. Yes, sir.

By Mr. Corbin: Mr. Griffin is not a professional photographer, is he?

Q. You are not a professional photographer?
A. No, sir.
Q. I show you a photograph and ask you what that is. Please state first whether you took it yourself?
A. Yes, sir.

By Mr. Corbin: Won't you mark them so that we can designate them?

By Mr. Vredenburgh: The first is No. 1; second No. 2; they are all marked.

Q. What does that show?

A. A saloon or hotel kept by John Moller, at the corner of South Morris and East Dickerson streets, in Dover.

Q. Is what you have just read stated on the back of the photograph?

A. Yes, sir.

Q. Is there anything else endorsed on the picture?

A. Who it was taken in the presence of.

Q. In whose presence?

A. In the presence of Charles A. Van Keuren and J. W. Griffin.

Q. Who is J. W. Griffin.

A. My father.

Q. Is that all on the back of the photograph?

A. Yes, sir.

Cross-examination by Mr. Corbin.

Q. Where did your camera stand?

A. On the opposite corner.

Q. Diagonally opposite?

A. Yes, sir.

Said photograph is offered in evidence and marked Exhibit C68.

Further Direct.

Q. Now, I show you another photograph; what is that?

A. That view shows sewer or pipe entering the Rockaway river at the foot of South Morris street,

Dover, taken February 15, by Weldon Griffin, in the presence of J. B. Griffin and J. W. Bonney.

Offered in evidence and marked Exhibit C69.

Further Cross.

Q. In which direction is that picture looking, east or west?
A. It is looking south.
Q. Towards the Lackawanna Railroad tracks?
A. Yes, sir.
Q. Where did your camera stand?
A. On the opposite side.
Q. Close to the bank?
A. Yes, sir.
Q. Does Morris street extend down to the river on both sides?
A. No, sir, only on one side.
Q. There is no bridge there?
A. No bridge.
Q. And what we see then is the end of Morris street?
A. Yes, sir, the end of Morris street.
Q. What is all that material piled up in the foreground?
A. That is flags, &c.

Further Direct.

Q. I show you another photograph; what is that?
A. View showing brook, situate 120 feet east of Hooey street, Dover, looking north from the spur of the Delaware, Lackawanna & Western Railroad, running to the gas house; this brook empties into the Rockaway river about 300 feet from this point, and drains and flows directly under several privies.
Q. What do you know about that as to whether that is true?

A. I have a photograph showing the privies.

Q. And it is stated on the back of that photograph that it flows under some privies?

A. Yes, sir.

Q. Do you know anything about that?

A. Simply that I took the picture and saw the privies there.

Q. Then that is true, is it?

A. Yes, sir.

Cross-examination by Mr. Corbin.

Q. Privies above or below that point on the stream?

A. Above that point.

Q. On what street do the houses front that have those privies

A. Hooey street.

Q. Can you give the numbers of the houses?

A. I can of some of them. This picture don't show much of the houses, but I have another which will be produced later.

By the Court.

Q. Perhaps you had better produce that one next. You say this brook flows directly under several privies?

A. Yes, sir.

Further direct.

Q. Will you just tell us what privies they are. Do you mean the privies standing on the brook?

A. Well, the brook, I should judge, was 10 or 12 feet underneath the ground; it is covered and filled.

Q. Covered with what?

A. Covered with soil.

Q. What is it, a pipe?

A. It is a covered conduit.

Q. And the brook is 10 or 12 feet below the surface of the soil?

A. Yes, sir, 10 or 12 feet below; you can't exactly trace the brook underneath there, but you can see both ends of it.

Q. For how long a distance is it covered?

A. Well, I should think about 400 feet.

Q. You can see where it goes in and comes out?

A. Yes, sir.

Q. And the course is apparently straight?

A. Apparently so, yes, sir.

Q. And you can see privies right over the line above it?

A. Directly over the apparent line of the brook.

By the Court: Have you got a photograph showing that better?

By the Witness: Yes, sir.

By Mr. Corbin.

Q. I would like to have him tell us what houses they are?

A. (After looking for the photograph) I don't find that photograph just at present, but I have some showing the front of the houses.

Q. I ask what these houses or what these premises are on which you claim there are privies over the line of this covered brook?

A. I find I haven't the number of those houses here, but they are the three houses directly north of the Delaware, Lackawanna spur of the Gas Works.

By Mr. Vredenburgh.

Q. I show you another photograph and ask you to read what is endorsed on that?

A. View taken from the same point looking

south, showing outhouses, etc., taken February 15th, by Wells & Friggen, in the presence of J. R. Bunney.

Marked Exhibit C 71.

By Mr. Corbin:

Q. These houses shown in C. 71 are not the ones you refer to?

A. No, sir.

Q. This is an open brook here, isn't it?

A. Yes, sir.

Q. How far from the Rockaway river is the point where your camera stood when you took C70 and C71?

A. Seven or eight hundred feet, I should judge.

Q. To the south or north of the river?

A. To the north.

Q. Doesn't the river run about north and south?

A. East and west at that point.

Q. It is to the north?

A. It is to the north, yes, sir.

By Mr. Vredenburgh:

Q. It is in the city of Dover?

A. Yes, sir.

Q. I show you another photograph—read what is endorsed on that?

A. View of the same brook where it empties into the Rockaway river, seven hundred feet south of the Salem street bridge, privies, etc., shown. View taken February 15th, by Wells & Griffen in the presence of J. R. Bunney.

Marked Exhibit C72.

Q. The statement on the back is within your knowledge and is true?

A. Yes, sir.

Mr. Vredenburgh: The deed from Charles A. Hagan to the Mayor, etc., of Boonton offered in the testimony of Mr. Ruggles is now marked C67 1/2.

By Mr. Corbin.

Q. On this photograph C72, you have put the statement, privies, etc., shown?

A. Yes, sir.

Q. You don't mean that all these buildings in the foreground here are privies?

A. No, sir.

Q. With the permission of the Court, will you take your pen and mark the letter "p" on those you claim are privies?

A. Yes, sir (witness does so).

Q. Did you examine the premises to see which were privies?

A. Yes, sir.

Q. And you have marked two on this picture?

A. Yes, sir.

Q. Now take Exhibit C71, and with the permission of the Court, with your pen mark the letter "p" on any privy shown in that picture?

A. Yes, sir (witness does so).

Q. How many have you marked on that?

A. One, on this one.

By Mr. Vredenburgh:

Q. I show you a photograph and ask you to read the endorsement on that?

A. A view of wells at Gas Works, Dover, N. J. Up to this point this brook is practically clear, also shows north end of twenty-inch cast iron pipe under the spur of the Delaware, Lackawanna Railroad taken February 15th by Wells & Griffin in the presence of J. R. Bunney.

Q. Is that true?

A. Yes, sir.

Q. The photograph was taken by you and the endorsement is true?

A. Yes, sir.

By the Court:

Q. When you say February 15th you mean this year?

A. Yes, sir.

Marked Exhibit C73.

By Mr. Corbin:

Q. What brook is that?

A. I don't know as the brook has any name particularly, it flows by the Gas Works.

Q. It is not the same one that was shown in the former pictures?

A. No, sir.

Q. You say up to this point the brook is clear. How far is this point from the mouth of the brook where it empties into the Rockaway?

A. I should think several thousand feet, if not more.

Q. A mile?

A. No, not a mile, I haven't really traced it right up to its mouth, I have been part of the way, several thousand feet up, I have been up the brook.

Q. I said mouth?

A. Oh, six or seven hundred feet I should think it was, to the outlet.

Q. Is the brook carried through this twenty-inch pipe shown at the right, under the Lackawanna tracks?

A. Yes, sir, there are two twenty-inch pipes; we have another photograph, I believe, showing the pipes.

Q. And the water is carried under the tracks by that into the Rockaway river?

A. Yes, sir.

Q. The Rockaway river is the other side of the tracks?

A. Several hundred feet, as I said before, three or four hundred feet.

Q. In the middle of this picture appears to be a square box with some sort of structure over it, what is that, is that the well?

A. That is the well where the gas works get their water from.

Q. And does this brook flow through that well?

A. Through the well, yes, sir.

Q. Into it on the far side and out on the lower side?

A. Yes, sir.

By Mr. Vredenburgh:

Q. I show you another photograph, and ask you to read the endorsement?

A. View showing confluence of the Rockaway river and the Morris Canal at the Sussex street bridge, Dover, New Jersey. This view was taken to show that the pollution entering the canal at Wharton, one mile above Dover, flows into the river at this juncture.

Mr. Corbin: I object to the last part of that statement.

The Court: I shall exclude "This view was taken to show that the pollution entering the canal at Wharton, one mile above Dover, flows into the river at this juncture."

Mr. Vredenburgh: Very well, I will erase that part of it from the back of the photograph.

Marked Exhibit C74.

Q. I show you another photograph and ask you, did you take that?

A. Yes, sir.

Q. When?

A. It was taken last Thursday.

(At this point the witness was withdrawn from the stand to permit of the examination of another witness who had to get away early.)

ELIZABETH CONDIT sworn.

Direct Examination. By Mr. Vredenburgh.

Q. Mrs. Condit, do you own any property up near the Parsippany dyke?

A. My mother owns the property. She is eighty-one and is not able to come.

Q. What does the property consist of?

A. A house and barn and two acres of land.

Q. How long have you owned it?

A. Mamma has owned it over thirty years, I don't know just how long.

Q. How near is it to the Parsippany Turnpike, near the dyke?

A. It is right on the Turnpike.

By the Court:

Q. On which side, the north or south side of the Turnpike?

A. The south.

Mr. Vredenburgh:

Q. On which side of the Turnpike, the north or the south side?

A. The south side.

Q. On the same side of the dyke or the opposite side?

A. Opposite.

Q. Now, after the water was let into the Boonton reservoir and reached the level, so that it ran over the spill way dam, did you notice anything with respect to this land owned by your mother, with reference to water?

A. Yes.

Q. Just state what you saw.

A. Well, the well overflowed, and there was water in the cellar half-way up. And the orchard, and all around the house, was wet. The ground was wet.

Q. What did the orchard consist of?

A. Apple orchard.

Q. Apple trees?

A. Apple trees.

Q. What age apple trees?

A. I don't know.

Q. How long had you known the apple trees to be there?

A. Why, 12 or 15 years.

Q. And where were they, with respect to the house?

A. Why, at the rear of the house.

Q. And how many of them were there?

A. I don't know.

Q. How soon did you observe this overflow of the well, and the water in the cellar, after the water filled the reservoir.

A. Why, I don't remember just when I went up. I don't live there.

Q. Who did live there?

A. A man by the name of Humphreys.

Q. A tenant of your mother's?

A. Yes. And when they blasted rocks, they knocked all the ceilings off, and side walls.

Q. We are now dealing only with the water. The question now is as to the water in the cellar and

in the well. What was the result of this water in the well, the well overflowing, and the water in the cellar, with reference to that tenant, Mr. Humphreys?

A. The result is we will never be able to remedy it again. What do you mean? I don't understand you.

Q. Cross-examine.

Cross-examination by Mr. Edwards:

Q. Where do you live?

A. At Passaic.

Q. And you don't know when the water first came into the well, do you, of your own knowledge?

A. I know it was there, for I saw it.

Q. You don't know how soon after the reservoir filled up it came in, or whether it came in before the reservoir filled up?

A. It didn't come in before the reservoir was there.

Q. How recently were you there before the reservoir was filled up?

A. When was the reservoir filled up?

A. I don't know. You must tell us that.

A. I don't know when it filled up.

Q. How often were you up there to this property?

A. Probably once in six months.

Q. When was the last time you were there before the reservoir was filled up?

A. If you could tell me when the reservoir was filled up, I went soon after that.

Q. Now, then, you say the water overflowed in the well?

A. Yes, sir.

Q. Did you see it.

A. I did.

Q. Is it overflowing now?

A. It is nearly up to the top now, last Sunday.

Q. Varies at times?
A. I suppose so.
Q. Sometimes it is dry?
A. Never.
Q. Well, I don't mean the well gets dry; the water is at its natural level?
A. Well, it is a deep well. It has never been as high as it is now.
Q. How deep is this well?
A. I don't know.
Q. And you say your cellar had water in it?
A. It is now.
Q. And it has been dry at times?
A. It was dry before the water supply company came there?
Q. Wasn't it dry since the water supply company came there?
A. No.
Q. Has there been a different level of water there?
A. Not when I have been there?
Q. How many times have you been there since the water has been in the reservoir?
A. Well, I don't know just how many times.
Q. Two or three times?
A. Yes.
Q. Not more than that?
A. I don't know. I can find out if it is necessary.
Q. How much water is in the cellar now?
A. Well, it is about that high (indicating).

The Court: About 18 inches you have indicated; I don't know.

Q. When did you see it last?
A. Last Sunday; and the walls are all green.
Q. That was after quite a heavy rain, wasn't it?
A. I don't know.

Q. Don't you remember there was rain on Friday and Saturday?

A. Well, I had forgotten it.

Mr. Vredenburgh: She wouldn't be likely to remember there was rain on Saturday. Saturday was a beautiful day.

Q. Now, there has always been a drain from your property to the low ground in the rear, hasn't there?

A. What do you mean? A pipe?

Q. Yes.

A. Yes, I guess all the houses are that way.

Q. Always been a low spot there, hasn't it?

A. No. Not where the house was.

Weldon Griffin, recalled.

Direct Examination by Mr. Vredenburgh:

(Witness is shown Exhibit C75.)

Q. Where is it?

A. Passaic street.

Q. In what city?

A. Dover.

Q. How near is it to the river?

A. Within three or four blocks of the river.

Q. What is that water we see there in the photograph?

A. That is the water as it comes under the canal.

Cross-Examination by Mr. Corbin:

Q. Are you looking towards the canal in the picture?

A. No sir; away from it. The canal is right at that point, and it wasn't shown.

Q. The camera stood near the canal?

A. Yes.

Q. Have you any name or designation for this picture?

A. It is commonly called the Passaic street sewer.

Q. It is an open ditch with a stone wall at one side of it

A. At this point, yes, sir.

Q. Is it a natural brook?

A. Yes, sir. Open for seven hundred feet right there. Then covered.

Q. In this picture, you are looking towards the Passaic River, are you not?

A. Towards the Rockaway?

A. Rockaway, I mean.

Q. Yes, that is towards the Rockaway river.

Q. Is that Passaic street?

A. Looking down Passaic street.

Q. This brook goes under the middle of the street?

A. This brook goes under the middle of the street.

Q. In what sort of a construction?

A. It is covered with large stones; built up and covered with large stones.

The Court: Did you give the name of the brook?

Witness: It is commonly called the Passaic street sewer.

Q. But it is a natural brook in fact, isn't it?

A. It is a natural brook; flowing water.

Q. And flowing water at the time this picture was taken the other day?

A. Yes, sir.

Q. Can you in this picture see as far as the Rockaway river? The bank in the distance. Is that beyond the Rockaway river?

A. The building in the distance—no, you can't

see as far as the——the bank is the other side of the Rockaway river.

The Court: You say that this brook flows through the middle of the street.

Witness: It flows under the street; I am not sure whether it is under the middle.

The Court: Under the middle of the street; for how long a distance?

Witness: I don't know. I am unable to tell. Seven or eight blocks, it flows. I only know where it comes out.

The Court: When you can see it at the other end, where is it? Is it in the middle of the street?

Witness: No, sir. The end of it is not in the street at all. It flows into a brook called the Electric Light brook; I should judge, six or eight blocks distant.

Q. How do you know it flows under the street six or seven blocks?

A. Well, the street is all covered there. I understand it——

The Court: You couldn't tell from your observation?

Witness: Except when it goes in, it is in the middle of the street.

Q. It flows under the street for a distance of six or seven blocks?

A. Yes, it flows under the ground; there is no way to see it.

Q. When it again appears below, is it in the street?

Y. Yes, it appears out from under the street; comes from underneath the street.

The Court: Don't it both ends? As I understand the witness, he can only determine where one end is.

Mr. Corbin: I was trying to identify it.

Witness: We have another picture showing the entrance; showing how it is made up.

Q. It empties into the Electric Light brook?

A. Yes, sir.

Q. Can you find it, and I will put the two in together?

A. Yes, sir. (Witness went and looked.)

Cross-Examination by Mr. Corbin.

Q. Doesn't this enter into Megin's drill works near the electric light station?

A. Well, the drill works are right on the same spot.

Q. Where this empties?

A. Yes, sir, also where the electric light brook empties.

Further Direct.

Q. You said that there was another photograph which showed a portion of this brook after it came out or before it entered these 6 or 7 blocks of closed way; now is this picture I now show you the one to which you refer?

A. This is a photograph of the end of the brook just before it enters into the Rockaway river.

Q. This photograph Exhibit C76 shows what?

A. Shows where this brook empties, how this brook comes out just before it enters into the Rockaway river.

Q. Is that brook below Exhibit C75 or above it?

A. Below it.

Q. This was taken by you?

A. Yes, sir.

Further Cross.

Q. When?

A. I don't just recollect the date.

Q. About when?

A. Within the last month.

Q. May, 1906?

A. Yes, sir.

Q. The brook is not shown here?

A. It shows the cover of it.

Q. Is this looking up the brook or down the brook?

A. Up the brook?

Q. Is it looking up Passaic street?

A. No, sir, it is in a different direction than Passaic street, at right angles.

Q. The brook turns?

A. Yes, sir.

Q. What is this street (indicating)?

A. There is no street there.

Q. Well, the church seems to be on some street?

A. Further up there is a street known as Railroad avenue.

Further Direct.

Q. I show you another photograph and ask you what that shows?

A. This shows the south side of Richards avenue, looking up from Passaic street.

Q. In what city?

A. Dover.

Q. Taken when?
A. Within the last month.
Q. By whom?
A. By myself.
Q. Looking from where?
A. Passaic street.
Q. Is it your judgment that this sewer which you said ran up Passaic street runs in the centre of that street?

Objected to.

By Mr. Vredenburgh: He says ran up some street 600 feet or 6 blocks. I am trying to find out whether this is the street.

By the Court:

Q. This photograph shows a section of Passaic street?
A. No, sir.
Q. What street does it show?
A. Myrtle avenue.
Q. Myrtle avenue?
A. Oh, no, Richards avenue.
Q. Did you observe any brook under Richards avenue, under that part of it shown on this photograph?
A. No, sir.

Further cross.

Q. Well, on the rear—what runs in the rear of those houses, any brook or anything?
A. No, sir, but I tested some of those houses shown on the photograph.
Q. How did you test them?
A. By placing urinite in the closet of the house and allowing the water to run and seeing it come out at the other end of the brook.

Q. These houses that you speak of, did they have water closets in them?

A. Some did and some did not.

Q. The ones you tested, did they have water closets in them?

A. Yes, sir.

Q. On what floor?

A. The second floor.

Q. And you put in some of these—what do you call it?

A. Urinite.

Q. Will you point out on the photograph any house you did go into?

By the Court: Mark it with a cross.

A. These two houses which I have marked.

Q. When you put this urinite into the water closets and then went out to the brook, did it show itself?

A. Yes, sir, in the electric light brook.

By the Court:

Q. Where is that brook in relation to these houses you have just marked, in the rear or front or where?

A. It is a covered brook, sir. In what street or what place there is no way of telling because the brook is supposed to be under the ground.

Q. Under Richards avenue?

A. Yes, sir.

Further Direct.

Q. When you spoke a few minutes ago that this sewer was under certain blocks in the street, I thought you referred to Passaic street?

A. It does go through a part of Passaic street; you can see it.

Q. Is that the same brook?

A. It is supposed to be the same brook, it is the same water anyway.

Q. Is this Richards avenue at right angles with Passaic street?

A. Yes, sir, at right angles.

Q. What time of day did you put this urinite in these closets?

A. I haven't just the time here, but if I remember rightly it was about 11 o'clock.

Q. In the daytime?

A. Yes, sir.

Q. How long after that did you see the urinite appear in the stream below?

A. —Twenty minutes.

Q. What kind of water closets were these; describe them if you can?

A. They were regular flush closets.

Q. Was there a bathroom there connected with them?

A. Yes, sir.

Q. Which did you put this in, the bathroom or the water closet?

A. The water closet.

Q. And that happened in these two houses you made the mark on?

A. Yes, sir, one of them is a double house.

Q. It is occupied by how many families?

A. Two families.

By the Court:

Q. Can you say approximately the distance between the water closet and the point in the brook where you first discovered the discoloration?

A. 400 feet.

Q. Was that in the rear of the house or where?

A. It is in the rear of the house at a point where the brook runs; it runs a block in the rear of this house.

(Mr. Vredenburgh requests the witness to mark the houses more distinctly, which the witness did.)

Q. Now look at this photograph which I now show you. Does that photograph show the same two houses which you marked on Exhibit C77?

A. Yes, sir, it is a different view of them.

Said photograph is offered in evidence and marked Exhibit C78.

(The witness marked the same two houses with an identifying mark.)

Q. (Handing witness another photograph). Does this show the same locality or some other?

A. It shows the same two houses.

Offered in evidence and marked Exhibit C 79.

Q. Now I show you another photograph of one of those houses from a different view. Was that taken by you?

A. Yes, sir.

Q. I understand that all three of these photographs were taken some time within a month?

A. Yes, sir.

By Mr. Corbin. May, 1906.

By Mr. Vredenburgh. No, not necessarily, April or May.

Further Cross.

Q. What are the numbers of those houses?

A. 68, 70, 72 and 78 Richards avenue.

Q. But the two houses in which you put the coloring matter and found results, what was the numbers of those?

A. 78, 72 and 70.

Q. The double house has two numbers, has it?

A. Yes, sir.

Q. How many water closets were there in the double house?

A. I only tested one side; I understood there were two there.

Q. Whose houses are they?

A. Owned by Mrs. Edwin Hughes, Cape May.

Q. Both of them?

A. Yes, sir, all three of them.

Q. Who are they occupied by?

A. I don't know who the tenants are.

Q. How long a time was there between the test of the first house and the test of the second house, that is, from the time when you put the blueing into the first and the blueing into the second?

A. One was just before lunch, about eleven o'clock, and the other was I should judge about four o'clock, just before we came home.

Q. What was the length of time it took it to appear in the first case, in the morning case?

A. Twenty minutes.

Q. How much in the afternoon?

A. Fifteen.

Q. Which one was the afternoon test, the double house or the single house?

A. The double house.

Q. Who was with you to assist?

A. Harold Bowden.

Q. Who put in the blueing?

A. I did.

Q. Who observed the outflow?

A. We both did.

Q. You put some in other houses, too, didn't you?

A. Yes, sir.

Q. And didn't get any results?

A. Yes, sir.

Q. On this street I mean, you didn't get any results?

A. We didn't put any in other houses on this street, they refused us permission.

Q. Did you inquire into the matter at all to see where these water closets were supposed to drain, whether into cesspools or not?

A. The tenants didn't know, there was no cesspool in the yard.

Q. Did you get any information about it?

A. No, sir, we couldn't get any information.

Q. You didn't trace the pipes to see where they went?

A. I saw no way to trace the pipes, they were under ground.

Q. And you found the blueing came out in the street directly in the rear of this property?

A. No, it was urine.

Q. Well, urine, or whatever it was.

A. Not directly in the rear, it came out in a brook which runs within a block of these houses, but not in the rear, it didn't come out in the rear.

Q. You stated to the court that it was to the rear?

A. The brook; there is a brook which runs within a block of those houses, to the rear of them.

Q. Came out of what, did you see a pipe for it to come out of?

A. No, sir, this electric light brook.

Q. Well, where did it first appear in the electric light brook, how high up the stream?

A. Where it empties into the Rockaway river.

Q. You just saw blue at the point where it empties into the Rockaway river?

A. Green.

By the Court:

Q. How far was that from the water closets?

A. Two short blocks.

By Mr. Corbin:

Q. Is the electric light brook covered where it empties into the Rockaway?

A. Part of it is.

Q. Didn't you try to trace it up Electric light brook to see how far up it went?

A. Yes, sir, I have.

Q. How far up did you observe the green?

A. Didn't observe it, except where it empties.

Q. Just at the point where it empties you saw green?

A. Yes, sir.

Q. Was there any evidence of a pipe or sewer there?

A. Well, the brook is covered there.

Q. Well, from there how far up is it covered?

A. I think only a block.

Q. And above that you would have open space to observe it?

A. Yes, sir, and there was no green there.

Q. And that open place above is still below those houses?

A. Yes, sir.

Q. A good ways?

A. No, a block below.

Q. And yet you found no evidence of green until you got down to the mouth of it four or five hundred feet away?

A. None at all.

Q. How long an open space of the electric brook did you find below these houses where you could observe its course?

A. Why, the electric light brook is mostly an open brook except about this block.

Q. Just the lower block of it?

A. Yes, sir; I have several pictures of it, I think.

Q. These houses are above the open part?

A. Yes, sir, slightly above it.

Q. The brook is itself open for a considerable space?

A. Yes, sir.

Q. And yet you think the blueing which you saw down at the mouth of the brook could be traced away back up there?

A. There are some other pictures which would show it.

Q. Well, you say four or five hundred feet?

A. Two short blocks, the houses are.

The Court: Well, produce the other photographs.

Witness: There is only one here.

By Mr. Vredenburgh:

Q. You produce one. What does that show?

A. That shows electric light brook as it is open for a thousand feet.

Q. Is that the brook above where you say it is covered or below?

A. Above where it is covered.

Q. This is above?

A. Yes, sir.

Said picture marked Exhibit C 80.

Q. How near is this location shown on this photograph C 80 to the covered portion of that ditch that you speak of?

A. About eight hundred feet.

Q. Now, is that the ditch which you showed us as running through Passaic avenue?

A. No, sir, that is another ditch. The Passaic avenue ditch or sewer empties into this electric light brook within a block of where it came out—where urine came out.

Q. Now does this Richard avenue—I think you call it—run parallel with that electric brook, or at right angles?

A. Parallel with electric brook.

By Mr. Corbin:

Q. This view of electric brook then is considerably above the point where these houses are that you have spoken of?

A. Yes, sir.

Q. I show you another photograph, and I ask you what is shown on it. Have you got the photograph there I gave you?

A. Yes, sir.

Q. What does that show?

A. This is a photograph of a blind drain X emptying into the Electric Light brook.

Q. How is that blind drain shown?

A. By a mark X. I desire to correct my testimony by striking out the word "blind," I meant to say drain. It is at the foot of Hudson street.

Further Cross.

Q. This is looking right towards the end of Hudson street?

A. Yes, sir, towards it.

Q. When did you take this?

A. Within the last two months.

Q. Do you know what that drain is, or what it comes from?

A. No.

Q. Stone drain or what?

A. Stone drain.

Further Direct.

Q. I show you a photograph which I should have shown you sooner. Just read what is on the back of it?

A. View showing south end of 20-inch pipe under spur of D., L. & W. carrying oil and tar from the gas house pipe about 3-inch full distance from the river about 300 feet, open drain or brook. Taken

February 15, in presence of J. R. Bonney.

Q. Did you see any oil or tar carried on that stream?

A. Yes, sir.

Q. When did you take that picture?

A. February 15th.

Offered in evidence. Marked Exhibit C 82.

Cross-Examined.

Q. Now the pipe shown on this photograph Exhibit C 82, is the same pipe shown on another photograph which showed the well near the gas works?

A. Yes, sir.

Q. This is an effluent pipe?

A. Yes, sir.

Q. These two pipes carry the brook you speak of as going through the well?

A. Yes, sir.

Q. The distance of these two pipes as shown here is correct?

A. Yes, sir.

By the Court:

Q. What do you say you saw there, oil or tar?

A. Both oil and tar.

Further Cross.

Q. I think you said there is about 3 inches of water in the pipe?

A. Yes, sir.

Q. A stream running through it?

A. Yes, sir.

Q. And on the surface of this water you saw some oil?

A. Oil and tar; it wasn't all on the surface, the tar was on the bottom, on the pipes.

Q. Was the tar moving when you saw it?

A. It was moving.

Q. Or was it deposited on the pipes?

A. No, sir, it was moving in the bottom of the pipe, it is heavier than water.

Q. Well, could you see down through the water?

A. On one side we could; on the other we could not on account of the oil.

Q. Did you see any place where the oil or tar could get into the brook?

A. Yes, sir.

Q. Did you trace it?

A. Yes, sir.

Q. What did you find?

A. I found any amount of oil or tar on the other side of the brook that was flowing on the ground.

Q. Between the brook and the gas house?

A. Yes, sir.

Q. Below the well, I suppose?

A. Below the well.

By the Court:

Q. What is that, a gas house for the purpose of supplying Dover with gas?

A. Yes, sir.

Further Cross.

Q. Did you observe the conditions around the gas house?

A. I did to some extent.

Q. Didn't you find that there was provision made there for carrying refuse away in another direction, and wasn't this merely an accumulation of past practices up there?

A. No, sir, it carried some of it away; they had

drains to carry some of it away, but it doesn't carry it all away.

Q. And you think it does not carry it all away now?

A. No, sir, it does not.

Q. Now, these remarks on the back of this picture, as far as it claims that oil and tar is being carried out of that pipe, I think that ought to be taken out of the legend.

By Mr. Vredenburgh: I see no objection to taking it out, if your Honor please, and I will strike out "carrying oil and tar from the gas house."

Further Direct.

Q. I show you another photograph, and ask you whether that is a photograph made by you?

A. Yes, sir.

Q. When?

A. In the month of February, 1906.

Q. What does it show?

A. It shows the north side of Myrtle avenue looking east from Passaic street.

Q. Did you test any of those houses?

A. No, sir—oh, I did, yes, on the opposite side of the street. This is the north side of Myrtle avenue looking east.

Q. (Handing witness another picture) Is this the opposite side of the street?

A. No, sir, this is not the other side, it is the opposite side of the street, but not directly opposite this point.

Said photograph was offered in evidence and marked Exhibit C 83.

A. (Continuing) The double house shown on this photograph I did test; my former answer was incorrect.

Q. Is that the same house you formerly testified about?

A. No, sir.

Q. Please mark that house?

A. (Witness did so.)

Q. What have you to say about testing that house; when did you test it and what did you do?

A. There is another picture there that I want first.

Q. (Handing picture) Is this it here?

A. Yes, sir, this is the house right here (indicating).

Q. You have another photograph of the same house?

A. Yes, sir.

Q. From a different standpoint?

A. Yes, sir.

Q. Can you produce that now?

A. Yes, sir.

Q. Is that a photograph you made?

A. Yes, sir.

Q. About when?

A. In February.

Q. Now mark that house the same way as you did the other house. February of this year, you mean?

A. Yes, sir.

Offered in evidence and marked Exhibit C 84.

Q. What test did you make in that house?

A. I placed urinite in the closet on the second floor, on March 2nd, and the result came out in the Electric Light Brook, or the green shade came out in the Electric Light brook in 30 minutes.

Q. What time of day did you put that in?

A. Between the hours of 10 and 4. I could not say just exactly.

Q. Where did you put it in?

A. In the closet.

Q. On which floor?

A. On the second floor.

Q. Was there a bathroom connected with the house, too?

A. Yes, sir.

Q. How many people are there in the house?

A. Two families, but I only tested one side of the house.

Q. How far did that have to go to get into the brook?

A. Well, that is either 3 or 4 blocks.

Q. And the urinite appeared in the brook within 30 minutes?

A. Yes, sir.

Q. What part of the brook did it appear in?

A. At the outlet, just before the Electric Light brook empties into the river.

Q. Can you see the point at which it appeared in the brook, can that be observed or is it covered?

A. I think it could be observed, it was open.

Q. What did it come out of to get into the brook?

A. It came out of the covered section of the brook.

Q. The brook itself is covered as far as the houses are concerned, is that your idea?

A. The idea is the brook is covered as far as the houses.

Q. The brook runs parallel with the houses there?

A. Yes, sir, parallel.

Q. In front or the rear of the houses?

By the Court.

Q. Parallel with the street line on which the houses front?

A. Yes, sir.

Further Direct.

Q. In the street or in the rear of the houses?
A. There is no way to tell; it is all covered. It must be in the street, but there is no way to tell whether it is underground in the rear of the house or in the street.
Q. How is it at the point where it disappears?
A. It is covered in the middle of the street.
Q. Where the sewer disappears, going up the brook I mean?
A. It is in the street at that point.

Cross-Examined.

Q. You don't know where the brook runs that passes by this house, where you made the test?
A. No, sir.
Q. Whether it is in the street or on private property?
A. No, sir.
Q. Or whether it is in the rear or front of it?
A. No, sir.
Q. How near the nearest point of the brook is to this house you don't know?
A. The nearest point to this house is four houses.
Q. The nearest point to the open brook?
A. Yes, sir.
Q. Some of the covered brook may be nearer still?
A. On a short block, yes, sir.
Q. You found the evidence of color in both cases away down at the effluent in the brook and down where it empties into the river?
A. Yes, sir.
Q. Rockaway river?
A. Yes, sir.

By the Court:

Q. Is the brook covered up to the point where you saw this green come out?

A. It is covered down that far.

Q. I want to know whether the brook is covered down to the mouth of the brook?

A. Part of the way, yes, sir; several blocks of it.

Q. Did you see the green coming out of the opening?

A. Yes, sir.

Q. Where the brook ceased to be covered?

A. Yes, sir.

Further Cross.

Q. Do you know the number of these double houses where you made the test last spoken of; have you the name of the owner or occupant of it?

A. Well, it is situated on the corner of Myrtle avenue and Union street.

Q. Do you know the name of the owner?

A. No, sir.

Q. Did you make any inquiry or investigation to find where the drain from the water closet was supposed to go to?

A. No, sir, the tenant didn't know.

Q. Which corner of the street is it?

A. Northwest.

Q. Now, I show you another photograph, and ask you whether this is a photograph taken by you?

A. Yes, sir.

Q. When?

A. The month of February last.

Q. Did you make any test of any house shown in this photograph?

A. No, sir; on the opposite side of the street I did.

Q. What is the force of this photograph, then?

A. Well, I never tested any of these houses; I

did not have the time to test them, but the houses across the street I did.

Q. What street is it?

A. Myrtle avenue.

Offered in evidence and marked Exhibit C 85.

Q. I show you another photograph and ask you if you took that photograph?

A. Yes, sir.

Q. Does it show any house that you tested?

A. No, sir. I wasn't in the house at the time the test was made.

Q. Well, what part did you have to do with any test?

A. I saw the drain running into Hudson street clear when Mr. Bouton and Mr. Griffin went into this house.

Q. You watched the drain near one of these houses shown on this photograph while Mr. Bouton went into the house?

A. Yes, sir.

Q. You remained by the drain?

A. Yes, sir.

Q. What did you observe coming out of the drain?

A. A green discharge.

Q. How long after Mr. Bouton had gone into the house?

A. 15 minutes.

Q. What was the character of that drain?

A. It was just a stone covered drain coming out from the end of the street—from the end of Hudson street.

Q. What does it enter into?

A. The Electric Light Company brook.

Q. It is the same drain as is shown on Exhibit C81?

A. Yes, sir.

Q. Out of the mouth of that drain you saw this green stuff coming?

A. Yes, sir.

Q. And this is the house which is on Exhibit C 86, and is on what street?

A. Bergen street?

Q. What number?

A. 36.

Q. What is the character of that house?

A. Double house.

Q. Occupied by how many families?

A. Two.

Q. Boarding house or anything like that?

A. Not that I know of.

Q. Did you go inside the house at all?

A. I have been inside of the house but not when this test was made.

Q. When you were inside the house did you see the closet?

A. No, sir.

Q. You don't know anything about that?

A. No, sir, the tenant is here.

Q. Who is the occupant or owner?

A. Mr. Lindaman, who occupied it.

Q. You say he is here?

A. Yes, sir.

Cross-Examined.

Q. Did you trace up the drain at all to see where it went?

A. No, sir.

Q. How far is it from this house to the mouth of this drain where you saw the green come out?

A. About six or seven hundred feet.

Q. On another street?

A. Yes, sir.

Q. Street running at right angles to this?

A. No, sir, parallel in the rear of the house we have been speaking of.

Further Direct.

Q. Now this drain which is shown in Exhibit C 81, can you tell the size of it?
A. I think it is about five inches high and a foot wide.
Q. Was it a pipe?
A. Just a stone way.
Q. Was it covered?
A. Yes, sir, a stone covered way.
Q. When was that test made did you say?
A. On March 1st.
Q. Of this year?
A. Yes, sir.

RECESS.

AFTER RECESS:

JACOB RINGLE, a witness sworn for the complainant.

Direct Examination by Mr. Vredenburgh:

Q. Mr. Ringle, you live at Jersey City?
A. Yes, sir.
Q. How long have you lived in Jersey City?
A. Something over fifty years.
Q. Have you been connected with the municipal government there of late years?
A. Yes, sir.
Q. Are you now a member of the Board of Finance?
A. Yes.
Q. And how long have you been a member of the Board of Finance of Jersey City.
A. Oh, I think it is about ten years.

Q. Were you a member of the Board of Finance in 1898 and 1899?

A. Yes, sir.

Q. As such did you visit Dover and the Rockaway water shed after Mr. Flynn had made his proposal to build the water supply?

A. I did.

Q. And do you recollect about when you went there?

A. Well, it was when the proposal was made. When the negotiations were going on at first. When Mr. Flynn tried to get our votes for his franchise.

Q. Well, who went up to Dover with the party? Do you remember anybody?

A. Yes.

Q. Members of the Board of Finance?

A. Yes, some of them.

Q. Who besides yourself?

A. Well, there was some of the Board of Finance and some of the Board of Street and Water Commissioners.

Q. Do you remember the names of any of them?

A. Mr. Heinz went up there.

Q. He was a member of the Board of ——

A. Street and Water Commissioners.

Q. Mr. Mitledge?

A. I think not; not at that time. Several others.

Q. Mr. Hauck?

A. Mr. Hauck went up there; Mr. Nolan went up there.

Q. Member of the Board of Finance?

A. No; the Street and Water Commissioners. The Board of Finance—I am pretty certain there were several went along, but I don't recollect the names now.

Q. At whose request did you go there?

A. On the request of the Mayor.

Q. At whose invitation?

A. Well, on the invitation of the Mayor.

Q. Who was Mayor then?
A. Mr. Edward Hoos.
Q. Was he along?
A. Yes.
Q. Who went up with you. I mean to say, who on the side of Flynn went up with you?
A. Oh, there was a man by the name of Beldon. And there was a number of others of that Flynn people, but I don't recollect the names much, and I know their treasurer. I knew them all by sight, but I don't recollect their names.
Q. Do you recollect whether you went up there at a time appointed by them or not?
A. I understood the agreement was with them. The Mayor told me so at the time.
Q. And you started from Jersey City together?
A. Yes, sir.
Q. Where did you go first?
A. Well, we went first to Boonton, from there they showed us the Rockaway river, and in the first place at Boonton they showed us where this dam was to go, this large reservoir, and where the retaining walls was to be, and from there we went to Dover and also to this place, Powerville, where the rag factory was, and so on to ——
Q. Now, when they were at Dover——
A. Yes.
Q. —— did they explain to you the plan they had preventing the contamination of the river by the sewage from Dover?
A. Yes.

Mr. Corbin: I object. I think we should know who spoke and what was said by each of them.

Mr. Vredenburgh: I am leading up to that.

Q. Please tell us who said it and what they said with respect to that plan?
A. Mr. Beldon was the spokesman, and this

man—this treasurer of theirs, I forget his name, a large man ——

Mr. Edwards: Mr. Kennedy.

A. Mr. Kennedy, Mr. Edwards knows the man.

Mr. Corbin: Was it Mr. Michael J. Kennedy?

Witness: Yes, sir.

Q. Well, now what was said?

A. Well, when we were up there we talked of this place Dover, that it was going to be larger and that the sewage of this place would be a menace, and that in order to keep this water pure we would have to have sewers to gather the sewage together and take it away from our water.

Q. Yes.

A. Well, it was all right; they showed us what they were going to do.

Q. Who showed you. Just mention the names?

Mr. Corbin: One moment, Mr. Vredenburgh, I object to this line of examination.

The Court: It will go in subject to objection to be considered at the proper time.

Q. Now, if you will state, as near as you can, who said it, Mr. Beldon, or ——

A. Mr. Beldon was the spokesman.

Q. Now what did he say?

A. He told us that they were going to—if this contract was awarded to them they were going to —build sewers and sewer disposal works from Dover. They were to clean the sewers in Dover, and they also showed us, that is, later on, after we got on the train coming back, where the sewage disposal works was to be. This Mr. Kennedy showed

us that, and that at Boonton the sewage at Boonton was to be gathered up and taken in large sewers away below our intake so as to have no contamination of our water at all; not only that, but the rag mill at Powerville, we went and looked at that, and that emitted a great deal of dirty water, and they also said that they had bought that and they were going to destroy that.

Q. Who said that?

A. Why, Mr. Beldon told us that. They also showed us where the dam was to go.

Q. Now, were you present when it came before the Board of Finance to vote upon it, when the contract came before the Board of Finance to vote upon it?

A. Yes, sir; I was present at all the meetings pertaining to this water works. I think at every one of them.

Q. Well, at that time was any one present on behalf of Mr. Flynn?

A. Yes, sir.

Q. Who?

A. Mr. Edwards. Mr. Edwards said he had all to do with it, and he had authority.

Q. Well, was anything then said about the plan which they had for preventing the sewage of Dover from going into the river?

A. Yes, sir.

Q. What was then said, and by whom?

A. Mr. Edwards told us the same thing, that they were going to gather up the sewage of Dover and Boonton, Rockaway and Port Oram, and also at this place in Powerville. I then made a memorandum at the time, and I read the memorandum over to Mr. Edwards and told him under those conditions alone would I vote for this contract, and that unless there was sewers and the sewers were properly built that would take the sewage from there at all times and have proper disposal works,

unless he would guarantee that I would never vote for it.

Q. Now did you make a memorandum of that? You say you made a memorandum and read it to him. Have you got that memorandum?

A. I have. It was made in pencil at the time.

Q. Do you say that it was assented to by Mr. Flynn and his attorney?

Objected to as leading and improper.

The Court: No. What did they say?

A. Well, Mr. Edwards, you stood at one side of the table and I at the other, and you seen me read it off.

Q. Well, have you got it here?

A. Yes, sir.

Q. Then you better produce it.

A. (Witness produces same.)

Q. You read it out loud?

A. Yes, sir.

Q. Well, now you better tell us what you read?

Objected to on the same ground.

A. Do you want me to read it off?

Q. Yes.

A. The first was a question. "What is to prevent persons from taking water from above our plant of over seventy million gallons of water." Mr. Edwards told us at the time that the whole plant would belong to us. The second was about the time of purchase after works was completed. There was in their specification——

By Mr. Corbin:

Q. Well, if you are going to read it you had better read it?

A. This is my memorandum that I made at the time.

The Court: The second memorandum don't seem to be in the form of a question.

By Mr. Vredenburgh:

Q. What is the second memorandum? Read it as you have it.

A. Excuse me a moment. There was in the specification—it said that if we purchased the works in a given time we would get the works for $7,595,000; if we didn't purchase within that given time they would add on $400,000 more, and we argued the case with them and said that we required more time than they would allow, because we would want to test these works for at least two years after the works were completed. Then we agreed that the time should be extended to four years and eleven months. I wanted five years, but for some reason or other Mr. Edwards wanted to take off one month, so that it was four years and eleven months.

Mr. Corbin: Now the four years and eleven months is in writing in the contract.

A. The third question was if the search of the property and guarantee of title should be paid by the Flynn people, or by others than Jersey City of all this purchased property. Mr. Edwards agreed to that, and then the fourth question was this,—the sewage and sewer disposal works to be built and maintained by others than Jersey City, and the fifth was the supply of shed to below to Jersey City, and water sold to others than Jersey City is to be sold by Jersey City and by none others. That Mr. Edwards agreed to.

By the Court:

Q. Now the one we were talking about was the fourth; that is what we want to know about.

By Mr. Edwards:

Q. This was about the sale of water?
A. Yes. You are to sell water to none others than Jersey City.

By the Court:

Q. Now your attention is called to the fourth question on the memorandum.

By Mr. Vredenburgh:

Q. Yes. The fourth one was with regard to sewage disposal works. What was said about that at that time?

Mr. Corbin: I object. It appears by the contract itself that explicit provision was made in writing with reference to that very topic.

A. I know about that too.

By the Court:

Q. Did you read out the fourth question?
A. Yes, sir.
Q. What was said in reply?
A. I read out that they were to build the sewers and the sewer disposal works at their own expense and to be maintained by others than Jersey City, and he agreed to do. I told him——
Q. You say he agreed to it. What did he say?
A. That was all right, he would agree to that. I told him at the time that unless Jersey City was

thoroughly protected in this matter I would not vote for it.

Further Direct.

Q. Now, was any reason given by him why the word "Dover" was not used?

Objected to as incompetent.

By the Court:

Q. Well, did they refer to Dover at this time?
A. Not at this time, but afterwards, when they came to sign the contract between Flynn and the Mayor; I objected——
Q. How long afterwards?
A. I guess it must have been six months afterwards, from the time we kept on negotiating until finally the contract was signed by our Mayor and Flynn.

Further Direct.

Q. Now, before the contract was signed you say that something was said about Dover, before the Mayor. Just tell what that was?
A. Well, at the time the contract was signed, I being a member of the Board of Finance, I got them to read this contract over, and I found that they said nothing about the sewer or sewer disposal works, or anything about the various localities, and I object to it, and told the Mayor at the time that these things, according to agreement should have went in there, but we had our counsel there, Mr. McDermott—Allan McDermott, and they agreed that it was not judicious to put the sewers and sewer disposal works in there, they said if they did, why these various places would make the Flynn syndicate, or whatever they are, built these

sewers, and if it was not in this contract, these names, why the Flynn people would force them to build the sewers without any cost to Flynn. Well, I asked Mr. McDermott, who was our counsel, whether that was all right, if that held water, and he said yes, that is perfectly good.

Q. Did you see the letter that was written by Mr. Flynn or Mr. Edwards to the Mayor before the contract was signed?

A. What letter is that?

Q. The letter with regard to the elimination of the rag mill?

A. I have a copy of that in my shop. The Mayor had the letter and he was afraid it would be stolen, so he gave me a copy in case it was stolen.

Q. Now, I want to get at when that occurred, whether you were present when that letter was delivered?

A. That was delivered before the Mayor signed the contract.

Q. Were you present?

A. I was, yes, sir.

Q. Who delivered it?

A. Mr. Edwards and Mr. McDermott wrote it up. The negotiations were about being broken off on that point, and they were going to part when Mr. Edwards straightened matters out and got up this letter, and the Mayor felt satisfied, so then the contract was signed.

Q. That is all.

Cross examination, by Mr. Corbin:

Q. You were present when the contract was signed by the Mayor?

A. I was.

Q. And it was read immediately before it was signed?

A. Yes, sir.

Q. And this discussion which you have men-

tioned took place immediately before it was signed?

A. Yes, sir.

Q. General Heppenheimer, your chairman, signed for your Board?

A. Yes, sir.

Q. Both the boards were present with the Mayor, weren't they?

A. Yes, sir.

Q. And was Mr. Flynn present?

A. Yes, sir.

Q. Who else on his side?

A. Beldon and his treasurer and Mr. Edwards.

Q. When you say Beldon, you mean Henry Beldon?

A. I don't know his first name, the man that done all his business along with Mr. Edwards at that time.

Q. He was the one who acted as witness for Flynn on the contract, the man that is dead now?

A. I don't know whether the man is dead or not, but I know this,—the man had all to say about it, and he showed us the various—

Q. Well, that answers it. Was the contract changed somewhat at that time, when you were making your objections and criticisms right there, before it was signed?

A. I don't know of any other change except this matter at Powerville.

Q. That was made right there while you were all present, was it?

A. Yes, sir. They were just memoranda of my own to jog my memory, that is all, when I put these questions to them.

Q. What is this last or sixth clause on your memorandum,—read it if you can?

A. I will try it. Well, this memorandum was—

Q. Won't you read it exactly as it is?

A. "Can Flynn supply water without Jersey City—"

Q. "abandoning its rights" is it. I will refresh

your memory. It had to do with Belleville, didn't it, getting back your rights.

A. It is just a scribble of my own and a memorandum of my own at the time, to refresh my memory.

Q. Doesn't that clause refer to Jersey City's rights at Belleville. You feared that if this new supply was demanded Jersey City might lose its rights at Belleville by non-usage?

A. Well, that we cut out.

Q. That was what that sixth clause referred to?

A. I know that was one of the clauses.

Q. Well, that is what the sixth clause refers to?

A. I will tell you what there was on it, as I understood; at the time, that Mr. Flynn wanted our rights of the Passaic river, and I thought at the time that Passaic river in the course of time might become valuable, and that the river might be cleared and the rights of the City might be available, in the course of time, and that was one of the things that I asked about.

Q. Was not this tenth clause inserted in the contract as a result of that suggestion by you: "10. Nothing in this contract contained shall be construed as an abandonment by Jersey City of its rights in the Passaic river at Belleville, N. J., or elsewhere, as vested in it by legislature grant, riparian ownership or otherwise."

A. That was one of my points.

Q. Then there was something put in the contract as a result of each one of your six suggestions?

A. I think so, yes, sir, except the sewage, they didn't put that in, but they were to build the sewers and maintain sewer disposal works.

Q. Read your memorandum 4, about sewers?

A. I will tell you. This may not be written—this was merely written as refreshing my memory at the time.

Q. We understand that.

A. The sewage and sewer disposal works to be maintained by others than Jersey City.

Q. Now, let me read to you section 8 of the contract, and see whether it is not what was put in as a result of that suggestion by you. "8. It is further understood and agreed that all sewers and sewage disposal works constructed or arranged for by the contractor to prevent or to carry off pollution existing in the water shed shall, under said specifications and plane, be so constructed and arranged for by him that in the event of the purchase of the water supply and plant by Jersey City under any of the options aforesaid, the operation and maintenance of such sewers and sewer disposal works, for the purpose aforesaid, shall not be a charge upon or expense to Jersey City." That was put in as a result of your suggestion, wasn't it?

A. I think so.

Q. Didn't you hand a slip like the one you have in your hand now, or something like it to Mr. Edwards and Mr. McDermott, to enable them to prepare these clauses?

A. No, sir, I read it off.

Q. Did they take a memorandum?

A. I don't know whether they did or not. Mr. Edwards was by all the while, and he was about the only man we had any talk to.

Mr. Corbin: I desire that that slip be marked in evidence.

The Court: I presume there is no objection. Mr. Vredenburgh do you offer it as your evidence?

Mr. Vredenburgh: Yes, I will offer it in evidence.

Said memorandum offered in evidence and marked Exhibit C 86, the following of which is a copy:

"1. What is to prevent persons from taking water from above our plant, of over seventy million gallons? Where is the claim to this filed.

"2. About the time of purchase after works are completed.

"3. The search on property to be paid for and guarantee of title.

"4. Sewage and sewer disposal works to be maintained by other than Jersey City.

"5. The supply of shed to belong to Jersey City and water sold to other than Jersey City is to be sold by Jersey City and by no others, from time of purchase.

"Can Flynn supply water without Jersey City effect rights, and how can we get the right back."

Q. When you went on your tour of inspection, you went as far as Boonton by train, did you not?
A. Yes, sir.
Q. And then where did you next go?
A. We went up from Boonton to Powerville?
Q. Did you, first? Or down to the dam?
A. To Powerville, where the rag place was.
Q. Was that the first thing you did?
A. Yes, after we investigated Boonton.
Q. Didn't you go down to the dam site first?
A. Yes, all around Boonton.
Q. First you investigated the dam site?
A. Yes.
Q. You drove up through the reservoir?
A. Yes.
Q. And saw what is called Hoos's Island, didn't you?
A. I seen that, yes, sir; Hoos's Island.
Q. Then you drove up to Powerville?

A. Powerville, yes.

Q. Did you get out of your wagons and walk about, there?

A. Yes, sir.

Q. Now you say that Beldon said something to you about buying that mill. I understood you to say that Beldon told you he had bought the rag mill. Aren't you mistaken about that?

A. No, sir. Both Mr. Beldon and Mr. Edwards told me that.

Q. But this was long before the bid was accepted, you say Beldon told you he had bought the rag mill?

A. Not only that. Mr. Edwards further told us—

Q. I am talking about Beldon.

A. He was there talking at the same time. He was with us. There was nothing going on generally without Mr. Edwards being by. Mr. Edwards further said that they had bought all the right along down the river. Everything. Everything where there was a question that any body had any right along the river. He also told us they had bought up the various water rights. He said twenty-four various water rigths they bought up.

Q. Why, Mr. Ringle, this was months before the contract was signed.

A. I understand that. That was all in the negotiations. He was trying to get our votes, and he was telling us all that. I recollect the matter very strictly.

Q. Didn't he tell you he had an option on the Fitz-Gibbon mill at Old Boonton?

A. No, sir. The only place where he said he had an option; I think there is a mill or factory there by the name of Lord.

Q. Cooper-Lord, in Boonton?

A. Cooper-Lord, in Boonton, said they had an option on that. Everything else they had bought.

Q. Well, Mr. Ringle, did you really think that

months before you had decided to give this contract, they had bought up all that property?

A. So he told us. I believed them to be honest men, and thought they would tell the truth. Of course, if I wasn't sure of these things, that Jersey City was thoroughly protected, I would never vote for it.

Q. How many trips did you make up there to the water shed?

A. I made two of them.

Q. Before the contract was signed?

A. One before the contract was signed, and one after the contract was signed. When they changed the retaining wall—I want to explain to you this. They showed us where they were going to put the original retaining wall—

Q. By retaining wall you mean the big dam?

A. Yes. They took us on the hill and showed us from this point to that point. I asked the gentlemen whether they had made soundings.

Q. Asked whom?

A. Mr. Beldon, and this treasurer, who was by, and Mayor Hoos was by on this hill. I asked them whether they had made soundings, so that they could put this immense wall. This wall was to be a hundred and thirty odd feet high; and it was to be a hundred and twenty-five feet at the bottom, in thickness; and it was to be eighteen feet thick on top.

Q. How did you get those figures?

A. They told me. And I asked them whether they had made soundings, and they said "Yes." And they laughed at me. Said: "Why, don't you see rocks cropping up out of there?" Afterwards, when this wall was to be built, after the contract was signed, they said they had made soundings, and couldn't get down there; they had made soundings to sixty odd feet, and couldn't find any bottom.

Q. And you voted for the change of the site of the dam?

A. I voted, because it was said to be the best they could do; they would give us so much more at the other end.

Q. Well, after you went to the rag mill at Powerville, where did you drive next on that first tour of inspection?

A. We went from Powerville to the river, the Rockaway river, above Boonton.

Q. Which side of it did you drive up?

A. I know we were on the left side of the river.

Q. Which places did you go?

A. Above Boonton; I can't tell you the names of the places. From there we went and took the train and went to Dover.

Q. You looked through it all around Dover?

A. Yes, sir.

Q. You didn't go higher up the river than Dover?

A. No, sir.

Q. You said something about Kennedy told you what the location proposed was for the disposal works?

A. Yes, sir.

Q. What did he say about that?

A. As we came along from Dover this way again on the train Mr. Kennedy and several of the other members got close to me,—I suppose they had the idea that I was the hardest of the lot.

A. A hard nut to crack?

A. Yes, sir, they all clubbed around me and showed me around as the train came along, a large sandy field below Dover, this side, and they said that was to be the sewer disposal works on this field.

Q. What time was this?

A. This was in the summer or fall, I cannot tell you now the exact time.

Q. After the bids had come in?

A. No, sir, before the bids came in. No, no,

one minute. This was before the contract was made.

Q. But after the bids had come in?

A. After the bids had come in.

Q. Now, Mr. Flynn had bid on the occasion of previous bids hadn't he?

A. I don't know about that.

Q. Had you been there before?

A. No, sir, on this occasion when Mr. Flynn's bid was to be considered, Mr. Kenndy pointed out of the window of the car to a sandy place.

Q. What did he say, just try and remember what he said?

A. Oh, I know all about it.

Q. Well, what did he say?

A. He showed me the location of a large sandy plane and said there was where the sewer disposal works were to be. I said what are you going to do with the water after you have disposed of it; he said we are going to leave it run back to the river and that the water would be clear; that the solids were going to be worked up and used for fertilizing and other wise, and I thought it was feasible at the time.

Q. Never mind stating what you thought. These two visits one after the bid of August, 1898, and the other when the dam sight was changed—

A. Before that was changed.

Q. Yes, before. Those were the only two visits you made to the water shed?

A. Yes, sir.

Q. During the whole time of the prosecution of this work until 1904, you never went up there again?

A. No, sir.

Q. Did anybody else go on behalf of the City?

A. I understand that quite a number of them went up there, but I never did.

Q. Have you ever been there since it was finished?

A. I didn't, but we had our inspector and engineers there.

Q. Are you still a member of the Board of Fiance?

A. Yes, sir.

Q. And you were the chairman of the committee on concurrent resolutions?

A. I am president of the Board and have been for five years, and before that I was the chairman of the Concurrent resolution committee.

Q. And the resolutions on this water subject all came from the Board of Street and Water Commissioners to your Board to be concurred in?

A. Yes, sir.

Q. They have to have joint action of both, as well as the approval of the Mayor?

A. Yes, sir.

Q. You say you were on that committee?

A. Yes, sir.

Q. That is the one that has charge of the Board of Works?

A. Yes, sir. I might say that the bid would not have gone through the Committee if they hadn't satisfied me that Jersey City was to be protected.

Q. Why this bid of Flynns was pending before your Board for six months before the contract was signed, wasn't it?

A. I guess it was.

Q. And there were numerous conferences of both Boards and the Mayor?

A. Yes, sir.

Q. And a great deal of time taken up?

A. Yes, sir, a great deal.

Q. In detail?

A. Yes, sir, they tried to convince me in some way or other.

Q. And finally it was passed by the unanimous vote of your Board?

A. Yes, sir, I was the only one that held out against it.

Q. And everything else was passed by the unanimous vote of your Board?

A. Yes, sir.

Q. Touching the final outcome?

A. Yes, sir.

Q. That is all.

EDWARD HOOS sworn.

Direct examination by Mr. Vredenburgh:

Q. You reside in the city of Jersey City, Mayor?

A. Yes, sir.

Q. How long have you been a resident of Jersey City?

A. Thirty-for years.

Q. And you were the Mayor of Jersey City several terms I think?

A. Yes, sir.

Q. From what year to what year, do you remember?

A. 1897 to 1901.

Q. You were mayor when this water contract was signed?

A. Yes, sir.

Q. Now, before it was signed, did Mr. Flynn or his attorneys state to you what their plan was?

A. They did.

Q. For preventing the contamination of the Rockaway river by the sewage of Dover?

Objected to as too general.

Q. I ask you whether anybody stated anything first—I want to know whether any such conversation occurred, and if you say yes, I will go on and try to find out about it?

A. During the course—well, while this agitation for water was on we had several conversations

about it, and had invitations to go to Boonton and other places to see about it, and naturally the question came up to see how they would take care of the sewage.

Q. Who assumed to represent Mr. Flynn?

A. Mr. Edwards.

By Mr. Corbin:

Q. Mr. Flynn was present?

A. He wasn't, he was never present until the contract was signed.

Further direct.

Q. Did you visit the Rockaway valley, Mr. Mayor?

A. I did several times before the contract was signed, and afterwards.

Q. Before the contract was signed did you go there at the invitation of anyone to see it?

A. I went as an investigating committee from the City by the invitation of Mr. Edwards and others who represented the water shed, before there was any idea of taking this water from Flynn or anybody else, and looked the water shed over. That was the first thing, and Mr. Edwards at that time pointed out where the different sources of supplies came from, numerous little brooks, and he showed all of what Jersey City was to have in the contract which was intended to be made, and then we ceased and the specifications were written up.

Q. Was that before or after Mr. Flynn had put in his proposition to furnish the water?

A. That was after the city had voted to give a water contract.

By the Court:

Q. See if I understand this rightly. In the

first place the City advertised for bids for a water supply?

A. Yes, sir.

Mr. Edwards: That was the seventh advertisement.

Q. The City advertised for bids upon the contract to put in the bid, and after Mr. Flynn's bid was accepted then the contract was signed. Now I understand you to say that you went up there before the City had even advertised for the last proposal. I don't think Mr. Vredenburgh understands it that way.

Mr. Vredenburgh: No, I do not.

The Court: That is what I understood the witness to say, and Mr. Vredenburgh better continue his examination of the witness.

Q. When did you first visit the water shed, this particular water shed, Mayor, with reference to the supply of Jersey City with water. Was that before or after Mr. Flynn had made the bid?

A. It was after.

Q. Who went up there with you at that time?

A. The members of the Board of Finance, Finance Commissioner Ringle, Simpson and Greenville, and Commissioner Bailey, one of the former members of the Board.

Q. Who?

A. Bailey.

Q. Who went up on behalf of Flynn?

A. Why, Mr. Edwards, Mr. Beldon, Mr. Kennedy and a man named Connelly, a contractor, and several other citizens of Jersey City, prominent citizens that were interested in it.

Q. Where did you go to?

A. To Boonton.

Q. How far up the river did you go?
A. As far as Dover.
Q. All in one day?
A. Yes.

By the Court:

Q. Was that the first visit you paid to that shed?
A. Oh, pardon me, I went over the entire water shed. That was the first visit, and they had flags staked out of what a large area the city was to have for it reservoir.
Q. This is not the visit you have just been describing, when you say certain gentlemen whom you described, went up?
A. They went at the same time.
Q. On the first visit?
Q. These gentlemen all went along at the same time—both times.
Q. What do you mean by both times,—did you go before the City advertised for the last bid,—the last time they advertised for bids, or did your first visit occur after that time.
A. After they advertised.
Q. Your first visit?
A. Yes, sir, I think I am right about that.

Further direct.

Q. When you came to Dover, was there anything said by Mr. Beldon or Mr. Kennedy or Mr. Edwards as to how they would prevent the contamination of the river by the sewage of Dover?

Objected to.

A. They said they would take care of the sewage.
Q. Who.

A. Mr. Edwards.

Q. How?

A. He said he did not know in what way,—that would come along afterwards as there were different methods of disposing of it, and he did not know whether they would have a sewage disposal works or build a real sewer.

Q. Build what?

A. Real sewer.

Q. Now was anything said by either of these gentlemen as to the rag mill at Powerville?

A. He said that the rag mill at Powerville would be entirely wiped out, that was his exact language.

Q. Now, was anything said in regard to the sewage of Boonton.

A. The same as with the other; that they would take care of it.

Q. Did he say how they would take care of it?

A. Just the same as I stated before; they did not know in what way; they might burn it up or use it in some other way to get it out of the way, but we would be free from pollution.

Q. Now at the time you signed the contract, or before you signed the contract, at the time the contract was signed, did you make any demand upon them in reference to the rag mill at Powerville?

A. Yes, sir.

Q. Upon whom did you make the demand?

A. As I had never met Mr. Flynn before, with the exception of that evening, and having from Mr. Edwards obtained a letter in which he promised that Powerville should be wiped out, I thought it was wise that I should have from Mr. Flynn his own approval of what Mr. Edwards said, and give it to me in writing. There seemed to be a hitch at once. Mr. Edwards, said it was all right,—that he would stand by what was written. I said to Mr. Flynn, you are here, and I would like to have Mr. Flynn's own signature. Then there was a consultation be-

tween Mr. Allan McDermott, Mr. Edwards, Mr. Flynn and the rest, and the matter was held about twenty minutes while they were having a conference amongst themselves, and I insisted upon Mr. Flynn's signature. Some of my counsel said it was such a little matter—there was no use in tying up this contract for this little signature. I said, well, gentlemen, I am not going to sign this contract unless I have Mr. Flynn's signature. Then they said, well, you will put the City to $5,000 extra expense for advertising on account of that objection. I said yes, I will throw up the whole job, I won't sign it. Then there was another conference and finally Mr. Flynn came in and I showed him the letter and he took it and said "I will sign any old thing." I said, you need not sign it at all, and if you ain't signing it willingly, why I will not sign it either. Then he seemed to see that the situation was such that he had to come to it, and the contract was signed.

Q. Now, have you got that letter?

Mr. Corbin: Letter or contract.

A. Letter and contract both; the letter was signed before the contract was signed.

Q. Have you the letter?

A. I have, I have a copy of it.

Q. Will you please produce it?

A. I will.

Mr. Corbin: Where is the original?

Mr. Edwards: This is a type-written copy.

Mr. Vredenbugh: I have here the clerk of the Mayor. We have made a very thorough search in the office, but cannot find it, but we have a copy in the bill of complaint or annexed to it.

Mr. Corbin: Is there any difficulty about getting the original.

Q. When was the copy made?

A. At the time the original came to the office.

Q. You said Flynn sat down and signed a letter then and there. What did you do with the original letter?

A. I don't know where it has been, because I got out of the City Hall, and a lot of papers went astray.

Q. When was this copy made?

A. Of Mr. Flynn's letter?

Q. Yes.

A. At the time it was signed—the next morning.

Q. Where?

A. In the City Hall,—that's the City Hall paper.

Q. Who made it?

A. My secretary,—Mr. Collins.

Q. Where is he?

A. He is employed in Brooklyn somewhere—Jimmy Collins, and the other letter is yours (to Mr. Edwards). Do you deny that you received this letter, Mr. Edwards. You don't deny having received this, do you.

Q. Do you say you sent a copy of it to Mr. Edwards?

A. Yes, sir, that is a copy; I had copies made and sent there, it shows that you (Mr. Edwards) was aware of that.

Mr. Edwards: That don't seem to be addressed to me.

Witness: Yes, it is.

Mr. Edwards: No; this is a letter to somebody else.

The Court: Do you require proof by the man

who made the copy, that this is a copy of the original?

Witness: I had several copies made. Mr. —— —— got one.

Q. You haven't seen the original letter since it was signed?

A. No, sir, I put it away and I don't know where it is.

Mr. Corbin: It is very safe.

The witness: Well, it might come up—you cannot tell. Perhaps it was P. H. Flynn instead of Patrick H. Flynn, but it was P. H. Flynn's signature. I can see his signature now before my eyes.

Mr. Corbin: I am not disposed to make any captious objection to the letter going in, but I think they ought to make a proper search for the original first, and if they cannot find it put the copy in. I shall object to the relevancy of it, of course.

(Witness withdrawn for the present.)

FREDERICK J. SEMEK sworn for complainant.

Direct examination by Mr. Vredenburgh.

Q. You are employed by the present Mayor of Jersey City?

A. Not just now.

Q. When were you so employed?

A. From 1903 to 1905.

Q. In what capacity were you employed?

A. I was clerk to the Mayor of Jersey City.

Q. As such clerk did you examine the records of

the office of the Mayor to find the original of a letter dated January 26, 1899, from William D. Edwards to the Honorable Edward Hoos, and signed by P. H. Flynn, February 28, 1899?

A. Yes, sir.

Q. What was the character of your search?

A. I didn't find it.

Q. Well, what was the character of your search?

A. I made a thorough search in the vault in the Mayor's office, which comprises a number of compartments—pigeon-hole compartments and I went through every one of them, and I could not locate that letter.

Q. Did you search every place in the Mayor's office where a letter to Mayor Hoos or record of that character would probably be kept?

A. Yes, sir, wherever I thought there was a possible chance of finding any letters filed in the Mayor's office.

Q. Did you find that letter?

A. No, sir, I did not.

By the Court:

Q. Did you ever see it?

A. No, sir, I never did.

By Mr. Edwards:

Q. You didn't enter the Mayor's office until some years after Mayor Hoos left?

A. I went in under Mayor Fagan.

Q. Two years after Mayor Hoos left you went in?

A. No, sir, a year afterwards, 1903 I think I went there. The Mayor was elected in April, 1901. Mr. Fitzgerald was clerk in the office 1902 to 1903, and I went in 1903 to 1905.

The Court: You have not yet proved that this is a copy of the letter you cannot find. You can only prove that by the person who made the copy.

Mr. Edwards: If it was a type-written letter there must be a copy in my office, and we might suspend this question now and perhaps we can help you.

Mr. Vredenburgh: We can prove that this is a correct copy of the letter undoubtedly if it becomes necessary. It appears to be a letter from counsel himself, and he ought to know whether he wrote it or not.

Mr. Edwards: Well, I say that if this is a type-written copy of a letter from my office I have no doubt a copy of it was kept, and if I have time I will try and hunt it up. I want to know if this is an exact copy of the letter, because the change of a word or two will make considerable difference.

EDWARD HOOS recalled.

Further direct examination. By Mr. Vredenburgh:

Q. Now, Mayor, was this letter which you have produced, in answer to any letter which you had written to Senator Edwards?

A. It was.

Q. Have you got a copy of the letter you sent to Senator Edwards?

A. Yes, sir, I gave it to you.

Mr. Vredenburgh: Now Senator, I ask you to produce the letter which was written to you.

Mr. Edwards: I haven't it with me, and I don't think from reading that copy over, it was sent to me, it was apparently sent to somebody else.

The Court: You don't produce it?

Mr. Edwards: We haven't had any notice to produce it.

The Court: Then you cannot use that copy yet, but you may give notice now, and if it is not produced on Wednesday I will consider the matter whether you shall be allowed to use the copy or not.

Q. Let me ask you whether the copy, signed by P. H. Flynn, which you have here, is a true copy of the original?

Objected to.

Adjourned until 9.45 A. M. Wednesday, May 23, 1906, at the Chancery Chambers, Newark, N. J.

WILLIAM J. RIGHTER sworn.

Direct examination. By Mr. Vredenburgh:

Q. Mr. Righter, you live where?
A. Parsippany,—always have until a while ago?
Q. You have lived there how long, sir?
A. Well I have always lived there until about a year ago,—eight months or ten months ago.
Q. In what part of Parsippany?
A. Well, right near the cemetery.
Q. How near is that to the dyke which is known as the Parsippany dyke of the Boonton reservoir?
A. Well, that is very close by—may be six or seven hundred feet, something like that.
Q. Look at this map, it is called Exhibit C 64, is your house shown on this map?
A. It is shown.

Q. You point to the house near the Parsippany Turnpike, the right hand side of the exhibit?

A. Yes, sir, here is the Turnpike road and here is the house (indicating).

Q. Now that is the house that you lived in for many years?

A. Yes, sir.

Q. And do you own any land in that neighborhodd?

A. Yes, sir.

Q. About how much?

A. About 65 acres.

Q. What other buildings do you own there besides this house—this dwelling house of your own?

A. Why, there is two other houses and a barn.

Q. What is the size of the dwelling house—your dwelling house, about?

A. Where I live?

Q. Yes.

A. Well, I think it is about seventy feet long, and probably—I never measured it, maybe thirty feet wide.

Q. Is it a frame house?

A. Yes, sir.

Q. Two stories?

A. No, sir.

Q. One story?

A. One story and a half?

Q. The old house I suppose?

A. Oh, yes.

Q. And your age is about what?

A. I was born in 1857.

Q. Were you living on the farm when this dyke was built?

A. I was.

Q. Did you assist in building it?

A. I helped haul some material, yes, sir.

Q. And about what time of the year was it finished,—was it substantially finished?

A. Well, about in September, I think.

Q. And do you recollect when the core wall was substantially finished?

A. About that time.

Q. About what time in September,—substantially finished.

A. Well, I think the fore part of September.

Q. Now how long after that was it before the water in the reservoir commenced to rise, to the foot of the reservoir, or did rise to the foot of the dyke?

A. Well, along about the first of October the water reached the back dyke.

Q. Well, now, after it commenced to rise above the foot of the dyke, will you please state what, if anything, you noticed with respect to your land?

A. Commenced to leak, commenced to get wet.

Q. What was the result, as the water got deeper?

A. More leak, more wet.

Q. Did it affect your land in any way?

A. It has.

Q. Now first as to your house, what effect, if any, has it had upon your house?

A. Well, what we call the Courter house and the other house, there has been water in the cellar, and the cellar is made very damp and wet.

By Mr. Edwards:

Q. Which house do you mean, the Courter house or your own house?

A. The Courter house.

Further direct.

Q. What effect has it had upon your dwelling house, if anything?

A. Made it very damp, the ground around there is much wetter than it has ever been before.

Q. The other house upon your property you did not describe, what do you call that?

A. Well, that is a smaller house, that is very wet, and there is no cellar under it.

Q. What do you call it?

A. The Courter house.

Q. Why do you call it the Courter house?

A. Well, the man that lives in it is named Courter.

Q. Is he conected with you in any way?

A. No, sir.

Q. Is he your tenant?

A. Yes, sir.

Q. Now that house is a smaller house?

A. Yes, sir.

Q. A frame house also?

A. Yes, sir.

Q. What effect upon this house did you notice after the water was raised in the reservoir to the present level?

A. There has been water in to it, there is water in the cellar and is to-day.

Q. And has that been the condition of the cellar ever since?

A. Yes, sir.

Q. To what height is the water in the cellar.

A. I have seen it as high as 18 inches.

Q. And as low as what, give us the range?

A. Well, some times it would be lower a little, I would not go there every day, of course, but I went there at one time and measured it when it was 18 inches.

Q. Have you ever pumped it out?

A. Yes, sir.

Q. How many times?

A. Different times.

Q. More than once?

A. Oh, yes, I had a pump there for six weeks, I guess, or longer, and pumped at different times.

Q. What effect did that have upon the occupation of it?

A. Well, it made it very damp, of course, the cellar full of water.

Q. The tenant continued to live there?

A. Yes, he stayed there, but he didn't want to, but he did.

Q. Did it cause any sickness.

A. Yes.

Objected to.

Over-ruled.

Q. Did you ever notice any water in that cellar before the water was in the reservoir?

A. No, sir.

The Court: You are now speaking of the cellar of the Courter house?

Mr. Vredenburgh: Yes, sir.

Q. Now as to your barns and other buildings there, is there any damage to them from water?

A. Well, the ground is very wet around it, just below it.

Q. No, the remainder of your farm. Did you notice what effect had, if any, the water in the reservoir, seeping from the reservoir, upon that land?

A. It has been wet ever since.

Mr. Edwards: Which part of the farm.

Mr. Vredenburgh: I will get it all out. I will get every bit out of it.

(Being so directed, the question was read by the stenographer as follows):

Q. Now, the remainder of your farm. Did you notice what effect had, if any, the water in the reservoir, seeping from the reservoir, upon that land?

Mr. Edwards: I object to that question, because it calls for a conclusion.

(Question withdrawn.)

Q. What did you notice with respect to your land after the water was in the Boonton Reservoir at its present level?

A. I did.

Q. What did you notice? What did you see?

A. Very wet.

Q. Can you tell us what part of your land was very wet? How much of it?

A. Well, it was on the south side of the road, and a good deal on the north side of the road.

Q. How many acres?

The Court: On the south side?

Mr. Vredenburgh: On the south side.

Q. Did you notice? Affected—made wet, as you say?

A. Well, I never had it measured, but a good big scope of it, on the south side of the road.

Q. We can't tell what a big scope is, Mr. Righter.

A. Well, I should say there was about thirty-five acres on the lower side of the road, and it runs even over on the other side of the brook where it is wet.

Q. Now, I am asking you about on that part of your land that lies between the Parsippany dyke and the Parsippany turnpike. Was any of that land affected?

A. Oh, yes.

Q. How much of it? How many acres?

A. Well, I can't tell exactly. Several acres in there that is wet. Can't drive over it.

Q. About how many acres?

Mr. Edwards: He told you; several. Two or three.

Q. About how many acres?

A. I should think there was six or seven acres or more.

Q. What did you use that land for before this water came upon it?

A. Well, all kinds of farm use.

Q. What do you mean by all kinds of farm use?

A. Well, hay, corn, potatoes, anything I wanted to raise. Oats—anything.

Q. What effect did that wetness have upon that land?

A. Well, it made it so wet I couldn't even get the horses on it.

Q. Please tell us what you mean by that?

A. Well, couldn't drive over it.

Q. Why not?

A. So wet.

Q. What effect did the wetness have upon your driving upon that land?

A. Well, the horses couldn't stand up. I went to drive them over there, and they sunk right in the mud.

Q. You mean they mired?

A. Mired; right in the mud.

Q. Was that the reason you couldn't drive over it, because they mired?

A. Yes.

Q. When you drove over it it before the land was affected by the water, did they mire then?

A. Never.

Q. Now, as to land south of the Turnpike. How much of that was affected by this wet?

A. Well, it is quite a scope of it. I never had it measured to see how much really there was. But there is quite a good deal of it there.

Q. We can't tell what quite a good deal means.

A. Well, ten or fifteen acres, maybe, altogether.

Q. What did you raise on that land, that ten or fifteen acres, before it was made wet?

A. Well, all kinds of farming. Anything I wanted to put there, I always raised there.

Q. What have you planted there, what have you raised there, what kind of crops?

A. I have raised corn, potatoes, wheat and rye.

Q. On that 10 or 15 acres you are speaking about now?

A. Yes, sir.

Q. Can you raise those crops there now?

A. No, sir.

Q. Why not?

A. I can't plow it.

Q. Why not?

A. I can't get the horse upon it, it is too wet.

Q. Couldn't you get the horse upon it before it was wet?

A. Oh, yes, sir, anywhere.

Q. Can you use that land now for any profitable purpose?

A. No, sir.

Q. Why not.

A. It is too wet.

Q. Can't you pasture on it?

A. Well, the pasture that grows onto it ain't much good, it is sour; the water appears to come up from underneath and makes it sour, it is no good for pasture.

Q. How was the grass before it was wet, as to sourness?

A. It was of a fine quality.

Q. How is it now?

A. Very poor.

Q. Now as to the well on your own property, did this water have any effect upon your well?

A. It raises very much.

Q. How much?

A. Well, I couldn't say exactly.

Q. Does it remain the same height or has it gone down, what do you notice as to that?

A. Well, it varies some, it goes up and down.

Q. Is there any more water in the well this year than there was last year?

A. Well, there is more water in it to-day than there was two years ago, and there has been ever since the reservoir was built.

Q. Now does that water affect your property in any other way than the way in which you have described?

By the Court: Has the witness stated whether he has a cellar under his own house?

By Mr. Vredenburgh: No, he has not, but I will ask him.

Q. Have you a cellar under your own house?

A. Yes, sir.

Q. Is there any water in that?

A. No, sir.

Q. Has there been?

A. Very little. There has been, but it is very wet on the outside of the house.

Q. How is the elevation of your house compared with your tenant house; which is the more elevated, which is on the higher ground?

A. Where I live myself is the higher.

By the Court:

Q. How much higher?

A. Well, I could not say exactly, a little higher.

Q. 10 feet?

A. Oh, I should say 5 feet.

Q. Is the land on which your house is built land which in course of nature is higher?

A. Yes, sir.

Q. How much higher?

A. Well, I should say it was at a rough guess 5 feet higher, 4 or 5 feet.

Q. How deep is your cellar below the surface of the ground?

A. Well, the ordinary depth of cellar, I should say 6 or 7 feet; I never measured it but I should think it was.

Further direct:

Q. The question I was asking you, have you stated all the damage there was to your property caused by this increased wetness. Just state what other damage there was to your property, if any?

A. Well, it is damaged on both sides of the road, and there is a running stream of water running through there all the time now besides from the seepage up through, and that makes it wet, and it is not only the wet that runs—the big body across, but it is the water that kind of comes up all over it, you can run a stick down anywhere else through it and pull it up, and the water will come right up to the top of the hole.

Q. Would that happen if you put down a stick through it before this Parsippany dam was built or the reservoir was filled with water?

A. Never.

Q. Now Mr. Righter, did you ever examine to see where this water came from?

A. I have.

Q. Please state what you did and what you saw?

A. Well, I have been at the back dyke and saw the water running out of the bottom of it.

By the Court:

Q. Where is the point at which you saw the water coming out? Point it out on the map.

A. Where the water comes from?

Q. Where you saw it running out?

A. Why, at different places along here at the back dyke, and it comes out of here at the bottom of this back dyke at different places, and follows these water-ways down into the same ditch (indicating on the map).

Further direct:

Q. Now, when did you first go there to see how the water—what was the cause of the water coming out onto your land?

A. A year ago last October.

Q. What did you see then?

A. I saw water running all over it, coming out underneath the back dyke there.

Q. Did you see any coming through the dyke?

A. Right down at the sides of it.

Q. Have you made any examination there recently.

A. Yes, sir.

Q. When?

A. Last Sunday.

Q. What did you see?

A. Water.

Q. How about it coming through the dyke?

A. Right along at the base of the back dyke the same as it was or a little more than it was a year ago at different places all along the back dyke.

Q. Well, there is a ditch near the toe of that back dyke, is there not?

A. Yes, sir.

Q. Running along the toe of the dyke?

A. All along the toe.

Q. Now, where was it you saw the water coming out into the ditch, on the side of it or where?

A. On the side of it, along here (indicating), at

different places, the water came out from the dyke into the ditch.

Q. Between the toe of the dyke and this ditch that is dug along the bottom of it?

A. Yes, sir.

Q. And in that respect did you see any improvement or any lessening of the water last Sunday than it was when you first noticed it a year ago.

A. I think there was more now.

Q. Now, did you commence any litigation against anyone with respect to this?

A. Yes, sir.

Q. Whom did you bring a suit against?

A. The Jersey City Water Supply Company.

Q. In what court do you remember?

A. Morristown Court.

Q. Did you also bring suit in the Court of Chancery?

A. Yes, sir.

Q. Now, after that suit was brought or when that suit was brought, were there any of the ditches that are now shown upon this map dug on this property?

A. No, sir.

Q. And it was after that Chancery suit was commenced that those ditches were dug?

A. Yes, sir.

By Mr. Edwards: After the lawsuit was commenced, don't get it mixed up with the Chancery suit.

By Mr. Voorhees: After the Chancery suit, they tell me, but you can find out about that.

Cross-Examination.

Q. Who dug them, did you dig them?

A. No, sir.

Q. How was it they were dug over your land; did you authorize them to be dug?

A. Well, my lawyer gave them the privilege to dig one ditch down through there, and these other ditches were all dug on the other side of the road upon their own property.

Q. Then it was dug by the Water Company or some one at their expense?

A. Yes, sir.

Q. Not at your expense?

A. No, sir.

Q. Just what was the result of this ditching upon your land?

A. Well, it was just as wet before as after, and after as before; just as wet now as before it was put through.

Q. These ditches haven't, you think, improved the wetness of your land?

A. No, sir.

Q. Was there any ditch along the road, along the Parsippany dyke at that time?

A. Well, there was always some ditches along the turnpike road along here.

Q. Inside the road?

A. Yes, sir.

Q. There is now shown a ditch along the outside of the road?

A. There is a ditch shown on the outside, yes, sir.

Q. This ditch?

A. The ditch on their own property.

Q. Yes, that has been built since the reservoir, has it?

A. Yes, sir.

Q. And there seems to be a new culvert across the road, at the point where that ditch crosses into the road?

A. Yes, sir.

Q. Was that culvert there before?

A. There was always a culvert there just to

carry off the surface water, but they dug it all up and lowered it quite a good deal and put in bigger tile.

Q. Who do you mean by they?

A. The Water Company.

Q. Now, Mr. Righter, the estate of Condit seems to own some land according to this Exhibit C 64, adjoining you?

A. Yes, sir.

Q. What do you know about that?

A. Well, it is a total wreck.

Q. Well, who owned it first?

A. Mrs. Condit.

Q. How long has she owned it?

A. Oh, a good while.

Q. What was the character of that land before the reservoir was built?

A. Always in good shape, a nice place.

Q. What was on that in the shape of improvements?

A. Houses and barns and various outbuildings for that kind of a place.

Q. Any apple trees?

A. Yes, sir, most all kinds of fruits, apples, pears and cherries.

Q. A garden?

A. Yes, sir, a very nice garden.

Q. What has been and what is the condition of that land now?

A. Very bad.

Q. From what cause?

A. Wet. The ground is full of water.

Q. What effect has it had upon the apple trees and the other trees?

A. Well, they don't amount to anything, there have been lots there, but it is deserted.

Q. Did anyone live there up to the time that the reservoir became full of water?

A. Yes, Mrs. Condit lived there herself for years.

Q. Now, the next place to Mrs. Condit is marked "A. Cobb." Did you know Mr. Cobb?

A. Yes, sir.

Q. And where was his house?

A. Well, he had a house right near there, but he moved across the road, they call it the Henion House.

Q. He had a house, you say, somewhere in that neighborhood, on which side of the turnpike, on the side towards the reservoir, or the other side?

A. There is where it formerly was, but he moved it across the street to put it on a foundation on the south side.

Q. I am asking you now, at the time when the dyke was built, where was his house?

A. On the north side.

Q. Is that between the reservoir and the Turnpike?

A. Yes, sir.

Q. He had a house there?

A. Yes, sir.

Q. That has been moved away?

A. Yes, sir.

Q. Now, how soon after the dyke was built did he attempt to build a house on the south side of the way?

A. Well, I think he started to move it last fall.

Q. Oh, he moved the house that was——

A. On the north side across the street to the south side of the road.

Q. What was the condition of his ground where his house was, when he attempted to move it across?

A. Very wet, so that they had—in the cellar there was two or three or four feet of water in it, and they had to wait until the cellar froze up to get the skids and stuff across to move it.

Q. What was the condition of that land before the reservoir was filled with water?

A. Always dry.

Q. Now, you say he attempted to move that, or

he did move that house across the road to some place on the opposite side of the Turnpike—on his own property?

A. Yes, sir.

Q. Property marked A. Cobb?

A. Yes, sir.

Q. Between the Condit house and the Children's Home?

A. Right in there, that is right. (Indicating on map).

Q. Now, what preparation did he make to have a foundation for the house?

A. Well, he started to dig a cellar on the opposite side of the road, and I guess he had to stop on account of the water running in so that he couldn't dig any further.

Q. Let us see what you know about it. As I understand, he dug a cellar for the purpose of moving his house over to it, is that right?

A. Yes, sir.

Q. Were you there when he dug his cellar?

A. No, but I went by there lots of times.

Q. When you went by there was he digging his cellar?

A. I saw him when he was digging it, and I saw the cellar after he partly dug it and had to quit.

Q. What did you see when you went by there with reference to this cellar that he was digging—how deep did he get it done before he quit?

A. Well, I think about four feet, between three and four feet, about four feet I should judge.

Q. What was the result?

A. Water came right in from the bottom.

By the Court:

Q. Well, was the surface of the land at that point higher or lower than the Parsippany Turnpike?

Mr. Vredenburgh: Where he dug his cellar, I suppose.

The Court: Yes, sir.

A. I should say it was very near the level, very near.

Further Direct.

Q. And was that above or below these ditches that were dug?

A. After.

Q. Now, then, when he dug down how many feet—how soon did the water commence to come in?

A. Well, I think the water commenced to come in before he stopped digging.

Q. Well, after he stopped digging how high did the water raise in that cellar hole?

A. Oh, there was a lot of water in it, and there is to-day, it stays there as it was dug, there was a lot in it and is to-day.

By the Court:

Q. Then he didn't put his house there?

A. No, he couldn't, had to move it away.

Further Direct.

Q. What was the character of his land other than where his house was built, on that side of the road before the reservoir was filled?

A. Fine farming land.

Q. What condition is it in to-day?

A. Very wet.

Q. What crops could he raise on it before?

A. Anything—anything that any farmer could raise.

Q. What crops can he raise there now?

A. I don't think any.

Q. What effect has it had upon his grass on the land?

A. Well, made it very sour, of course, and rough grass, and don't amount to anything.

Q. Now the next property, the Children's Home —has it had any effect upon that, do you know?

A. Well, I think it has, but personally I don't know, only what I have heard.

Q. Now you said that your land was affected also on the opposite side of this Troy brook—what do you mean by that?

A. Well, I mean it is—we dug test holes over there last Spring and there was water in them, just came right up through the ground.

Q. How do you explain that it got across Troy brook?

A. Well, the pressure is all I know; it is there.

Q. You own on both sides of Troy brook for some distance, don't you?

A. Yes, sir.

Q. About what distance do you own?

A. Well, there is a strip of land on each side, I cannot say exactly.

Q. Well, how many feet along the brook?

A. Quite a long stretch, and it is kind of crooked around, I cannot say exactly.

Q. Half a mile?

A. No, I don't think so, not quite.

Q. Was there ever a pond on Troy brook on your property?

A. Yes, sir.

Q. How long ago?

A. 35 or 40 years ago, I don't know exactly, but a good while ago.

Q. Where was the dam of that?

A. That was on the lower side of the road near the Troy brook.

Q. It wasn't across Troy brook?

A. Yes, sir.
Q. It was across Troy brook?
A. Yes, sir.
Q. What was that for?
A. A little saw mill, just a little saw mill pond there years ago, and a good many years ago.
Q. There must be quite a fall on Troy brook, on your property?
A. Yes, sir, there is a good fall.
Q. How much would you say there was fall on your whole ownership there?
A. I cannot say, I don't know.
Q. Four or five feet or six feet?

Mr. Edwards: Three feet and four inches.

Q. Now, I have not asked you about the land adjoining Cobbs and yourself on the north side of the road between the dyke and the road; was there any buildings in there before the reservoir was filled?
A. There was.
Q. What was there, what buildings?
A. Different buildings, a couple of barns and two or three houses—two houses and different out buildings.
Q. Any hall?
A. Yes, Drains hall.
Q. What size building was that?
A. Well, maybe 20 x 35 or 40.
Q. Frame?
A. Frame, yes.
Q. How many stories?
A. Two.
Q. And what became of those buildings?
A. Been torn down.
Q. What has been the effect upon the land there?
A. Very wet.
Q. How was it before?

A. Dry.

Q. How far has that water affected the land towards the west—still west of the property you are now describing—any land in there affected by the wet?

A. Well, only what comes out on the west side over on my side, it comes very close to the road. From the back dyke to the road here (indicating) is a strip of land in here, this comes around here (indicating) and here (indicating) is the road, and all in here (indicating) is very wet, and off in on this side (indicating) it is wet. This is on the north side of the road.

Q. Is anybody else's land affected by that wetness except those that you have mentioned?

A. I don't think so.

Q. How about the cemetery?

A. Well, there was a good deal of talk about it last Spring, what I personally know about it I don't know.

Q. You don't know much about it?

A. No, sir.

Q. That is all.

Cross-Examination. By Mr. Edwards.

Q. Mr. Righter, you have how many acres of land there?

A. Sixty-five, about.

Q. How much of that is north of the road and how much is south of the road?

A. About equally divided, I suppose.

Q. Now, then, how much of that which is south of the road is south of the Troy brook?

A. Well, I cannot say exactly.

Q. The greater portion of it?

A. I should say part of it.

Q. Well, the greater part of it south of Troy brook, isn't it, you have more south of Troy brook than you have north of it—south of the road?

A. I don't think so.

Q. It is about equal, you think?

A. Somewhere about that, I never measured it.

Q. Troy brook overflows in freshet times?

A. It is very high water sometimes.

Q. And it overflows all this land?

A. No, sir.

Q. Overflows its banks?

A. Just the edge of the brook.

Q. How many acres does it overflow?

A. It doesn't overflow no acres, just the edges of the brook, and probably runs down half an hour afterwards.

Q. This old dam site was about where this letter "c" is?

A. Down the lower part, away down.

Q. And this was only a pond back there in those days?

A. A good many years ago, yes.

Q. How many acres did it flood?

A. Three or four or five—three or four I guess.

Q. And it flowed the low ground?

A. Right down, yes.

Q. Now you have told us that in the Courter house you have seen eighteen inches of water?

A. Yes, sir.

Q. How much water is there now—any?

A. Yes, sir.

Q. How much?

A. I cannot tell, I have looked in there Sunday, and I seen there was a good deal of water there, but I didn't measure it.

Q. In your own house you say there is no water?

A. No, sir.

Q. Do I understand you to say that the cellar of your house is five or six feet higher than the cellar of the Courter house?

A. Well, I never measured it, but I think it is higher, yes, I think so.

Q. You are speaking now of the bottom of the cellar?

A. Well, yes.

Q. You never measured it, did you?

A. No, sir, never did.

Q. Now, would you be surprised to learn that your cellar was six inches lower than the Courter cellar?

A. I would.

Q. You never had it surveyed, did you?

A. No, sir.

Q. Now, how far from the dyke, in feet, is this Courter house, about?

A. Well, I don't know, maybe four or five hundred feet, I never measured it.

Q. Isn't it about nine hundred feet?

A. Well, it might be.

Q. Now, you tell us that this portion of your land is—where it has been wet—south of the road, and you dug test holes there, did you?

A. Yes, sir.

Q. The water in those test holes has varied very much?

A. At times, yes, sir.

Q. The water in the different test holes has been at different levels, hasn't it, at the same time?

A. Yes, and the reservoir has been at different levels.

Q. I didn't ask you that. Has the reservoir been at different levels?

A. I think so.

Q. When has it been that the water has not been running over the dam?

A. It has been at different heights on the back dyke.

Q. How could it be at different heights at the back dyke if it was running over the spillway?

A. It is.

Q. You didn't measure it, did you? You don't know?

A. No, but I saw where the water dropped on the stone.

Q. Would not that be the action of the wind against the rubble masonry of the dam?

A. I don't think so.

Q. You don't think so?

A. No, sir.

Q. Don't think that?

A. No, sir.

Q. But you don't know anything about the water in the reservoir, except it has been flowing over the dam continuously?

A. I don't know that. I have seen the water raise and lower at the back dyke. But the dam I know nothing about. I never been there but two or three times.

Q. Then, you say, the water varies in these test holes at times. Sometimes they are almost dry, are they not?

A. No, sir.

Q. Sometimes they have been overflowed, have they not?

A. No, sir.

Q. How much difference has there been in the test holes?

A. Oh, there has been some difference. Last summer, in a very extraordinary dry time, there was a good deal less water.

Q. Was that a dry time in the reservoir?

A. The water was lower there.

Q. Water in the reservoir?

A. I think so.

Q. Don't you know as a matter of fact that the water has been running over the spillway every moment since the water has been turned on?

A. I don't know.

Q. Don't know it?

A. No, sir.

Q. Now, you say you had ploughed this property?

A. Yes.

Q. How many years ago is it since you ploughed that last?

A. Two years ago.

Q. Two years ago?

A. Yes.

Q. Do you remember testifying on the trial that it had been five or six years since you had ploughed it? I speak now of the property south of the turnpike.

A. Well, there is some ground that I haven't plowed in five or six years, three or four years. There is some I have ploughed in two or three years.

Q. What have you grown, except grass, south of the Turnpike, in the last five years? Anything?

A. Yes.

Q. What?

A. Rye, corn, potatoes——

Q. In the last five years?

A. Yes, sir.

Q. Now, then, you say that you lost some corn on the north side of the reservoir? Six or seven acres?

A. Quite some there, yes.

Q. Didn't you testify on the jury trial that you only lost half an acre? How about that?

A. We ploughed a lot more there to put in; we undertook to plough it, but we quit, for we couldn't do it.

Q. Didn't you testify as follows (reading from printed book):

"Q. How many acres of that corn did you get?

"A. Which corn?

"Q. The growing corn which was in the field. How many acres was there of that?

"A. An acre and a half, or two acres.

"Q. You think you lost about half an acre?

"A. I lost that, with all that I couldn't plough because it was too spongy."

A. That is right.

Q. That is the way you testified?

A. I think it is, yes, sir. The rest of it was so wet we couldn't do anything with it.

Mr. Vredenburgh: Is that on the north or south side of the road?

Witness: North side.

Q. Now, you say, you began suit against the water company, did you not? None of your neighbors brought such suits that you know of?

A. Not that I know of.

Q. And what was the result of the first case?

A. Got judgment.

Q. You got a verdict? How much?

A. $150, I think.

Q. And then you brought another case?

A. Yes, sir.

Q. And the second case was brought after the culvert was built?

A. Yes, sir.

Q. Do you remember the verdict in the second case?

A. I do.

Q. What was the verdict in the second case?

A. Six cents.

Q. That was the verdict of the Morris County jury on this question?

A. Yes, sir.

Q. And in this case the second jury went over and viewed the ground, didn't they?

A. Yes, sir.

Q. And went on the premises?

A. Yes, sir, they did.

Q. Before rendering the verdict?

A. Yes, sir.

Q. That is all.

FINLAY SACKETT sworn.

Direct Examination by Mr. Vredenburgh.

Q. Where do you live?

A. 389 Lafayette avenue, Brooklyn.

Q. Have you spent any time up in the neighborhood of the Parsippany dyke and the Boonton reservoir?

A. Considerable off and on for the last 25 years.

Q. Have you lived there?

A. Never had my domicile there, but I have sojourned there and been up there from a day to a week at a time.

Q. How near have you sojourned to the Ryder property?

A. Well, I have stopped at the Ryder property.

Q. Are you related to Mr. Ryder?

A. I am related, I am his brother-in-law.

Q. And you used to stop on the Ryder property?

A. Yes, sir.

Q. Before the reservoir was built, will you tell us what the character of the land was owned by Mr. Ryder, between the turnpike and the reservoir?

A. Between the turnpike and the reservoir, that is the side on the north of the turnpike and immediately adjoining the house?

Q. On the north side of the turnpike, and it is the land owned by Mr. Ryder?

A. Well, I have traveled over all that land more or less for the last 25 years, and just prior to building the reservoir, which was about two years or 2 1/2 years ago, I have traveled over that property from Mr. Richard's house almost to Boonton dry-footed, except down in the centre of what is known as the reservoir, which was then more or less boggy, but all the other land I have always traveled over dry-footed, always to my knowledge it has been dry land.

Q. What change have you noticed, if any, after the reservoir was built, in the land of Mr. Ryder?

A. Well, I went over the land without reference to any suit in the matter about two weeks ago. I went over there to visit my sister, and chanced to go over that property, and noticed the condition of the land; it was spongy and muddy, altogether barren of verdure in places. Part of it was property adjoining Mr. Richards' property, and at present the property of the Jersey City Water Supply Company, but the character of both his land and the adjoining land which belonged to the Water Supply Company is identical.

Q. How about the south side of the road?

A. On the south side of the road I went over the land last Sunday; that land had always to my knowledge been dry and always yielded heavy crops. I found in the lower portion of it that it was marshy and wet, and in some places I went in over my shoe tops.

Q. Did you ever see that land in that condition before the reservoir was built?

A. Never; I never knew it to be in that condition. I have been over that land, as I say, for the last 25 years—that is, the land on the south side of the road.

Q. Do you know about the water in these cellars, Mr. Sackett?

A. Well, there is an old house there I have known for 25 years belonging to, I believe, Moses Condit, or the widow of Moses Condit. I went into that cellar on Sunday, it is on the south side of the road, and the cellar had water in it to a depth of —I couldn't say accurately because I did not make any measurement of it, but I should judge about six inches of water there easily, probably more.

Q. Do you know what the condition of that cellar was before the reservoir was built?

A. Well, I could not say with definiteness; I never was in that cellar, except that I know the

house was habitable, it was inhabited for years.

Q. Was it inhabited when you were there last Sunday?

A. Oh, no, sir, it is a wreck now.

Cross-Examination by Mr. Edwards.

Q. What is your business?

A. Broker.

Q. Your visits to Parsippany, I suppose, have been in the summer time chiefly?

A. No, sir, at all seasons.

Q. Did you ever walk over the reservoir side in the fall or spring seasons?

A. My recollection is that it was in the fall; I won't be certain, but I went from Mr. Richards' house to Boonton, over that territory.

Q. That was only on one occasion.

A. That was only one occasion on which I went directly from Mr. Richard's house to Boonton, but not only on one occasion did I go by the land.

Q. One time you walked right across?

A. Yes, sir.

Q. Have you ever seen the Troy brook overflow its banks?

A. That is the brook that is on the south side of the turnpike?

Q. Yes.

A. Not to my knowledge.

Q. Did you ever walk down over that property to the brook?

A. Yes, sir.

Q. Many times?

A. Oh, very frequently.

Q. How much of that property did you find wet south of the road, on last Sunday?

A. Well, I found it wet in spots, it was not altogether so.

Q. Over how much an area—just below the brook?

A. No, sir, from the turnpike down to the brook, and from the culvert probably 100 feet back on the high land and on the low land.

Q. Some of that land is called high, is it not?

A. Some is quite high.

Q. That wasn't wet?

A. No, sir.

Q. The low land, is that adjoining the banks of the brook?

A. No, not altogether so; as a matter of fact, the land closer to the brook was dryer than the land further from it.

MELVIN S. CONDIT sworn.

Direct Examination by Mr. Vredenburgh.

Q. You live where?

A. I live at present in the town of Boonton.

Q. Lived there how long?

A. 13 years.

Q. How long have you lived in Morris county?

A. Since 1868.

Q. Your age is what, sir?

A. 31 past.

Q. Have you occupied any public positions in Morris county?

A. Yes, sir.

Q. What?

A. Clerk of the county.

Q. When?

A. From 1878 to 1888, I am also the assessor of the township of Hanover, the place where I was located.

Q. Township assessor of the township of Hanover?

A. Yes, sir.

Q. Is this Parsippany dam and the Ryder house in that township?

A. Yes, sir.

Q. Did you have occasion to know the character of the land owned by Mr. Ryder and the Condits and Mr. Cobb, prior to the Boonton reservoir being filled?

A. Yes, sir.

Q. When were you assessor?

A. I was assessor from 1870 to 1877.

Q. Were you the owner as executor or otherwise ofthe Cobb property?

A. I was executor of the Andrew Cobb property, and I assumed that position in 1872.

Q. And you still are executor or have you closed up the estate?

A. I am still the executor, sir.

Q. Now, will you tell us the character of the Cobb property before this reservoir was built; first of all tell us what improvements were there upon it in the shape of houses?

A. We had tenant houses there for the farmers, two tenant houses, two or three barns, and the land was used for agricultural purposes.

Q. You spoke of the Condit property adjoining the estate property on the south side of the Parsippany dyke?

A. Not that single piece of property, but what is on the north side of the turnpike.

Q. You were the owner of that property as executor?

A. Yes, sir.

Q. As well as some other property—land on the other side of the road?

A. Yes, sir.

Q. On the north side of the road you say there were two tenant houses; were there any other farm houses on that side of the road?

A. Another farm house, the Hennion house, as it is called, is down at the junction of the little road that runs across the Morristown road; the Hen-

nion house and store and probably 2 or 3 acres of land.

Q. Now, will you please tell us what was the effect upon that property north of the road by the raising or the filling of the reservoir with water?

A. Its effect was to saturate that property, that is, the seepage or leakage from the dam seemed to saturate the top of the ground so that it was all mud or wet, and the water percolated all along the road on both sides of it.

Q. What could that land be used for before that time, what kind of crops could you raise?

By Mr. Edwards: I object to that. That is our property now.

Q. You can answer the question I gave you when we were interrupted.

A. Agricultural crops, that is, corn, oats, potatoes and grass—more especially grass, as you see it was better fit for grass than any other purpose, although it was tilled at certain times.

Q. What effect did the wetness have upon that ground as to the raising of the same crops afterwards?

A. Well, after they built that dam, of course the property was not used as a farm, and I could not tell you what the effect of it was because it wasn't used for a farm then, except that the water was very evident there.

Q. Now the land on the opposite side of the road, what became of the houses you have spoken of on the north side and the other improvements?

A. The farm houses that belonged to the Cobb estate originally were destroyed by the company, eventually. The Hennion property, as it was called, was purchased by a son of Andrew B. Cobb, and was owned by him until finally the Water Company purchased that, but he repurchased the house and attempted to erect it on the other side of the road.

Q. Now, did you notice what effect it had upon the well?

A. Which well?

Q. The well on the north side of the road?

A. No, sir, I never went and examined it at all.

Q. Now, you have been telling us with respect to the land on the north side, now the land on the south side you have spoken of, how was that affected by the wet?

A. Well, the same conditions exists there to-day and has existed there for the last year or more—I mean wet—it is very evident.

Q. What effect does it have upon raising crops on that land?

A. Well, it has this effect; it is almost impossible to till such land when it is wet; the nature of it is a heavy clay, practically a clay loam, and it is impossible to till that kind of land when it is wet, with any profit.

Q. Now, you say there was an attempt made to move a house across the road; was that within your knowledge?

A. Yes, sir.

Q. Well, do you know of your own knowledge why the house was moved across the road?

A. It was moved across, but not put upon its foundation, for the reason they attempted to build a foundation there, but they were stopped by the water.

Q. Was the house actually moved over to the other side of the road?

A. It was by a house mover, and it was put on timbers, and placed on the other side of the street.

Q. You didn't put it over any cellar?

A. No, sir, the cellar could not be dug.

Q. Why not?

A. There was too much water, you couldn't go down two feet, I don't think.

Q. What happened when you did go down two feet?

A. The water stopped us digging.

Q. Do you know anything as to the cellars on that side of the road before the reservoir was built, or do dou know about the wells there?

A. I knew the Condit property. Mrs. Condit's house, Mrs. Esther A. Condit owned a little property on that side of the road, I knew that very well.

Q. Well, do you know whether the cellar of the Cobb house could have been dug before the reservoir was filled, do you know whether it could or not without it being filled with water; if you know, just tell us why or how you know?

A. Well, I don't know, I couldn't give you any practical reason, for the reason that no digging was ever done along that side of the road to test it. I do know that the land over there on that side of the road was dry usually, and there was never difficulty about tilling or driving or walking on it or anything of that kind across it.

Q. Before the reservoir was filled?

A. Yes, sir.

Q. But how has it been since?

A. Well, it is very wet, evidently very wet—visible from the road.

Q. You may go on and tell us about the Condit house, tell us what you know about it?

A. Well, I have been on those premises at different times, and I was in the cellar years ago, and I knew about the well there years ago, and the water was always in the well, that is, the water was normal there as a rule, it never fluctuated in volume, that is, as to rising or falling, that I know of, or that I ever saw, and I never saw any water in the cellar there, and I have been there that I can recollect twice.

Q. Now, since the reservoir has been filled, did you notice any difference?

A. Well, I haven't been on it.

Q. What?

A. I haven't been on the Condit tract since the reservoir was filled, and I couldn't tell you anything about it.

Q. Have you driven up and noticed the condition of the Condit land?

A. Yes, sir.

Q. Is there any difference in that since the reservoir has been built?

A. I saw water standing there upon the surface there back of the house.

Q. It does not?

A. Yes, sir.

Q. How was it before the reservoir was built?

A. I never saw any there.

Q. Did you notice any difference in the roadbed of the Parsippany turnpike as it is marked on the map before or after the reservoir was filled, and if so please tell us?

A. There has been a very great change within the lost two years, that is, the last two springs. This last spring a year ago, the roadbed was affected by the water, it is very evident, for the water shows at the surface of the road even in the warmest and dryest summers, and at the spring—last spring a year ago the roadbed was so soft underneath that we had to shut it off, would not allow teams to drive over it.

Q. It became impassible?

A. Yes, sir.

Cross-Examination by Mr. Edwards.

Q. You say the Hennion house was originally on the north side of the road?

A. Yes, sir.

Q. And they always had water in that cellar, didn't they?

A. I don't know myself, but there was a ditch from it, sir.

Q. There was a ditch there to drain, wasn't there?

A. Yes, sir.

Q. And from that you assumed there was water in it?

A. I suppose probably in the spring of the year there was.

Q. Over swampy land is it not?

A. No, sir.

Q. How did the water get into that cellar then?

A. I can't tell you; sometimes in the spring rains it would get there, I suppose.

Q. When you dug the cellar on the other side of the road, did you build a ditch down there to the Troy brook?

A. No, sir.

Q. Have you looked at that cellar recently?

A. I have passed it within ten days.

Q. Is there any water in it now?

A. Yes, sir.

Q. Haven't they built a ditch down from it so that it is perfectly dry now?

A. Not that I have seen or heard.

Q. Not that you have noticed?

A. No, sir, I have not noticed it.

Q. This Cobb property has been sold, has it not?

A. Yes, sir.

Q. You have no interest in that now?

A. No, sir.

Q. The Water Company owns that?

A. Yes, sir.

Q. And Mr. Cobb put the house somewhere else?

A. Yes, sir, he took it to Green Pond.

Q. He did not move it as a whole house?

A. No, sir, he took it down.

Q. And moved it a great many miles away?

A. Yes, sir, he tore it down and we moved it up to Green Pond.

Q. This property north of the road used to be good farm land?

A. Yes, sir.

Q. The Water Company filled it in, didn't they?

A. What?

Q. They filled in the land between the reservoir and the road?

A. Nothing except the dyke.

Q. Didn't they fill in on the surface of the land here, too?

A. Nothing except the dyke.

Q. And the top soil in the building of the dam was removed?

A. Inside of the dyke?

Q. How about the outside?

A. I didn't see but very little removed there.

Q. You don't know about that?

A. There was very little removed.

Q. Have you any interest in any other land here?

A. No, sir.

Q. None at all?

A. No, sir, not now.

Q. Don't you hold a mortgage against Mr. Richards' property?

A. Yes, sir, two of them.

WILLIAM F. F. MITLEDGE sworn.

Direct Examination by Mr. Vredenburgh:

Q. You live where?

A. Jersey City.

Q. You have resided there all your life?

A. Yes, sir.

Q. Practiced your profession as a lawyer there?

A. Yes, sir.

Q. Were you a member of the Board of Finance of Jersey City when this water contract was up?

A. Yes, sir, I was a member of the Board of Finance from April, 1897, until January, 1901, which was the election when Fagan went in first.

Q. At one of the meetings of the Board of Finance before this contract was voted on, and after the Flynn proposal was submitted to the city, were there any representations made to the Board in your presence, with reference to a plan which they had for preventing the contamination of the river from the sewage of Dover?

A. Yes, sir.

Q. Will you please state as near as you can when it was, and who made it and what was said?

By Mr. Corbin: I make the same objection to this line of testimony that I made before, as not competent and not pertinent, and because all these preliminary negotiations were afterwards merged into a written contract, which was signed afterwards.

A. There was a general discussion with reference to the contamination from the towns that laid within the water shed from which the city of Jersey City was to receive its water supply, and the question of taking care of this pollution was a subject that was entered into very fully and discussed not only in the Board, but also through the press. The representations which were made directly to the Board and to me directly were made by William D. Edwards, who was the counsel for Mr. Flynn, and Mr. Connelly. I am not sure that I have got that last name right. He was a tall, stout man, I think his name was Connelly. I talked with both of them myself with reference to that, and stated that under no circumstances would I as a member of the Board vote for a contract that did not provide in an absolutely complete measure for

the care and for the pollution which would arise in the town of Dover and Powerville and through that section of the country from which we would take our supply. Mr. Edwards stated very definitely, Mr. Connelly also, that a sewage disposal works was to be constructed by the contractor who was to supply the water to Jersey City, and after that was built it was to be cared for by the towns that laid within its territory, and as far as I understand it, there was an intercepting sewer to be built which was to take all the sewage——

By Mr. Corbin (interrupting): I object to that form of testimony. The witness must state what was said, not what he understood.

The Court: The witness must state just what was said.

A. That is all I am stating, just exactly what was told me. Mr. Edwards himself very definitely told me that an intercepting sewer was to be built to carry off the sewage and prevent the contamination of the stream, and after it was built it was to be cared for by the towns that it served. I am stating that that subject of contamination was one that was most thoroughly discussed in the Board.

Cross-Examination by Mr. Corbin:

Q. Mr. Connelly is dead?
A. I don't know, Mr. Corbin.
Q. Where were these talks had?
A. In the City Hall in the Board of Finance.
Q. These are the statements which you heard Connelly and Edwards make?
A. Yes, sir, right in the meeting of the Board.
Q. You said you would not vote for anything that would not absolutely provide for taking care

of the pollution of the towns. Did you express yourself any more definitely as to what you meant by that?

A. I think that is definite enough, I did not want to have any pollution of our water supply.

Q. You didn't go into it any more definitely than that—you wanted something to take care of it?

A. Something that would take care of it, and I inquired as to what methods they were going to pursue.

Q. And they said intercepting sewers?

A. Yes, sir.

Q. You were speaking about Boonton and Dover, were you not?

A. And Powerville, I believe; there was quite a discussion as to Powerville; Powerville seemed to supply a large amount of contamination.

Q. Did you understand that there was to be an intercepting sewer there?

A. I understood there was to be something to take away the pollution of Powerville.

Q. Did you go up and look at the water shed before the contract was signed?

A. Yes, sir.

Q. Did you say you understood that at Powerville there was to be an intercepting sewer?

A. No, I said that Mr. Edwards stated that there would be a sewage disposal works in the nature of an intercepting sewer, which would take the pollution of the different towns.

Q. What did you understand that there was to be at Powerville?

A. I understood that there was a rag factory there.

Q. You saw that?

A. Yes, sir, that was very definite in my mind.

Q. That is about all there is there, isn't it?

A. I don't know whether there is anything else there or not.

Q. You don't recall anything else?

A. Well, when I went up there, we went over it in one day, and we didn't have such an awful lot of time to go around, we took a very cursory view of the country.

Q. That was after Flynn's bid was received?

A. Yes, sir.

Q. And you covered a good deal of ground in driving about with a wagon that day?

A. Yes, sir.

WELDON GRIFFEN recalled.

Further Direct Examination. By Mr. Vredenburgh.

Q. Mr. Griffen, I call your attention to Exhibit C 72, and on it there is marked a "P" which I suppose stands for privy?

A. Yes, sir.

Q. Do you desire to correct your testimony with reference to that?

A. Yes, sir, one of these is incorrect, it is not a privy, not being used at present as a privy.

Q. Well, won't you change the one that is marked incorrectly by erasing the letter "P" that you marked on it?

A. Yes, sir.

Q. Draw two pen strokes through it?

A. (Witness draws two parallel lines over the letter "P").

Q. Now there is another "P" on the same photograph marked Exhibit C 72, is that correct?

A. Yes, sir.

Q. And that indicates where there was a privy located?

A. Yes, sir.

By Mr. Corbin:

New Jersey State Library

Q. This picture shows one privy and not two?
A. Yes, sir.

Further Direct.

Q. I want to ask you a question about Exhibit C 43. When did you last visit the police station which is shown on that photograph Exhibit C 43?
A. On May 17th, this year.
Q. Did you at that time test those cells in any way?
A. Yes, sir.
Q. How?
A. Why there is a trough runs along the bottom of them, and we placed some urine, my father and Mr. Bouten and myself, placed some urine in the floor and took a pail that was standing close by and threw some water on it, and the green came out on the bank of the river nearly directly under the building.
Q. I show you a photograph and ask you who made that photograph?
A. I did.
Q. And when, about?
A. During the month of either February or March.
Q. What does it show?
A. It shows the Swedish Lutheran Church on Blackwell street, in Dover, and the closet in the back.
Q. And how is the closet in the back shown—shown by a small building?
A. Small building, yes, sir.
Q. Is that water that you saw there the Rockaway river?
A. Yes, sir.

Mr. Vredenburgh: I offer that photograph in evidence.

Marked Exhibit C 87.

Q. I show you another photograph and ask you if that is the same building?

A. Yes, sir, the same building from a different view.

Mr. Vredenburgh: I offer that photograph in evidence.

Marked Exhibit C 88.

By Mr. Corbin:

Q. In this picture, Exhibit C 87, there appears to be two small buildings in the rear of the church. Which one is the closet? The one painted white, or the unpainted one?

A. The painted building.

The Court: Mark it.

(On Exhibit C 87 witness marked on the closet referred to the letter "P.")

Q. It is an ordinary out-door privy, with a pit or vault under, isn't it?

A. Yes, sir.

Q. Used by the church?

A. I don't know, sir.

Q. Well, it doesn't appear to be connected with any other premises, does it?

A. No, sir; it is on the church premises, apparently.

Q. It was locked when you went there, was it?

A. Yes, sir.

Q. How did you get in?

A. We didn't get inside.

Q. Were you there when, Boughton says, he put material under it?

A. Yes, sir.

Q. Put it in from the outside?

A. From the outside. The closet is broken away at one point, and we threw it in from there.

Q. I think Boughton said he saw material come out.

A. I think he did.

Q. Did you observe whether it came out into the stream?

A. Yes. It did.

Q. And how soon after he put it into the vault?

A. (Consulting book). I haven't the time down here. I think it was about half an hour.

Q. When was it you put it in?

A. On what date?

Q. Yes.

A. February 24th, 1906.

Q. Was there water in the bottom of the vault when you put it in?

A. No, sir; there was not. Not where I saw it.

Q. It was dry?

A. You couldn't see——

Q. Did you put water in?

A. Yes, sir; we poured water in.

Q. How much water did you pour in?

A. How much? About eight or ten pails full.

Q. Was there a box in the bottom of this vault, or was it earth, or what?

A. It apparently was built up of loose stones; loose masonry.

Q. Earth bottom?

A. I don't know. I didn't see the bottom.

Q. How deep did it appear to be?

A. It was filled up within five or six feet of the top. I don't know how deep it was.

Q. Can you indicate with the pen on that picture, with the permission of the court, where you saw the color come out into the stream?

A. Yes, sir.

(On Exhibit C 87 witness marks "W" at the point referred to).

Q. Directly opposite?
A. Yes, directly opposite.
Q. You saw evidence of color down in the water, did you?
A. In the water.
Q. You didn't see it pouring out through the wall?
Y. Yes. You could see it come out through the wall.
Q. And it was half an hour after you put it in the closet?
A. Yes, sir.
Q. How high up did it come out?
A. It came at about the water level.
Q. You saw evidence of green?
A. Yes, sir.
Q. How was the water otherwise? Clear?
A. Yes, sir; it was clear.
Q. Does that picture indicate a high stage of water, or a moderate stage of water?
A. I don't know, sir, I am sure.
By Mr. Vredenburgh:
Q. I show you another photograph, and ask you who made it.
A. I did.
Q. When?
A. March 1st.

The Court: Of the present year?

Witness: Of the present year. All these photographs were taken this year.

Q. Did you visit any house shown on that photograph?
A. Yes, sir; I did.
Q. Which one?

A. Number 99 1/2.

Mr. Corbin: What street?

Witness: East Blackwell street.

(On Exhibit C 89 witness places a cross on the house visited by him).

Q. Did you make any tests of that house?
A. Yes, sir; I did.
Q. What?
A. Placed urinide in the closet on the second floor.
Q. What kind of a closet was it?
A. As I remember it, it was an ordinary flush closet.
Q. A water closet in the bath room?
A. In the bath room, yes. I don't remember whether there was a tub or not.
Q. But you remember it was in the bath room?
A. Yes, sir.
Q. On the second floor?
A. On the second floor.
Q. Do you know whether there was any other closets in that house?
A. It was a double house; I believe, a closet on the other side of the house.
Q. What was the result of that test?
A. The green color came out through the wall directly in the rear of the house; in the wall of the bank of the river.
Q. There is a wall along the bank of the river in the rear of that house?
A. Yes.
Q. You mean the wall of the house, or the wall of the bank of the river?
A. The wall of the bank of the river.
Q. And you saw the results of that test, coming through what wall?

A. The wall of the bank of the river.

Q. And how soon after you put the stuff in the closet?

A. Ten minutes.

Q. And can you say how it got through the wall?

A. No, sir; it just came through the wall; that is all you could see.

Q. What was the character of the wall? Dry wall? Or was it a made-up wall?

A. The next photograph shows you the wall.

(Photograph offered in evidence and marked Exhibit C 89.)

Q. I show you another photograph, and ask you if that is the one you referred to in your last answer.

A. Yes, sir; it is.

Q. And have you marked on that photograph where, when you tested this water closet, you saw the results flow in the river?

A. Yes, sir, I have.

Q. And is that the point where you saw it?

A. Yes, sir.

By Mr. Corbin:

Q. How high above the water of the river did you see the color come through the wall?

A. It came out in the water.

Q. Oh, in the water?

A. Yes, sir.

Q. You didn't see above the level of the water any indication of anything flowing through the wall?

A. No, sir.

Q. Didn't see any pipe there?

A. No, sir.

Q. How far from the rear of the house is the

point where you saw the color come into the river?

A. I should think, sir, a hundred and fifty feet.

Q. A deep lot?

A. Yes, sir, quite deep.

Q. Who was the tenant of the premises where you put the color into the closet?

A. I don't know.

Q. Who is the owner?

A. I don't know that, either.

Q. Who was with you?

A. Mr. Harold Bouten.

Q. Who put the color in?

A. I did.

Q. Then what did you do after you put it in?

A. We allowed the water to run in the closet for several minutes.

Q. Let it run freely?

A. Yes, sir.

Q. Then you went back to the end of the lot to watch?

A. Yes, sir.

Q. Now, when you say you saw the results, as counsel put it, in the river, what could you see, and how much could you see?

A. You could see a bright green coming right out of the wall, very plainly.

Q. Into the water?

A. Yes, sir.

Q. How long would it continue—or did it continue?

A. Why, I didn't stay there until it stopped.

Q. You knew that a joint test of these same premises had been made by the city and the company before?

A. No, sir, I did not.

Q. Weren't you there?

A. No, sir, I wasn't.

Q. Did you learn where the water closet pipe run to and where it was supposed to empty?

A. No, sir, I did not.

Q. Didn't inquire?
A. No, sir.
Q. Don't know whether it was a cesspool or what?
A. No, sir, I do not.

By Mr. Vredenburgh:

Q. I show you another photograph and ask you who made that?
A. I took it.
Q. When?
A. March 2nd of this year.
Q. Did you test any houses in that picture?
A. Yes, sir, I did.
Q. What street was the house on that you tested in that picture?
A. On Richards avenue, No. 180.
Q. The number is 180?
A. Yes, sir.

The Court: Mark the house.

Q. Please mark the house on the picture with a cross?
A. (Witness does so.)
Q. What did you do there?
A. Placed the urine in the kitchen sink in the house.
Q. In the kitchen sink in the house?
A. Yes, sir.
Q. Was there any water closet in that house?
A. No, sir.
Q. Or any bath room?
A. No, sir.
Q. In the sink was that Town water or public water or——
A. It was a pump, they had a pump and pumped the water from a well.
Q. Now, you put urine in the sink—kitchen

sink, won't you describe that a little, what was its size and what was it used for, etc.?

A. Why, it was an ordinary kitchen sink used for all ordinary purposes, I don't know exactly what they used it for, but it was in the kitchen.

Q. Was it inside the kitchen?

A. Inside the kitchen, yes, sir.

Q. Well, what was the result of your test?

A. The urine came out through a drain into a little stream that runs right close to the house, within a few feet of the house, which runs into a brook running directly into the river.

Q. Now, that stream or brook—that brook run into another stream, you say, which ran into the river?

A. Yes, sir.

Q. How far did it run down the brook before it got to this stream?

A. Fifty feet, I should say.

Q. And how far was it from where the brook entered the stream that the stream entered the river?

A. About two hundred feet, I should think.

Q. Were either of them covered?

A. No, sir, neither of them.

By the Court:

Q. Were they both natural water courses?

A. Yes, sir.

Mr. Vredenburgh: I offer that in evidence.

Marked Exhibit C 91.

By Mr. Corbin:

Q. Can you indicate on this picture where you saw the color emerge from the drain or pipe?

A. Yes, sir.

Q. Will you please do that with a double cross or something?

A. (Witness marks it with a double cross.)

Q. You speak of the place where you saw the color emerge as a pipe?

A. Yes, sir.

Q. What kind of a pipe?

A. I think it was a tile pipe, I am not sure.

Q. That emptied into what?

A. Into a running stream, very small stream.

Q. That stream ran for a distance of how far before it struck another stream?

A. Fifty or sixty feet.

Q. Thence along that stream to the river?

A. It wasn't over two hundred and fifty feet.

Q. So that all told, the house itself is perhaps within three hundred or three hundred and fifty feet of the river?

A. Yes, sir.

Q. This picture doesn't show the streams at all, does it?

A. I can show where one stream is on it, the large stream.

Q. With the permission of the Court cannot you mark on this picture a line showing the course of the streams, so far as included in the picture?

A. Yes, sir (witness does so). The single line is a small stream and the double line is the large stream.

By Mr. Vredenburgh:

Q. Mr. Griffin, did you visit the Singleton Manufacturing Company mills?

A. I did.

Q. When? Since the last examination?

A. No, sir, at that time, I will give you the date. February 27th I was there.

Q. Were you present when the tests were made?

A. I was not in the building, I stayed outside and took photographs of the ground, while my father and Mr. Bouten went inside and tested it.

Q. Did you see the results of their tests?

A. Yes, sir, I did.

Q. Now, where is that photograph?

A. It is in one of the exhibits, I believe.

Q. You haven't the Singleton mill photograph with you?

A. No, sir.

Q. Now this photograph that you have in your hand, who made that?

A. I did.

Q. When?

A. During the month of February, I don't know just the date.

Q. Did you visit any of the houses shown on that photograph?

A. No, sir, I visited these premises, though.

Q. You visited the premises?

A. Yes, sir.

Q. Will you mark on it the premises you visited?

A. I will mark it with an "X."

Q. Who was with you?

A. Mr. Harold Bouten.

Q. There is a brook shown on that property?

A. Yes, sir, there is.

Q. Did you notice a closet near it?

A. Yes, sir, there is a closet within several feet of the brook, that brook is covered.

Q. A privy?

A. Yes, sir, a privy.

Q. Well, within how many feet?

A. Within four or five feet at the most.

Q. Now, did you test that?

A. No, sir, we wanted to test it, but the owner of the place told us that he wouldn't allow us to test anything on the place.

Q. What did you ask him?

A. We asked him to give us permission to test the closet. We asked for permission and he refused it. The brook flows right under some of the

outhouses here, some of the buildings in the back, it is covered through his place, most of the distance.

By the Court:

Q. What is that business?
A. Sunnyside Green houses.

Mr. Vredenburgh: I offer that in evidence.

Marked Exhibit C 92.

By Mr. Corbin:

Q. Whose premises are these?
A. Premises of the Sunnyside Green houses, I don't know who owns them.
Q. Who is this owner that refused you permission to make tests?
A. He said he was the owner of the grounds there, he didn't give us his name.
Q. These buildings that are shown in the foreground are the buildings of his greenhouse establishment, are they?
A. They are not the greenhouses, but the buildings connected with the greenhouses, I suppose.
Q. This brook appears to come from under a bridge, as shown here, has it any cover except at the bridge?
A. It comes—I don't think there is a bridge there, it comes from under that building.
Q. Well, did you trace it up to see where it flowed above there?
A. Yes, sir.
Q. For how long a distance is it covered?
A. Just a short distance, I should judge, twenty feet, right through his yard there, part of it.
Q. About 20 feet?
A. Yes, sir.

Q. It is a natural brook flowing down towards the Rockaway, isn't it?

A. Yes, sir, it is.

Q. What street do the greenhouses front on?

A. East Blackwell street.

Q. Do you know the number?

A. I think I can give you the number, I am not sure. Yes, I have the number here, I think it is 166 East Blackwell street.

Q. When did you make the examination at 36 Bergen street, of which you spoke the other day, and what is the name of the tenant in that house?

A. March first when I made the examination of it.

Q. Who was the tenant of the premises in which your examination was made?

A. I don't know the tenant's name.

Q. Were there other tenants besides that one in the house?

A. Yes, sir, it is a double house.

Q. You don't know the names of any?

A. I believe Mr. T. W. Meningham is one of the tenants.

Q. Who is the owner?

A. I understand it belongs to the Richards estate.

Q. That is all.

ISAAC W. SEARING sworn.

Direct Examination. By Mr. Vredenburgh:

Q. How long have you been Mayor of Dover?

A. I am not Mayor of Dover, I am ex-Mayor, my term expired in January.

Q. Of this year.

A. Yes, sir.

Q. How long had you been Mayor prior to that date?

A. The term is two years, but on account of the change in the law the term should have expired in May, but was held over until the first of January.

Q. So you were one term and part of a second term?

A. Yes, sir.

Q. How long have you lived in Dover?

A. Fifty years.

Q. Is there a public water supply there?

A. Yes, sir.

Q. How long has that been there?

A. The present supply has only been completed I think three years.

Q. Three years?

A. Yes, sir.

Q. Was there a public water supply there before that?

A. Yes, sir, operated by a private company.

Q. This is operated by the city?

A. Yes, is owned by the City or the Town.

Q. What is the character of those works, artesian wells or surface water?

A. Both. The major part of the supply comes from south of the town, about a mile and a half from a series of springs and the balance is from artesian wells west of the Town.

Q. Is there a reservoir or stand pipe?

A. There is two reservoirs on the mountain.

Q. And the water is conducted to the city in what way?

A. From the gravity surface that runs direct into the lower reservoir, and from the higher surface which is supplied altogether from the wells, it is pumped and can be pumped into there.

Q. Well, now, it is conducted to the city by pipes?

A. By pipes, yes, sir.

Q. And owned by the city?

A. Yes, sir.

Q. And are there hydrants for fire purposes?

A. Yes, sir.

Q. And does it supply the bath rooms and water closets of the town also?

A. It supplies the town for domestic uses, generally, of course it is not all good water.

Q. Can you tell us what proportion of the town has water in the houses?

A. I could not tell what portion. I think a large portion of it has probably one-fourth of it I should think.

Q. Well, those three-fourths—do a majority of them have bath rooms and water closets?

A. No, I think not.

Q. Not so large a proportion?

A. No, sir.

By the Court:

Q. What is the population of the Town now?

A. About seven thousand.

Further Direct.

Q. Are there drains in the town for carrying off this water?

A. There is no sewer system; the portion of the town to which your evidence related this morning, that is, from Bergen street east, a large portion of that has under drains leading to the river.

Q. Well now in those under drains, we will take Myrtle avenue, do you recollect how the houses on Myrtle avenue, towards the brook they call the electric brook, I think, are drained?

A. Why the water all flows into the river, of course, there is no other outlet.

Q. Well, one of those brooks, I forgot which one, is covered over for the distance of several hundred feet, it was testified to at the previous hearing, do you recollect now that covered brook?

A. Well, a large portion of them is covered over,

some of them are in the streets and some are not.

Q. Those that are laid in the street are laid there by municipal permission—by permission of the city?

A. By private parties, when it was laid out.

By the Court:

Q. That is, when the streets were laid out?

A. Yes, sir.

Further Direct.

Q. Are those streets improved by the city?

A. No, sir; they were put in passable condition before the Town accepted them.

Q. Well, are not the streets of Dover curbed and guttered, some of them?

A. Generally are, yes, sir, mostly curbed and guttered.

Q. Is that done by the city or private parties?

A. Under the direction of the city, but at private expense, the curbing and walks.

Q. Well now, when those improvements are done——

By the Court:

Q. Of course you have a system by which you regulate the grades of streets?

A. Oh, yes, the streets are all graded.

Q. What department takes charge of that?

A. The Common Council.

Further Direct.

Q. Well, Mayor, the pollution of the city at Dover now substantially passes into the Rockaway river, doesn't it?

Objected to as leading.

Objection sustained.

By the Court:

Q. How is the sewage of Dover disposed of?

A. There is no disposal system except by cesspools and the portion of the Town from Bergen east is so laid that the water level is near the level of the river, and the banks of the river are very low, and from Bergen east the cesspool system I should regard as very imperfect.

Further Direct.

Q. Why, Mayor?

A. Because it is so near the level of the river, and the under-drainage all goes to the river, what under-drainage there is in this section of the Town must go to the river.

Q. Did you notice whether in these cesspools that are built the water rises in the cesspools as the water rises in the river?

A. The water stands in low cesspools when the level of the river is low.

Q. And as the river rises the water in the cesspools rise, is that so?

Objected to as leading.

A. The water in the ground is near the level of the water in the river.

Q. And keeps that way, does it?

A. Yes.

By the Court:

Q. Are there any Town ordinances which regu-

late the connection of closets with cesspools or drains?

A. I think not, not that I recollect.

Q. Then anybody does as he pleases?

A. Yes, sir.

Q. Now, haven't there been within your knowledge, applications made there while you were Mayor, or since you were Mayor to increase the size of these drains to the river because of the number of houses that wanted to use them being increased, and therefore requiring larger drains?

By Mr. Corbin: I object to that as not the proper way to prove such a fact.

Question overruled as to form.

Q. Has there been any application made for drains or for enlarged drains to your knowledge, by any of the property owners there?

Objected to as incompetent and not pertinent.

By the Court: I suppose the Mayor can testify if he knows, whether there was a necessity for larger drains.

By Mr. Vredenburgh: My purpose is to show the character of the improvements there, and what the people say they want by their application. It is a matter of no great moment whether it is in writing or not; I want to show that such applications have been made.

By the Court: You may inquire what has been done.

Q. Can you describe, Mayor, if you will, what has been done in the way of directing construction of drains by the city or not constructed by the city,

but permission given by the city for the construction of drains?

A. I know of nothing that has been done in that line.

Q. Do you know of drains that have been constructed without asking permission?

A. Yes, yes, sir; this flat on Richards avenue, drains have been constructed in that manner there without permission.

Q. Do you recollect the character of the drains?

A. The drains are stone drains—stone drains, stoned up and covered over.

Q. About what size?

A. Well, in the street they are quite large.

Q. What do you mean by quite large?

A. I should think they were 3 feet wide probably, and as much as that in height.

Q. Large drains?

A. Yes, sir.

Q. And other drains?

A. They were small connections—running from houses on cross streets.

Q. The character of the houses along the street are the better class, are they not?

A. They are very good; ordinary class on Richards avenue.

Q. And all the houses drain into this large drain?

Objected to as leading.

Q. How is it on that avenue with the houses you speak of, how are they drained?

A. Well, there are a very few cesspools.

Q. Then those that have no cesspools drain how?

A. They have no other means except gitting into these under drains.

Cross-Examination by Mr. Corbin:

Q. These big stone drains were put in by Mr. Richards in grading and improving his property and laying out streets on his land, were they not?

A. By Mr. Cross.

Q. How long ago?

A. 25 or 30 years ago.

Q. Before the houses were built?

A. Yes, sir.

Q. And they carried all of the water which formerly flowed into the natural water course through that land?

A. Yes, sir, the land is low, and they drained into those.

Q. They were not built at all as sewers for water closets, but were built to drain the land?

A. For any purpose I suppose that they wanted them for.

Q. There were no water closets in Dover 25 or 30 years ago?

A. Not many.

Q. Some of these ditches or water closets through this land were brooks carrying considerable water?

A. There was one small brook ran across that land.

Q. And that was carried into this stone drain you speak of 3 feet square?

A. Yes, sir, I am speaking now simply of that section. Further east there is 2 or 3 streams across the property.

Q. And these stone drains that were built are partly along the streets and partly along private fields?

A. Yes, sir.

Q. To drain the land to make it dry and suitable for building purposes?

A. Yes, sir.

Q. And it has since been built over, practically covered over with houses?

A. Yes, sir, this property was opened up into building lots, and the proprietor constructed these drains I suppose to be used for anything that was necessary.

Q. Do you know of any instance where any owner conducts the pipe from his water closet and bathroom into these drains?

A. No, sir.

Q. Do you know of any instance in the whole town of Dover where any possessor of a water closet and bath room conducts the same right into these drains?

A. No, sir.

Q. Or to the river or any of the brooks running into the river?

A. Not that I know of.

Q. Your purpose was, Mr. Mayor, to carry the effluent of the bathroom and water closet into cesspools?

A. Yes, sir, it is now.

Q. Has there ever been anything different from that?

A. It has been different, yes, sir.

Q. It used to go very largely into the Rockaway river?

A. Yes, sir.

Q. Before ever the Jersey City Water Works were built, the officers of that company insisted upon a change in that regard?

A. Yes, sir.

Q. And there was a change made to the extent of several hundreds, wasn't there?

A. I don't know how many, but all to my knowledge have been changed.

Q. You even changed your own, didn't you?

A. Yes, sir.

Q. The Water Company or the Jersey City authorities have had inspectors in that locality ever

since the water works were built?

A. Well, I know nothing about it only from hearsay.

Objected to as not cross-examination.

Admitted as direct evidence of defendant.

Q. Now, isn't the number of people who use water closets in Dover very small as compared with those having privies; in other words, is not the common system to have a privy in the back yard?

A. Yes, sir.

Q. Some of the better houses have water closets in their houses?

A. Yes, sir.

Q. Speaking of ordinances, are you not aware that the Board of Health there has an ordinance regulating this matter in many instances?

A. I don't know what their ordinance is in regard to the pollution of the river.

Q. But there is a Board of Health having regulation upon that subject in Dover?

A. I don't know what the ordinance is, I don't recall that now, but we have a Board of Health there.

Q. How many fire hydrants are there in the streets of Dover for protection against fire?

A. I don't recall now, but the whole town is protected with them; the town has fire protection; I don't recall the number.

Q. That is all.

HAROLD BOUTON recalled for Complainant.

Direct Examination by Mr. Vredenburgh.

Q. You were on the stand before as a witness; now since you were on the witness stand have you made any further investigation as to these houses?

A. Yes, sir.

Q. Now at No. 12 Hooey street, when did you make your test there?

A. Sometime in March I think it was.

Q. What test did you make?

A. We tried the sink in one house adjacent to the Hooey street brook.

Q. What did you do with the sink?

A. We put the urine in the sink and looked for any results in the brook, and some short time afterwards we found a green coloring.

Q. Now 13 East Blackwell street, do you recollect testing that?

A. I do.

Q. When did you do that?

A. That was around the 1st of March, or first or second, somewheres around there.

Q. What did you do?

A. Tried the closet on the top floor with blueing, and looked for the results at one of the down stream pipes of the Morris street sewer, and found this discoloring there, which we considered the result of the test we made in the closet of that building.

Q. Do you recollect you testified about the Schwartz building?

A. Yes, sir.

Q. You made no test of the Schwartz building since that, have you?

A. No, sir, we have not.

Q. Since you were a witness?

A. No, sir.

Q. Have you made any test at 78 Richards avenue?

A. Yes, sir, we tried that building in March.
Q. What test did you make?
A. Let's see, 78 Richards avenue.

By Mr. Corbin:

Q. Can you state the exact date?
A. Yes, sir, I can give you that.

Further Direct.

Q. March 2nd, was it not?
A. Yes, sir. March 2nd, No. 78 Richards avenue, tested closet on second floor at 2.10 in the afternoon with urine, and we got a green color at the outlet of Electric Light brook next to Tiernan's drill works, 20 minutes later.
Q. Do you recollect testing Richards avenue and Union street?
A. What number?
Q. 62, 70, 72 and 78 Richards avenue?
A. Yes, sir, I tried No. 70, I think it was. We understood those 3 buildings belonged to the same owner, so we tried No. 70 in the closet upstairs.
Q. What was the result?
A. At 11.40 we tried uranine in the closet; and at 12 o'clock we got it at the Electric Light Brook at McKiernan Drill Company.

The Court: What date?

A. March 2d. We asked permission at Number 68, and the lady said she would let us try that place half an hour later. I think we got around there three-quarters of an hour later, and the house was shut up. But in May, this month, we went there, and the same lady refused us permission to try it.

Q. Number 36 Bergen Street. When did you test that?

A. 36 Bergen Street? We tested that on the first or March. Uranine in the closet.

Q. Where was the closet?

A. Top floor.

Q. What was the result?

A. We got the green in a brook, the Electric Light Brook, just east of Hudson Street, I think it was; yes, Hudson Street. About 15 minutes later; it was just 15 minutes later. We tried at 3.10, and got the result 3.25.

Q. Now, 13 East Blackwell Street: did you test that?

A. Yes, Number 14. I testified to Number 13.

Q. Testify about Number 14?

A. Yes, we tested 14, top floor, at 1.40 P. M., for uranine, in the presence of one of the tenants there; and at 1.50 we got the green color at the Morris Street outlet, down-stream pipe.

By Mr. Corbin:

Q. What did you put that color into?

A. Into the basin of the closet.

Q. Water closet?

A. Yes, sir.

Q. Date?

A. March 2, 1906.

Q. Where did it come out? I didn't understand your description.

A. The down-stream pipe of the two, at Morris Street sewers there at the river. Directly at the river.

By Mr. Vredenburgh:

Q. Lest I forget, I will now skip to Boonton. I will ask you a question about Boonton. Did you

test any closet in any building in Boonton, near what is known as the Brook Street sewer?

A. Yes, sir; I tested the closet in the last building under which the Brook Street brook passes. That is very near or right above the inclined plane.

Q. When?

A. I tested that on the first of March.

Q. This year?

A. This year.

Q. What was the result of the test?

A. It came out on the inclined plane by means of the Brook Street brook.

By Mr. Corbin:

Q. What did you put it into?

A. In a closet.

Q. Water closet?

A. Yes.

Q. Did you attempt to trace where the pipe from the water closet led?

A. I don't know that you could trace. It is directly—this brook passes directly beneath this building.

Q. Is the water closet in the house?

A. Yes, it is in the house. There is a bath—

Q. Doesn't this Brook Street brook empty into this semi-circular drain which the company built, that has been spoken of?

A. Oh, yes.

Q. And that carries the water into the lower level of the canal, doesn't it.

A. Yes.

Q. What do you mean by saying it appeared on the inclined plane?

A. Well, the drain is built on the inclined plane. I mean, in that drain.

Q It didn't appear on the ground?

A. Oh, no; I meant in the drain.

By Mr. Vredenburgh:

Q. To return to Dover; number 79 to 89 West Blackwell Street. Did you make any test of any of those?

A. I did. There is a row of six brick buildings there. We tested number 87 in the closet upstairs on the 15th. of May. And we looked for the result at a point on the canal where we had gotten before, the Dover Laundry. At 10:45 we tested it, and at 11 o'clock we got it at the same point.

Q. Now, what year?

A. 1906. All the tests are this year.

Q. Did you say the waste from the Dover Laundry passes into this same drain?

A. Yes, we tested that. Pierce and I. I think we tested that in February.

Q. Now, this was the test of a house 79 Blackwell Street, and when you tested it you found that this uranine passed from the water closet into the same drain in the same way.

A. Same drain, yes, sir. That is one of the six houses there.

By Mr. Corbin:

Q. Where did you find the color appearing after you put it into number 87 West Blackwell street?

A. We found it pouring out of a pipe. I should say it was about 4 inches, perhaps 6 inches pipe. Directly above the canal and from one bank.

Q. From the Morris Canal?

A. Yes, sir.

Q. How far from the brick building?

A. Well, I should think that was eight hundred feet perhaps.

Q. And pouring into a ditch which the laundry also empties into?

A. No, pouring into the canal.

Q. Directly in the Morris canal?

A. Right into the canal.

Q. Does this pipe appear?

A. Yes, we could see it on the bank. It is above the water level of the canal.

Q. It is the laundry about which you testified?

A. We testified to that, in February; and that is where we got the laundry test; it empties in the same place.

Q. Into the Morris Canal?

A. Yes, sir.

Q. Through the same pipe?

A. Yes. Through the same pipe.

Q. Whose property is this brick row of six buildings?

A. I really don't know.

Q. Who is the tenant of the number 87 you tested?

A. I don't know.

By Mr. Vredenburgh:

Q. Now the slaughter house belonging to Jack Sampson is situated where?

A. That is the eastern part of Dover.

Q. City of Dover?

A. Oh, the Sampson slaughter house. That is on the Mount Hope Road from Dover, but I believe that is in the town of Rockaway. It is just that portion—Mount Hope Road divides the two townships, I understand. It is down five or six hundred feet on the Mount Hope Road on the steep slope to a brook that leads right to the Rockaway.

A. Yes, I recognize that.

Q. I show you a photograph, and ask you if you recognize it.

A. Yes, I recognize that.

Q. Is that the one you have been testifying about?

A. It is that row of six houses. And the Dover laundry shows there adjacent.

(Photograph offered in evidence and marked Exhibit C 93.)

Q. And I show you another photograph of the Dover laundry.

A. Yes; that is the Dover laundry.

(Photograph offered in evidence and marked Exhibit C 94.)

Q. Did you make a test of the Jail on May 15th?

A. Yes, sir.

Q. Was there anything different in that test from the former test?

A. No difference at all.

By Mr. Corbin:

Q. On Photograph C 93, mark if you can the locality where you made the test on the brick houses, and also mark the place if it is shown where you saw the water.

A. You can't show where it comes out. There is a picture that shows the front of the houses better.

Q. Perhaps this is better (showing Exhibit C 94).

A. No; that is the laundry.

Q. Can you show the place where it comes out into the river?

A. It is only down the canal. You could only indicate about where; you couldn't show it very well.

Q. Is this stream, shown on Picture C 93, the canal or the river?

A. That is the canal.

Q. This point where the pipe empties into the

canal, is it below or above the point where the river and the canal meet together?

A. It is above the point. That water goes into the river.

By Mr. Vredenburgh:

Q. Mr. Bouton, did you, on May 15, 1906, test number 46 McDevitt Place?

A. Yes.

Q. With what result?

A. Why, we tested a sink there? We tested a sink at 1.45 P. M. and at 1.55 P. M. the color showed in a drain leading to the Electric Light Brook.

Q. Did you test on the same day 57 Passaic Street?

A. Yes, sir.

Q. In the town of Dover?

A. We did. Not the same day; 16th of May, at 11 A. M. And at 11.10 A. M. we got the color in the drain leading to the Electric Light Brook.

Q. Did you test 59 Passaic Street in the same city on the same day?

A. Yes. That is right next door. The same test, with the same result in the same time and in the same manner.

(Photograph offered in evidence and marked Exhibit C 95.)

By Mr. Corbin:

Q. What was your color put into, at number 57 Passaic Street?

A. In the sink.

Q. Kitchen sink?

A. Yes, sir.

Q. And the same at number 59?

A. Yes, sir.

Q. No water closet at those houses?

A. No.

Q. What kind of a drain is this in which you saw color appear after?

A. It is an open drain walled up with stone on the side.

Q. How far distant from the sink where you put the color in?

A. Oh, I should think, about—it runs in front of the houses, just across the roadway there—and the distance from the back of the houses to that drain, I suppose, would be fifty to sixty feet.

Q. (Showing Exhibit C 95) Which is 57?

A. It is the middle house. I think it is the middle house: I can tell you in a minute. Yes, it is the middle house.

Q. That is 57 and 59 Passaic Street, you are talking about?

A. Yes.

Q. This drain you speak of isn't a brook? It is a mere drain in the rear of the premises, isn't it?

A. No, it is a brook running in front of the premises. It comes up from that district we tested before, McDevitt Place, and through there. It is the one that goes around through Myrtle Avenue and down through all those other places we tested and eventually goes to the Electric Light Brook.

Q. That is an open ditch along the side of the road, isn't it?

A. It is open in front of the houses, and then as it leaves these houses it is then covered.

Q. Follows the line of the road, doesn't it?

A. Yes, it is walled up.

Q. Does this stone wall in the foreground of the picture indicate the line of the ditch?

A. Yes, that is it.

Q. Well, Mr. Boughton, all that amounts to is this, isn't it, that the sink water from these kitchens flows out into the ditch that runs under the road?

A. Oh, no. It comes out through the wall.

Showed through the wall. Both places showed at the same spot.

Q. The wall of the ditch? Comes out into the ditch which runs under the road?

A. Oh, yes. It comes out there.

Q. That is the way the sink water is disposed of, percolates through?

A. I wouldn't say it percolates through. Since the two houses are not joined together, and the results show at the same spot in the wall, I should think there was a drain leading to that place.

Q. You didn't see any drain?

A. Oh, no; but both came to the same place.

Q. How far is this point where you said the color come out from the Rockaway river?

A. Considerable distance above it.

Q. How far?

A. It must be half a mile above it, because the drain leads all down through that part of town, turning the corners.

Q. Runs along the road at this place. After it has gone past these houses it is then covered, and it is the one that we think runs through these different streets.

Q. When you saw this color come out through the wall, of course there was some water with it?

A. Oh, yes.

Q. And then it disappeared into the ditch, didn't it?

A. Oh, yes.

Q. Sunk into the ground?

A. Not at all. There is a running stream.

Q. Is it a natural stream?

A. Whether it is natural, or comes from the houses above, we don't know. But it is sufficient to run all the time.

Q. Had there been rains? Water high at that time?

A. No, I think not. Both those days were dry.

The 15th we were testing, and the 16th they were bright days.

Q. Where that ditch ultimately empties you don't know, really, do you?

A. I don't know, except from the result of our tests I should think it came out of the Electric Light Brook.

By Mr. Vredenburgh:

Q. Now, did you test 158 Richard Avenue on May 16th?

A. Yes. May 16th we tested the sink with uranine at 1.30 and 1.45 got the color in the brook.

Cross examined.

Q. Brook where, what brook?

A. Well, the brook that lets down—I don't know the number there, it is one of those several brooks down in that section of the town, it seems to flow all the time.

Q. And how far from the house?

A. I should think about 55 feet.

Q. An open brook?

A. Yes, sir.

Q. And coming through the wall?

A. It came through the drain.

Q. Open drain?

A. Yes, sir.

Further direct.

Q. Now say East Blackwell street, did you test that on May 16?

A. Yes, sir.

Q. What did you test?

A. It was a double frame building, we tested one side of 321 by placing urine in the sink at 4.15 and at 4.20 we got the color, the green coloring in

the drain, and that leads to a system of drains and ditches in that vicinity, and leads to the Hooey street brook. That drain is covered with boards and pieces of tin.

Q. And No. 9 North Essex street?

A. Yes, sir, that was a double frame building.

Q. Occupied by whom?

A. Fleischman Yeast Company, and tenants there. We tested the sink with urine at 10 o'clock, and at 10.10 we found a green discharge at the outlet of this drain pipe into the river.

Q. You found it coming out discolored?

A. Yes, sir.

Q. Into the Rockaway river?

A. Yes, sir, right back of the river there through this wall.

Q. Did you say something about the drain?

A. A 6-inch drain pipe that comes out of the wall there. The wall is on one side of the river.

Q. Did the drain come through the wall?

A. The drain came through the wall.

Q. Into the river?

Q. Right at the river.

Q. Did you attempt to test other houses?

A. We did.

Q. Several?

A. Yes, sir, we tried to test several houses.

Q. Well, why didn't you test them?

A. Well, we were not permitted to do so, they refused to allow us to test them.

Q. Did you visit the Boynton stove works yesterday or day before?

A. No, sir, I did not go there; I did around the 1st of May last.

By Mr. Vredenburgh: We were asked to prepare and I have had prepared a statement of what further tests of the capacity of the works we desire to make. I now hand it to counsel. It is addressed to Mr. Gardner.

By Mr. Corbin: You said you wanted to make a further test of the conduit?

By the Court: Well, you cannot answer it right away?

By Mr. Corbin: No, sir, it is a matter of four pages; it is not worth while attempting to answer it now.

By Mr. Vredenburgh: My object in presenting it now is that I have already stated I would prepare such a statement. I haven't confined myself to the conduit alone, but to all the tests we desire.

By Mr. Corbin: The proposition came from our side, and the proposition referred to nothing else but the conduit. We will consider the matter.

WELDON GRIFFIN recalled for the Complainant.

Further direct examination by Mr. Vredenburgh:

Q. Did you visit the Boynton Stove works yesterday?

A. No, sir, not yesterday. I visited them on the 15th.

Q. Of May?

A. The first time the 15th of May.

Q. What occurred?

A. Mr. Bouton and myself visited the premises of the Richardson & Boynton stove works. Mr. Bouton asked permission of the superintendent, Mr. Lynn, to test the closets upon the premises, which he refused to do.

Q. Have you been there since?

A. Yes, sir, I visited them on the 17th.

Q. What happened on the 17th?

A. My father and myself went there to serve a subpoena on them.

Q. State what you saw and heard.

A. I had a subpoena to hand to Mr. Lynn, and I handed it to him. He said at that time that his time was taken up a great deal, and he would like to know if there wasn't some way whereby he could be excused from attendance. I told him that all we wanted was to test the premises, and that if they would give us that permission we would be satisfied. He then gave me permission to test them in the afternoon of Tuesday. The closet was not exactly a closet, but had a 6 inch pipe running from one end of the closet, and there is a runing stream of water through it all the time. I got my results from the river at the outlet of the drain running through perhaps half an hour later.

Objected to.

Q. State what you did.

A. I placed urine in the sewer pipe running from underneath the closet.

Q. What do you mean by closet?

A. Water closet.

Q. Do you know anything about the water closet, whether it is a water closet, or what do you know about it?

A. There is a wagon stands underneath the water closet on which they take the solids, allowing the liquid matter to run off through this pipe.

Q. How do you know it is a water closet, have you been in it?

A. Yes, sir.

Q. And is it used by the operators?

A. Yes, sir, Mr. Lynn told me that they had about 660 men working there at the time.

Q. Now from this water closet there leads a sewer pipe?

A. Yes, sir.

Q. Is there anything in that sewer pipe?

A. The under part of the closet is open and you can see the pipe, you can get access to it.

Q. And is the water closet at present connected so that it is discharging through that pipe?

A. Yes, sir, the liquids but not the solids.

Q. How are the solids kept away?

A. They have a wagon standing there to catch the liquids, the solids are carried off.

Q. Do you mean to catch the solids, the liquids are drained off,—don't you?

A. Yes, sir.

Q. They are drained off at this pipe, do you say?

A. Yes, they do.

Q. That pipe you tested?

A. Yes, sir.

Q. With urinine.

A. Yes, sir.

Q. And you found the results where, what did you find?

A. I found the water inside of half an hour, discharging a green color.

Q. Where?

A. The outlet of their sewer system which run through their yard, they have a sewer system running through the yard, and I discovered at the outlet of this drain—I found the water green.

By Mr. Corbin: Shall I cross-examine now?

By Mr. Vredenburgh: Yes, sir.

Cross examination by Mr. Corbin:

Q. This water closet was in the yard of the Boynton stove works?

A. Yes, sir.

Q. Underneath the benches where the men go was standing this wagon?

A. Yes, sir.

Q. Does any of the liquid matter drop in there too?

A. It does not.

Q. How can it drop in any other place?

A. Well, the urinal discharges is right on the ground; they have a urinal in the place also.

Q. Discharges on the ground where?

A. Within 2 feet of this pipe which I have described.

Q. The wagon is underneath the seats of the solid matter?

A. Yes, sir.

Q. The urinal you say is a few feet away?

A. No, sir; the pipe carrying the urine, not the urinal, is all in the same place.

Q. Is the urinal itself over the wagon?

A. No, sir, not directly over it, it is off to one side.

Q. Is there any pipe discharging into the wagon?

A. No, sir.

Q. Did you see where it discharged?

A. No, sir.

Q. It falls on the ground outside?

A. Yes, sir, it falls on the ground outside.

Q. And it is absorbed in the ground?

A. No, sir, it runs directly into this pipe.

Q. What do you mean by that?

A. No, sir, it runs over the ground into the pipe.

Q. It runs over the surface of the ground?

A. Yes, sir.

Q. What kind of a pipe is it?

A. It is tile pipe about 8 inches or 12 inches, I can't say which.

Q. What does it connect with, the other end?

A. Just an open pipe with a stream of water going through it; the stream of water comes up through the ground and runs into the pipe.

Q. You put your green matter into the end of the pipe?

A. Yes, sir, I did, it is open.

Q. You did not put it into the main drain of the whole works?

A. I did.

Q. Where is that?

A. Off to one side.

Q. You did not get any result from that?

A. Yes, I did.

Q. You did not tell us about those?

A. No, sir.

Q. Isn't that where you got both of your results from, the main drain?

A. No, sir, I did not; I got it from the outlet of the main drain, yes, sir.

Q. How far apart did you make your two tests at that time?

A. Well, I will tell you how I came to make the second test.

Q. Cannot you answer my question, how far apart were they?

A. This second was not a test, it was made at the request of Mr. Lynn.

Q. Did you test the main drain or not?

A. I did for Mr. Lynn.

Q. You put coloring matter into it?

A. Yes, sir.

Q. How far apart between the two times did you make those tests?

A. Over an hour.

Q. You found the green coloring coming out of the same place?

A. Yes, sir.

Q. How far was the place where you put in the green the first time from where you put it in the second time?

A. 50 to 60 feet.

Q. And this is a drain draining the grounds there generally?

A. Yes, sir.

Q. The same drain as the other?

A. No, sir.

Q. Were these test that you made on the same day,—both these places ran into the same drain?

A. They discharged into the same drain, yes, sir.

Q. Which drain did you test first?

A. The urinal first.

Q. When did you put the stuff in?

A. At what time?

Q. Yes.

A. Quarter past one.

Q. When did you get the coloring in the river?

A. 1.45.

Q. When did you test the main drain?

A. I don't know just exactly, I think about 2.30.

Q. Was Mr. Lynn there during the test?

A. Not during the first test. Mr. Richardson was there.

Q. He saw the first test?

A. Yes, sir.

Q. Mr. Lynn was there the second one?

A. Yes, sir, it was at his instructions I made the second test.

Q. How much water did you pour in the first test?

A. None.

Q. Where is the big drain, or where does this big drain empty that you saw?

A. Into the river.

Q. How far from the point where you put the test in?

A. 250 to 300 feet.

Q. How far from the point where you first put the urine in is the point where this urinal empties out on the ground?

A. 2 or 3 feet.

Q. Is it not 20 feet?

A. No, sir, it is not.

Q. But you did not make any measurements there?

A. Yes, sir.

Q. And you say it is within 2 or 3 feet?

A. It is within 2 or 3 feet of where I saw the urinal.

Q. Why didn't you put coloring matter in the urinal to see if you could not get results?

A. Because I would have to have discharged water into it.

Q. Didn't you put any in the urinal?

A. No.

A. Or in the water closet?

A. No, sir.

Q. But you put it in the pipe which empties into another place?

A. I didn't do anything of the kind.

Q. He showed you where it empties into the river?

A. Who showed me? He told me it didn't empty into the river.

Q. You call this a water closet; it is not a water closet, there is no supply of water to it is there?

A. No, sir, it is a privy.

Q. There is no supply of water to it?

A. No, sir, none at all.

Q. Do you know how many urinals and privies there are in those premises?

A. Mr. Lynn told me that this was the only one.

Q. For 600 men?

A. Yes, sir, he told me that was the only closet on it.

Q. Who told you that?

A. Mr. Lynn, the superintendent.

Q. Don't you know that there are at least four of those on the premises?

A. I don't know anything about it.

Q. Did you examine any others?

A. He would not allow me to.

Q. Did you ask him if there were any others?

A. Yes, sir, and he told me no.

Q. You said he told you you could examine them?

A. He told me I could examine this one.

Q. Then did you examine any other?

A. No, sir.

Q. How many seats are there for men?

A. Just an open seat to sit down.

Q. How long is the place?

A. About 20 feet long, I should think, I am not sure.

By Mr. Vredenburgh:

Q. As I understand it, Mr. Lynn rather than obey this said that you might make tests?

A. Yes, sir.

Q. And you did make a test?

A. I did.

Q. And did he tell you before you made the test whether this place in which you put this urine emptied into the river?

A. Yes, sir.

Q. Did you call his attention to that?

A. I did, yes, sir, when he came back; he was away when I made the first test.

Q. And when he came back you called his attention to that?

A. Yes, sir.

Q. What did he say?

A. Said it seemed rather funny it should take thirty minutes to get into the river. I said there is a very small flow of water running through it, and I suppose that is what takes up the time. He said, well, I don't know, possibly this drain of ours is caved in at some point and is stopping the water; we often have back water here, I would like to know if it was, and he said, it would help me out a great deal if you found out if the green comes through this big drain.

Q. That was the other test?

A. Yes, sir.

Q. What did you do then?

A. Made the second test and found it took sixteen minutes to come through this big drain. I then asked Mr. Lynn if I could take a picture of the closet to show how the situation was, and he said no, and he said, I would like you to serve that subpoena now. He said I have seen some people from the Water Company, and they advised me what to do in this case; and I consider it very funny it only takes sixteen minutes for the green to come through the large drain and thirty minutes through the small one. He asked me if I knew who was up there that day from the Water Company, and I said no, and I asked him if he would mind telling me, and he said he wouldn't, but that he had seen them in the mean time.

By Mr. Corbin:

Q. Did you serve the subpoena on him?

A. Yes, sir.

Q. You just used it to bulldoze him and get what you wanted and then didn't serve it?

A. I didn't use it for that purpose at all, had no intention to use it for that purpose. I agreed that I wouldn't bring him here if he would allow me to test it.

By Mr. Vredenburgh.

Q. Now Mr. Griffin did you on the same day—

Mr. Corbin: I want to ask just one more question.

By Mr. Corbin:

Q. Who did you say saw the green come out of the end of the pipe on the first test?

A. Mr. Richardson, I will give you his name,—Cortlandt Richardson.

Q. Who saw it on the second test?

A. Also at the same time, Mr. Lynn went and saw it come out.

Q. The first or second test?

A. He saw the first test as it came out.

Q. Who saw the second?

A. Mr. Richardson and Mr. Lynn, both of them, were present.

Q. Who saw you put it in the pipe the next time?

A. I am not sure that Mr. Richardson saw me put it in, but he was there on the grounds, he came up just as I was putting it in.

Q. Who saw you put it in the second time?

A. Both of them saw me put it in the second time. Mr. Lynn said he didn't know how this discharge could get in the main drain, and he had a man go in to find out how it got in, and the man—

Q. You need not tell anything more that he said.

By Mr. Vredenburgh:

Q. Have you visited the premises of the E. J. Ross Manufacturing Co.?

A. Yes, sir.

Q When?

A. Yesterday.

Q. What did you do there?

A. I asked for the superintendent, and met Mr. Markowitch, and asked him if he had any objection to my testing the premises and he said no. He took me through and showed me the closets, etc., and I tested one of them. This was at Wharton. I tested the closet on the first floor and got results, got the green discharge in a raceway which runs right close to the building and into the Rockaway

river, practically take up all the Rockaway river at that point, in ten minutes.

Q. What are these Ross people?

A. Silk mills.

Q. How many people employed there?

A. Mr. Markowitch told me there were 188 in all.

Q. How many closets have they?

A. They have none closets throughout the buildings.

Q. Did all these nine closets empty into this same place?

A. I just tested this one, couldn't test any more at the time.

Q. How near were the closets to each other?

A. Why there were five of them in the same building, four in another building within a couple of hundred feet of it.

Q. What connected the closets with the river?

A. I cannot say that, it was covered where the green discharge came out.

Q. Where it came out of the river what was it, did you see that, was it a pipe or drain?

A. No, sir, it was just this open raceway.

Q. When it came out into the open raceway what was it?

A. I couldn't say, it was covered at that point.

By Mr. Corbin:

Q. Was that a privy or water closet?

A. Water closet.

Q. Supply of water furnished?

A. Yes, sir, running all the time.

Q. You saw your color come out in a race not in the river?

A. In a raceway at that time.

Q. What is that, the tail-race of the mill?

A, It is where they get their power from, yes,

sir, the tail race, I should judge, I am not sure of the name.

Q. How far from where you put it in did it come out?

A. Well, I don't know just exactly how long the building was, but I tested it in the center of the building, the closet is in the center of the building and the raceway at the edge, I should think about fifty feet.

Q. Well, it came through in a pipe or how?

A. I cannot say, it was covered.

Q. You simply saw the green in the water?

A. Yes, sir.

Q. Did you learn what the system was of disposing of the effluent of the water closets?

A. No, sir.

Q. Didn't you ask?

A. No, sir.

Q. Who saw you put it in?

A. Mr. Markowitch, the superintendent.

Q. Did anybody go with you to see it in the raceway?

A. Yes, sir, he came out and saw it, and said the North Jersey Water Company controlled that stream and if they found us putting anything like that in the river they would have me arrested for discoloring the river.

Q. That is all.

Recess.

EDWARD HOOS recalled by Complainant.

Further direct examination.

Q. You were examined the day before yesterday about a letter from Mr. Flynn, and Mr. Edwards, to yourself. Have you since yesterday made

a further examination in your house for that letter?

A. Yes, sir.

Q. Have you now found the original of that letter?

A. I have.

Q. Will you please produce it?

A. (Witness did so.)

By Mr. Vredenburgh: I offer that letter in evidence. It seems to bear your signature, Mr. Edwards.

By Mr. Edwards: I had already brought you my copy book with a copy of the letter in it.

By Mr. Vredenburgh: Yes, he brought us the copy book here, and we find it is an exact copy of the original letter. I think I have completed my examination of Mr. Hoos, I don't know whether he was cross-examined or not.

Cross examination by Mr. Corbin:

Q. One time, Mayor Hoos, you went out and examined the whole water shed, as you expressed it?

A. Yes, sir.

Q. Looked over not only the Rockaway but other streams as well, didn't you?

A. Yes, sir.

Q. Green Pond?

A. Green Pond, yes, sir.

Q. And up on the Ramapo water shed?

A. Yes, sir, I was over that for another company.

Q. And that was before this Flynn bid?

A. Yes, sir.

Q. And that was the first examination you ever made of the water shed?

A. Yes, sir.

Q. And you went to Greenwood Lake also?

A. I believe that was the Schwerin people of New York.

Q. Yes, you went up to Greenwood Lake also, didn't you?

A. Greenwood Lake, no, sir.

Q. That was a year or so before this bid came in?

A. Yes, sir.

Q. Your second visit was after the Flynn bid came in?

A. Yes, sir.

Q. And before it was accepted?

A. Yes, sir, that is right.

Q. And this second visit was simply to Rockaway valley?

A. Yes, sir, Rockaway valley.

Q. Was Mr. Beldon along on both occasions?

A. I remember he was along on one occasion.

Q. Wasn't he also there on the first occasion?

A. Yes, he was.

Q. And Mr. Edwards too?

A. Yes, sir, Mr. Edwards also, and Mr. Condit was there once.

Q. That was the last time?

A. Yes, sir.

Q. Condit was Mr. Flynn's treasurer, wasn't he?

A. So I understood.

Q. And Connelly was the man who had charge of the work?

A. He had charge of the work, had charge of the construction of the dam at the beginning, yes, sir.

Q. He is now dead?

A. So I understand.

Q. Your first examination was a year before the Flynn bid, and was the more thorough of the two, wasn't it?

A. Yes, sir, it was more extensive I believe.

Q. It took two or three days, didn't it?

A. It took two days. We stayed one night, I think in Boonton.

Q. Didn't you go to Hibernia?

A. Yes, sir.

Q. And Green Pond?

A. Yes, sir, we went all through the country where the mines were.

Q. You were up to the mines?

A. Yes, sir, and to Butler.

Q. The city was considering three possible sources of supply, wasn't it, at the Ramapo, Wynacka, and the Rockaway rivers?

A. Yes, sir, and one scheme was from the Ingraham people.

Q. That was the Ramapo?

A. No, sir.

Q. The Sussex lakes?

A. Yes, sir, up to Boonton.

By Mr. Edwards:

Q. No bid was ever made upon that?

A. No, sir, he claimed he was entitled to the contract.

Q. This letter which Mr. Edwards signed, and to which you also got Mr. Flynn's signature was delivered you just before you put your hand to the contract?

A. No, sir, the letter I had in my possession for a long while before, but I never had it signed by Mr. Flynn until them.

Q. As soon as you got Mr. Flynn to sign that, then you signed the contract?

A. That is right.

Q. One more question. At the time when you signed the contract the members of the Board of Finance and the members of the Board of Street and Water Commissioners were also present, were they not?

A. They were all present.

Q. And the city counsel?

A. Oh, yes, Mr. Augustus Van Wyck, the assistant counsel.

Q. Judge Van Wyck?

A. Yes, sir, there was a resolution passed by the members of the Board of Finance and the Street and Water Commissioners, in fact, requesting the signing of the contract, because Mr. McEwen had raised some questions. I signed the same day, I think I have a copy of that resolution in regard to the question Mr. Ringle testified to the other day in the 6th paragraph of the little pamphlet you had in regard to some question raised by Mr. McEwen about the pollution.

Q. Well, the final action taken by the two boards was all taken on the same day at least?

A. Well, it was late in the evening and the members of the Board of Aldermen were in there too, or a good many of them.

By Mr. Vredenburgh: I want to get this letter on the evidence. I will read it to the stenographer, and have him take it down.

Wallis, Edwards & Bumstead,
Counsellors at Law,

Hamilton Wallis,
William D. Edwards,
William S. Bumstead,
James T. Winthrop,

1 Exchange place, Jersey City, Jan. 6, '99.

Hon. Edward Hoos,
Mayor, Jersey City.

My Dear Sir:—

When the sewer inspection was made of the Rockaway water shed under the pending proposal to my client, Patrick H. Flynn, to furnish a new

water supply to Jersey City, attention was called by his engineers to the rag factory at Powerville, as among the possible sources of pollution. You were then told that it was the intention of the contractor to remove the same although no specific mention had been made of this place in the specification or of the proposal. I beg to assure you that such removal has always been contemplated in our plans, and that if the contract is awarded to him, such removal must take place.

Yours respectfully,

Wm. F. Edwards.
P. H. Flynn.

Re-direct.

Q. The tour of inspection referred to in this letter of William D. Edwards was a tour which you took after Mr. Flynn's bid, was it not?

Objected to as leading.

A. That is correct. You know it was after the bid was in, and they naturally thought of entering into a contract with Mr. Flynn.

GEORGE C. WHIPPLE recalled for Complainant.

Direct examination by Mr. Vredenburgh.

Q. I only want to recall you on one point, did you yesterday examine a house at Boonton, near the reservoir?

A. I did.

Q. Do you recollect whose house it was?

A. I don't know the name.

Q. How near is it to the Rockaway river?

A. I should say it is between two and three hundred feet from the Boonton reservoir just below the point where the Rockaway river discharges into it.

Q. What is the character of the ground as to elevation between this house and the reservoir?

A. It is a very deep slope down towards the reservoir.

By the Court:

Q. Did you say on which bank of the stream it was?

A. On the left bank.

Further direct.

Q. Was there a privy there?

A. I saw a privy back of the house on the slope.

Q. How far was that privy from the water?

A. I made no measurement but I should say between two and three hundred feet away from the water.

Q. What was the character of that privy?

A. It was an open privy, with a very shallow box underneath it, and I saw coming from the box fecal matter which was running out on the top of the ground.

Q. What as to the quantity of fecal matter that was under that privy, did you notice?

A. Not particularly, but the shallow box was quite full, I should say there might have been perhaps half a cubic yard.

Q. What would be the effect of the rain in that neighborhood as to the contents of that privy?

Mr. Corbin: I object to that, that is a matter of experiment. He can state the conditions. The

Court can infer the result just as well as a bacteriologist.

The Court: He can say whether the obstacles intervened between the box and water.

Q. You say the slope was steep, was there anything intervening to prevent that matter passing into the river?

A. The slope was rocky, but I know of no reason why with an ordinary heavy rain the material from this privy might not be washed and would not be washed into the waters of the river.

Q. Was there anything about it to indicate how long it had been substantially in that same position?

A. The privy appeared to be an old one, not a new one, I don't know how long it had been there.

Q. Apparently an old privy?

A. Apparently, so.

Q. Was there any evidence that it had been lately cleaned?

A. It certainly had not been cleaned lately.

Cross examination, Mr. Corbin:

Q. Who is the tenant?

A. I don't know his name.

Q. Who is the owner?

A. I don't know that.

Q. What street is it on,—what street does it front on?

A. It fronts on a street which crosses over the long bridge just below the point where the Rockaway river enters the reservoir, right at the turn of the road.

Q. That's the street crossing over the long bridge?

A. Just below the point where the Rockaway

river enters the reservoir, right opposite the cemetery, in other words.

Q. Dwelling house?

A. Yes, sir.

Q. How high is the ground where the privy is above the level of the water in the river?

A. Well, perhaps 50 to 100 feet, I didn't notice particularly there was a steep flow from the privy towards the river.

Q. Nice class of residences in that vicinity are there not?

A. Beg pardon.

Q. Rather a nice class of residences in that vicinity are there not?

A. Some distance up that street, yes, sir.

Q. Right around there?

A. This house is quite isolated from the others.

Q. Is it a good house or a poor house?

A. Not a very substantial house.

Q. One family house?

A. I should say one family now, although there were too doors to the privy.

Q. Well, what is wanted is the cleaning out of the privy vault, that is the size of it?

A. Well, I should want to have that privy improved so that there would be no danger of the material oozing out as it does now.

Q. You want a deeper box?

A. Yes, sir, and in any case it is too near the river to be allowed to remain there.

Q. Do you think 300 feet away is too near?

A. Yes, sir, in the condition of the flow there it might not be if there was a flat flow.

Q. You would not think ordinarily there would be any danger if everything was moved away 200 or 300 feet from the water?

A. Well, in a heavy rain flow there might be.

Q. Half a mile would be more desirable?

A. I think it would be, yes, sir.

Q. And the depopulation of the entire water

shed would be still more desirable?

A. Yes, sir.

Q. It is a new house, is it not, built about four years ago?

A. I don't know when it was built.

Q. It looks like a new house?

A. I didn't notice that particularly, but it has been there ever since I have been on the water shed.

Q. Does the privy look like a comparatively new privy?

A. No, sir.

Q. Is it the last house on Washington street before you reach the river on your right or left as you go towards the river?

A. It was on your right as you go down the street towards the river.

ALBERT LINDERMAN sworn.

Direct examination. By Mr. Vredenburgh:

Q. Where do you live?

A. 34 Bergen street, Dover.

Q. What is your business?

A. Reporter.

Q. How long have you lived in Dover.

A. I moved there the 1st of May, 1897, but I was in Dover a year before myself.

Q. This house you occupy, is it a single house or double house?

A. A double house.

Q. Which side of the house do you occupy?

A. 34 is the house nearest to Blackwell street as you go through Bergen street to the right.

Q. Bergen street runs north and south or east and west?

A. North and south, and I live on the north portion of the house.

Q. You live on the northerly side of the double house or the southerly side?

A. Southerly side.

Q. Your family consists of what?

A. There are at the present five in my family.

Q. Have you a bath room?

A. Yes, sir.

Q. Water closet?

A. Yes, sir.

Q. Have you had those in for some time ever since you have been there?

A. It has been there from the beginning, I believe I am the first tenant to occupy that side of the house.

Q. And the other side of the house is occupied by whom?

A. Thomas E. Sturdavent and family.

Q. What does their family consist of?

A. Three in family.

Q. Have they a bath room and water closet on their side also?

A. Yes, sir.

Q. Is there any sickness in their family or in yours?

Objected to as too remote.

Overruled.

Q. Do you know where your water closet drains, —bath room drains?

A. I was present Sunday when a test was made, —or a test was made on Sunday, in my presence, and that showed me where it drains, besides general knowledge.

Q. What was the test?

A. Mr. Griffen, who is in Court, put some urine in the toilet and we went to the ditch that runs parallel with the river, and about ten or fifteen minutes after arriving there, and that is two blocks

from the house, we saw the water turn green,—discharge green and continue so for some time.

Q. Has there been any change in this condition of things since you have lived there?

A. When I moved into the house there was no cesspool in the yard. A cesspool was constructed about three or four years ago, and while in course of construction it filled up with water almost to the surface at once, and the understanding of my family has always been that no connection has as yet been made with that cesspool.

Q. Well, the cesspool, you say, filled up with water?

A. We live on what has been called the flat here, and that is the low lying part of Dover, filled ground, and you reach water there anywhere in digging down a few feet.

Q. Then the water that came in the cesspool was water that came from the ground?

A. Yes, sir.

Q. Do you know whether the cesspool has ever been cleaned since you have been there?

A. It has not been cleaned to my knowledge, and could not have been cleaned without my knowledge.

Q. Were you present at any time at a meeting with reference to the drainage into the Rockaway river?

A. I attended nearly all the council meetings, my son is Town Clerk and because of his illness I go to the meetings to help him, and I was at a meeting recently when a communication—

Mr. Corbin: I object to what took place; he says he is present and that answers the question.

Mr. Vredenburgh: What occurred at that meeting with reference to the drainage?

Mr. Corbin: I object to that as not competent

evidence against the defendant.

The Court: Do you want to show the resolution.

Mr. Vredenburgh: I want to show that an application was made to that Board to enlarge, as I understand it, one of these drains upon the allegation that so many houses had gone upon the drain that a larger drain was needed.

Mr. Corbin: Objected to, facts cannot be proven in that way.

The Court: I suppose you could call the applicant and ask him about the size of the drain, but this evidence is pure hearsay.

Witness: This was a written communication to the Town Council and is incorporated in the minutes.

Q. There was a written application at that time to the Board was there?

Mr. Corbin: Objected to as nothing but hearsay, and cannot be competent evidence against the defendant.

The Court: You can show, of course, as a fact that this drain in this particular street will not hold the drainage, but you can prove that by the persons who have information upon the subject, but you cannot prove any resolution, I take it, of Dover, for the reason that anything that Dover says cannot bind the Water Supply Company.

Mr. Vredenburgh: The view I had was that I had a right to show the surroundings here. It made no difference whether the resolution was granted

or not, I want to show what the surroundings were, what the circumstances were.

The Court: You can show that by persons who have knowledge of the facts. Now there was a petition, as I understand it, presented to the Town Council by persons presumably cognizant of the facts that they stated in that application. If the facts are so important that they ought to be proven why you will have to prove them by persons who are cognizant of them.

Q. Do you know of your own knowledge of any other houses that drain in the Rockaway river through any drains?

A. If you mean by that whether I was ever in the closets of such houses and saw in any way how they drained, I do not. I know it from the owners of such houses either directly or indirectly.

Q. Can you mention those houses?

A. Mr. John H. Bickley, has two houses I think on Myrtle avenue, either Myrtle avenue or Richards avenue, but I know that he is at present at the —as I understand it—at the instance of the Water Company disconnecting his water closet from a drain that empties into the ditch, and substituting a cesspool, as a means of discharge.

Q. Do you remember any other?

A. Mr. J. J. Vreeland is in a similar case, he has three houses and has been notified to disconnect, as they now discharge into a drain and he is now or is about to put in cesspools.

By Mr. Corbin:

Q. What street?

A. I don't know, it is right in my immediate vicinity, I don't know just where the houses are, I say I have this more or less directly from the owners

or members of the families of the owners. Mr. Vreeland's son is in the court room.

By Mr. Vredenburgh:

Q. Do you recall any other?

A. I have only a general knowledge of houses in that section where cesspools drain into ditches, into drains that discharge into the river. I say that that is a matter of common knowledge.

Q. Does the drain which apparently comes from your house go towards the center of the street or go to the rear of your house?

A. To the rear—the cesspool is in the rear yard and the drain—the discharge from that drain is to the rear of my house and in a southerly direction.

By the Court:

Q. Have you a cellar in your house?

A. Yes, sir, it is a cement cellar.

Q. How deep?

A. Well, I should say five or six feet below the surface of the rear of the yard.

Q. Is the cellar dry?

A. Yes, I say it is cement. The walls and cellar floor are cemented.

Q. Well, how deep down do you have to go before you reach water?

A. I don't think you can go down quite two feet before you reach water. A cesspool was dug nearly three or four years ago, and I don't know the exact distance, I only know that it filled up.

By Mr. Vredenburgh:

Q. Were you present when this test was made of the Boynton Iron Company, I think the witness mentioned your name as being present?

A. Not when the test was made. I was there on

Sunday with Mr. Griffin the elder.

Q. What did you see there then?

A. I saw this wagon of which mention was made, under an out house which is open on three sides and which has a shallow pit or depression under it, and the wagon was—the top of the wagon was full of papers, not toilet paper but paper used for such purposes and the ground was littered with it. In a corner of this depression was an eight or ten inch drain pipe run off in a south easterly direction, and I saw a place where the drain discharges from the premises into the river or into water that is practically an arm of the river.

Cross examination. By Mr. Corbin:

Q. You used to be the editor of the Era?

A. Yes, sir.

Q. You are a reporter now of the Newark Evening News?

A. Yes, sir.

Q. And also write for the Dover papers?

A. No, I do not.

Q. You have been an advocate and writer on sewage system for Dover haven't you, for some time?

A. I don't know that I have done that exactly, I have been an advocate but not a writer, because the matter has not come up so definitely since I left the Era two years ago,—more than two years ago.

Q. Well, you took a fling at the subject once in a while in the papers?

A. I have written up the meetings that have been held in connection with this agitation resulting from the Schwarz case, for the Evening News, but I did that for my son, who was unable to attend the meetings.

Q. You tried to give the color which he would give rather than your own color to it?

A. It was a very peculiar meeting, it was an in-

dignation meeting, and I reported it just as it was. The Mayor presided.

Q. Now you said a test was made there at your house, was it of the closet in your house?

A. Yes, sir, in my house.

Q. Was the test made of No. 36 next door, at that time?

A. Not at that time.

Q. Now, I understand—

A. I knew nothing about the test of No. 36, except what I have heard in Court.

Q. Who is your landlord?

A. Mr. ——, the house belong to George Richards' estate, and my dealings as tenant are with Mr. D. R. Humer,—Mr. Humer and Mr. Justice Mahlon Pitney are the executors who take charge of the property.

Q. Did you report the result of this to them?

A. No, sir.

Q. I understand you to say that a cesspool was made in the back yard three or four years ago; you have been under the impression that your closet connected with that cesspool, haven't you?

A. No, we knew all the time—I don't know how, but we knew all the time that it was not connected until the Water Company forced the—

Q. What did you suppose you were connected with?

A. With this drain.

Q. Do you know the plumber that built that cesspool?

A. I think a mason built that cesspool.

Q. What is his name?

A. Thomas Fanning, that is to my understanding.

Q. The cesspool was built to accommodate both houses?

A. Yes, sir.

Q. And the mason bricked it up, didn't he?

A. I think it was bricked up.

Q. And he put flags over the top?

A. There is a flag stands over the center with a cast iron cover.

Q. Did you observe how deep he dug it?

A. I don't recall now, I saw it in process of construction for several days.

Q. Well, it was dug deeper than your cellar, wasn't it?

A. I don't think so.

Q. How many feet from your cellar is it?

A. Possibly twenty, it is in the rear of my back yard.

Q. And you think the water came up to within two feet of the top of the surface?

A. Yes, sir.

Q. Yet there is no water in your cellar?

A. My cellar is tight.

Q. But there is no water in your cellar?

A. My cellar is cemented sides and bottom, for that very purpose, to keep water out.

By the Court:

Q. The cesspool was constructed of loose rock?

A. Loosely walled up.

Further cross.

Q. Brick or stone?

A. I think brick, I know that brick were in the back yard nearly two years before they began the construction of the cesspool, and when those brick were wanted for another purpose they were carted away, they had been there nearly two years for that purpose.

Q. Is the cesspool brick or stone?

A. I think it is brick because the brick was there for so long a time.

Q. Laid in mortar?

A. I think not.

Q. And you think the bottom of your cellar is six feet below the surface of the ground?

A. There are, I think, about six steps in the back cellar way leading from the yard to the bottom of the cellar.

Q. That would be about four feet?

A. I said from four to six feet.

Q. The house was new when you went into it?

A. My side of the house hadn't been occupied.

Q. The house was new was it?

A. Well, the other side had been occupied a year or more before,—a year at any rate, the owner of the house kept it for me nearly a year before I moved my family to Dover.

Q. Was it a new house?

A. It wasn't new when I moved into it.

Q. How old was it?

A. The house had been erected a year or two before, my side of the house was new, so far as occupancy or tenancy, was concerned.

Q. When you saw this green two blocks away, emptying into a ditch, did it come out of a pipe or out of the side of a bank?

A. No; there is no pipe. It is a sort of a drain, with I believe, stone round about it. A loosely constructed stone drain.

Q. See any evidence there of anything discharged at that point except this green water?

A. Well, there was a whole lot of nastiness right about that place. I didn't see any fetid matter just then; because I don't know that the closet was being used.

Q. Who told you about Bickley's place?

A. I called on a friend Sunday before last, and Mr. Bickley was sitting on his porch; and he left just as I got there, and then this friend whom he was visiting told about the drains there.

Q. Who is that?

A. Thomas Davey. He has lived there a great many years and owns property there.

Q. Who told you about J. J. Vreeland's houses?

A. Mr. Vreeland's son.

By Mr. Vredenburgh:

Q. In answer to cross-examination, you spoke about an "indignation meeting." What do you mean by an indignation meeting.

Objected to.

Question overruled.

Mr. Vredenburgh: I proposed to prove by him that the indignation meeting was with reference to draining the sewage into the river, and the attempt to prevent it, which was called out by the bill which was before your Honor. That was my object. If your Honor thinks there is nothing in that, I won't pursue it.

The Court: Oh, yes.

JACOB J. VREELAND, Junior, a witness sworn for the Complainant.

Direct examination by Mr. Vredenburgh:

Q. You reside in Dover?

A. Yes.

Q. And have resided there all your life?

A. Yes.

Q. And you are by profession, I believe, an architect?

A. Yes, sir.

Q. Do you know of any houses, of your own knowledge, which drain into the Rockaway river?

A. Yes, sir.

Q. Will you please state what houses you know, of your own knowledge?

A. There's three that belong to my father on

Myrtle Avenue, number 10, 12 and 14.

Q. And is there water closets in them?

A. Yes, sir.

Q. And how long have they been built?

A. Well, one has been built about twelve years; the other one about ten and the other one eight.

Q. And when were the water closets put in?

A. When they were built.

Q. Bath rooms same time?

A. Yes.

Q. And how do they get to the river?

A. Why the main drain, that goes down Passaic Street to Richard Avenue; thence easterly to Mercer Street; thence southerly to River Street; easterly again to the end of the McKiernan Drill works, where it turns southerly and goes out into the river. There is a drain that runs up through the back of the lot; a drain put in there at the time the property was bought and when it was laid out.

Q. Is it partly covered or all covered? The drain is all covered, isn't it?

A. It is all covered now.

Q. And how about the sewer? Is that covered? A covered sewer?

Mr. Corbin: What sewer is that. He hasn't spoken of any sewer.

A. Drain, I said. The little sewer that came up in back of the house ran into that drain that goes to the river.

Q. Is there a sewer which goes under the canal?

A. That is the same continuation, goes under the canal over to McFarland Street, and west along McFarland Street till it gets to the westerly side of Lincoln Avenue, thence along that property, about midway, and crosses over and goes up what we call Mount Hope Avenue. And there is two branches of that. One goes up in the front on the

southerly side of the street by Segur Street, and the other goes up in the middle of the properties half way betwen Segur Street and the cemetery, which is Guy Street.

Q. Now, do the houses on these different branches and drains generally drain into or empty into these drains?

Mr. Corbin: I understand you are asking him things of his own knowledge. Is that what you want to know now?

Mr. Vredenburgh: That is what I am trying to find out.

The Court: Speak of your own knowledge.

A. Well, the general impression when these drains were built—

Objected to.

A. Well, the new houses, the majority of them, the sinks empty into these drains.

Q. Well, is it a fairly built up section of the city?

A. Fully built up. Very few vacant lots now, except in McDevitt Place. There is a square there.

Q. And there has something been said of the Electric Light Brook.

A. That is the old mill-race that used to come down parallel with the Central Railroad tracks; runs on and goes out into the river at the same opening that the Richard Avenue and Passaic Street drain goes into.

Q. How far does that run up into the city?

A. That runs up just to the outlet at the head of Morris Street, opposite Morris Street. North side of the river to Morris Street.

Q. And are there houses on that drain, also?

A. No. Well, there is some lateral drains run into that.

Q. Now, there is a pond to the west of the built up portion of Dover, where they skate. What is that pond called?

A. The mill pond? Above the Ulster Iron Works, we call the mill pond. And the southerly side is what we call Billy Ford's pond, behind the cemetery. Jay Street is the head of it.

Q. Well, the outlet from the pond I refer to runs under the railroad for some distance.

A. Yes. That comes down and goes under Morris Street and down along Mr. K place, and down along the Birch property, and through the Dover Beef Company's property, and underneath that, and comes out to the surface under the Lackawanna tracks, and then goes opposite the Lackawanna round-house and thence into the river.

Q. That is a distance of a mile or more, isn't it?

A. About a mile.

Q. And there are houses all along that?

A. Not after you leave the depot.

Q. Where that runs under the Delaware and Lackawanna road; aren't there houses on the opposite side to the railroad?

A. Opposite the station, yes.

Q. Quite a number of houses there, aren't there?

A. There's five there, I think.

Q. And the sink wash and the waste of those houses. Do you know where that goes to?

A. No, sir; I don't.

Q. Is that covered for any of its length, after it passes the round house of the Delaware, Lackawanna and Western?

A. It isn't covered from the time it leaves the ground by the Dover Beef Company's place.

Q. It crosses the Delaware railroad, doesn't it?

A. Goes under a culvert there.

Q. After it passes that culvert does it go into a drain concealed from sight?

A. No, the drain goes up through the Dover Lumber Company's place, and the Park Union Lumber Company's place &c to what we used to call the *middle turnpike* (?). Then it is covered from there to the river, a distance of about 75 feet.

Q. After it crosses the Delaware railroad in the rear of the lumber yards, out through the lumber yards, aren't there closets, privies, all along it there?

A. There's houses out there. I don't know what they are. I have never been in them.

Q. Do you recollect any other houses that you know of that sewer into the river, besides those that you have mentioned?

A. Well, no; I don't say that I remember exactly any at the present time. They may have been cut off, for all I know.

Cross examination by Mr. Corbin:

Q. How many houses are there in Dover? About?

A. Oh, I should say, in the neighborhood of 2,000 or over.

Q. Well, you reckon about five persons to a house, wouldn't you, in estimating the number.

A. That is the rule. There's lots of houses hasn't got that, and others has.

Q. It would average about that?

A. Yes.

Q. It has been testified that the population was something near 7,000.

A. 7,000, yes.

Q. About one-fifth of that, or 1,400?

A. Probably in that neighborhood.

Q. Now, is there no cesspool for the accommodation of your father's houses number 10, 12 and 14 Myrtle Avenue?

A. No, sir.

Q. Do they all empty into the one pipe? All lead into one pipe?

A. Now, this drain runs about ten feet from the house; and the pipes come out from the wall and go into the drain.

Q. Stone drain?

A. Yes.

Q. In the street?

A. No. In this property. Goes to the one on Passaic Street.

Q. In the rear?

A. Yes.

Q. How big a drain?

A. About 12 by 18 inches.

Q. Is it an old natural water course, or was it built for this purpose?

A. No. At the time Mr. C laid the property out he put these drains all the way through, and the property owners covered this drain up with big stones.

Q. This is all land that was known as the "Flats?"

A. Yes, sir.

Q. Filled since?

A. Yes.

Q. And these drains were put in so as to carry the water off and make the property available for building purposes?

A. Yes. Drains was laid off every hundred feet, the lateral drain ran into this; on the property lines.

Q. And as people built houses they filled their lots up?

A. Yes. Four to six feet.

Q. Your father used this drain for a sewer?

A. Yes, sir.

Q. Never made any other provision?

A. No, sir.

Q. And that drain carries to a larger drain in the street?

A. Yes, sir.

Q. And that larger drain was formerly a brook, wasn't it?

A. I believe it was.

Q. That is in Passaic Street?

A. That is in Passaic Street; and runs in Passaic Street to Richard Avenue and then on Richard Avenue.

The Court: How much below the level of the street was the bottom of the drain?

Witness: I should judge, about six feet.

Q. The bottom of your drain?

A. Yes. That property, you can strike water anywheres in there now from five to six feet.

Q. It is entirely covered with stone and earth?

A. Yes. About three feet of earth on top of it.

Q. You spoke of new houses in the neighborhood emptying their sinks into the drain. You think they carry their sinks out back?

A. What I mean to say, that the new houses, from the time I remember, they used these drains to put their sinks into.

Q. Have you seen that?

A. Yes, sir; I have.

Q. Where? What streets?

A. Oh, on Richard Avenue; Union Street.

Q. Won't you name such as you know, by the name of the owner of the property?

A. The owners has changed now.

Q. Perhaps you could tell the numbers, or otherwise indicate.

A. I don't know as I can tell the numbers. Everybody thought they had a perfect right to do it, and always done it in that section.

Q. Where is this part of Dover they call the "Flats"? Is it to the east or west of the Lackawanna station?

A. It is from the upper street, what we call Essex Street. North-east.

Q. Towards New York?

A. Yes, sir.

Re-direct examination by Mr. Vredenburgh:

Q. You spoke of a drain, in the street, in answer to Mr. Corbin's inquiry. What is the size of that drain?

A. Of the drain that runs down Passaic Street, and thence Richard Avenue? It is about three feet wide by four feet high.

Q. What is it built of?

A. Native stones, and large stones across the top of it.

Q. Now, do you know of your own knowledge of any privies there in which the water rises and falls with the water in the river?

A. The majority of all of them. In high water, all through the "Flats" in the cellars not made tight, the water rises up to the height of the river, and when the river goes down they go down together. The strata there is a sort of hard pan we call it. It is gravel and muck; the black muck on top of it about a foot thick. And above that is all made ground. The natural grade there was a swamp all the way through. The ground was springy.

At this point Mr. Vredenburgh announced that he had no more witnesses present, and defendants' Counsel not desiring to proceed until Complainant's case was closed, the Court adjourned the hearing until 9.45 A. M. on Friday, May 25, 1906.

GEORGE E. JENKINS sworn.

Direct examination. By Mr. Vredenburgh:

Q. Mr. Jenkins, you live where, sir?
A. I live in Dover, New Jersey.
Q. How long have you lived there?
A. I have lived there since 1887, but my home was two miles from Dover, so that I have been in Dover all my life time, but not actually living in the town.
Q. What is your age?
A. I am 45 nearly.
Q. Well, now since you have been in Dover, have you practiced any profession?
A. Yes, sir, I have.
Q. What?
A. I am civil engineer.
Q. And as such have you surveyed property more or less throughout Dover?
A. Yes, sir, that is my principal business.
Q. Property located along the bank of the Rockaway river through Dover?
A. Yes, sir.
Q. Now have you noticed whether in summer time—in dry times there is much or little water running in the Rockaway through Dover?
A. At times the river bed is practically entirely exposed. The water is diverted by the canal at North Morris street where there is a dam across the river.
Q. What is the distance, about, through Dover, that the river is practically dry?
A. Well, the water returns to the river from the canal at a distance I should judge of about three thousand feet from where it is diverted.
Q. Then there is a distance of about three thousand feet when the bed of the river is sometimes practically dry?
A. Yes, sir.

Q. Now during those times what is its condition as to smell?

A. In the summer time there is a decided odor.

Q. Offensive or otherwise?

A. Offensive.

Q. Due to what?

A. Due to the emptying into the river of certain drains that carry the surface drainage and other drainage from different parts of the Town into the river.

Q. Do you know the premises of Ruben Fahr?

A. Well, if you mean the land that he has recently purchased from the McDervitt estate I do, yes, sir.

Q. Yes.

A. Yes, sir.

Q. What is the condition of that as to drainage?

A. There used to be a small brook running through that property that came down from a body of water known as Black pond, I think it still carries some of that water from there, and some years ago that was changed from an open brook to a sort of closed sewer, and in some places, however, it is still open, it is not entirely closed, and that stream runs down through this lot, I think on that particular lot it is still open and exposed to the atmosphere, but below it is covered.

Q. Well now the drain that goes from that lot, do you know whether it is sufficient now to carry the drainage that it attempts to carry?

A. No, sir, it is too small.

Q. Well, why is it too small?

A. Well, the culverts that have been made for carrying this water across the streets that it crosses have not sufficient carrying capacity to take care of the water in times of flood, under ordinary circumstances I guess it does take care of it.

Q. And what result have you observed upon the lots of Mr. Fahr because of that?

A. Why it floods the lot anywhere from two to three feet in depth.

By the Court:

Q. Well, is this property in the eastern part of the Town?

A. It is in the north eastern part of the town, yes, sir.

Q. In the low lying district?

A. Yes, sir.

Further direct.

Q. On which side of the river is it?

A. On the north side of the river and north of the canal.

Q. Is it vacant property?

A. It is vacant property.

Q. Do you know whether by reason of this stoppage the drainage from the house—house waste has been forced over his lot?

A. There is a great deal of house waste on the lot, and I don't know where it would come from otherwise than in that way.

Q. Did he through you apply for an enlargement of that drain?

A. No, sir.

Q. It wasn't through you?

A. No, sir.

Cross examination. By Mr. Corbin:

Q. You spoke of this three thousand feet of the river bottom in Dover which is to a large extent exposed in dry weather?

A. Yes, sir.

Q. How wide is the Rockaway river in Dover at that point?

A. I would have to give you an estimate of it,

I think that our bridge crossings there—

Q. Oh, just give me a guess?

A. Fifty to sixty feet perhaps more than sixty.

Q. Well now a fresh water stream exposed for a distance of three thousand feet and fifty feet wide in summer, is bound to send up a smell anywhere, isn't it?

A. Yes, sir.

Q. And you think that perhaps that smell which would naturally rise has been enhanced by the drains that empty into the river, is that it?

A. Yes, sir, I think so.

Q. Now as to this place or Fahr's—

By the Court:

Q. Well, do I understand you to say that the bed of the stream at that point is ever entirely dry?

A. Entirely dry. We use such seasons as that for removing the cobble stones that are in the river to endeavor to lower the bed of the river and thus try to do away with some of the damage by floods that we get there. That has been done frequently and the stone has been used by the City.

Q. Well, is the bed dry every summer at the same time, in the course of the summer or only in dry summers?

A. Well now I cannot say absolutely that it is dry every summer, but I should say that as a rule it is.

Q. For how long a time?

A. Well, for periods of two and three weeks, and perhaps a little longer than that.

Further Cross.

Q. During those dry periods the canal itself becomes the river, doesn't it?

A. Yes, sir.

Q. And carries the whole flow of the river?

A. Yes, takes all the flow of the river.

Q. When the water rises higher by reason of rains then the old bed of the river resumes its duty?

A. Yes, sir.

Q. When the water is high after a heavy rain, the whole of the river is full as well as the canal, I suppose?

A. Yes, sir.

Q. Now as to this Fahr property, you say you saw upon the surface of this vacant land, house wastes; what do you mean by house wastes?

A. Well, I mean by house wastes, ordinary house sewage such as is discharged from sinks, like grease on top of water.

Q. How large a property is the Fahr property?

A. The lot is probably on MacFarland street, and has a frontage of about 250 feet, and then it extends back to McDevitt Place, a distance in the neighborhood of 400 feet, I should judge.

Q. 2 1/2 acres?

A. Yes, sir, about.

Q. And that lot has not been filled up like the other low land around there?

A. No, sir.

Q. Not only Fahr's land but the other unfilled land is flooded in the time of high water, is it not?

A. In time of extra high water, yes, sir.

Q. Spring freshets always flood those lands?

A. Not so much as this particular lot, it is especially low.

Q. Not filled at all?

Q. Passing on down the stream below the limits of Dover, there is no land all along the stream that is not flooded every spring?

A. Generally, I should say yes.

Q. A heavy fall of rain will flood them as well?

A. Yes, sir.

Q. Along through Dover and below Dover there is a very large area of this low lying flat land, is there not?

A. Considerably.

Q. Some hundreds of acres, possibly thousands?

A. I don't think there are thousands of acres.

Q. And this flat land with muck on top of it lying in all along that shore is but little above the banks or little above the stream, is it not?

A. They are flat lands but I don't think there is much there in the shape of muck on them.

Q. Are some of them swampy land?

A. Some are swampy.

Q. And these are flooded in times of high water?

A. Yes, sir.

Q. Those lands on the flats in Dover which have been filled for the purpose of house building, are they filled so that they are not flooded any more, or are they also flooded?

A. I think not exactly floods, they are affected by high water.

Q. They have not been filled high enough to entirely escape?

A. No, sir.

Q. That is all. Oh, one more question, is Fahr's property north of the canal?

A. It is north of the canal.

Re-direct.

Q. Have you a map showing these sewers?

A. Yes, sir, I have the town map.

Q. Have you brought it with you?

A. Yes, sir.

Q. Will you produce it?

(Witness did so.)

Q. This map, which you produce, Mr Jenkins, is a map of what?

A. It is a map of the corporate limits of the town of Dover.

Q. Do you know by whom it was prepared?

A. I prepared the map from a smaller map, or

from a map small in detail—from the city map of the different streets.

Q. Is it accurate?

A. Accurate as such a map as that can be made on such a scale as that.

Q. What is the scale?

A. 200 feet to an inch.

Q. Is that marked upon it anywhere?

A. Yes, sir, in the right hand corner.

Q. And the compass I see you have there also?

A. Yes, sir.

Q. And the map is entitled map of Dover, Morris County, New Jersey?

A. Yes, sir.

Q. Is it an up to date map?

A. Yes, sir. There may be some minor changes that are not shown; I think the new viaduct is not shown there,—in Blackwell street now being made.

Q. By viaduct you mean roadway?

A. Yes, sir.

Q. And there is such a roadway being built across the railroad?

A. Over the railroad on Blackwell street.

Q. Over the railroad at Blackwell street?

A. Yes, sir.

Q. The railroads are shown on this map in what way?

A. With a broken dotted heavy line; both lines are shown, the D., L. & W. and the Central Railroad of New Jersey.

Q. What are the names marked on this map, what do they represent?

A. They represent the river, &c.

Q. And represent accurately the things they purport to represent?

A. They do.

Q. What do the blue lines mean?

A. They represent the drainage channels or sewers, so-called, that empty into the river and canal.

Q. What are these round black dots?
A. They represent the location of the hydrants and the location of the water pipes in the town.
Q. The buildings are shown in what way?
A. By square rectangular blocks.
Q. Have you indicated on this map in any way what streets have been improved by the city?
A. No, sir, most of those streets on here that are shown have been improved by the city.
Q. Do you show the street car railway?
A. No, sir, that is not shown on this map.
Q. There are electric street cars in Dover?
A. Yes, sir, introduced recently and that has not been added to this map.
Q. The lights—the public lights, are they shown?
A. No, sir.
Q. What are the character of these lights?
A. We have electric lights on the main street, an arc system, and on the others the incandescent light.

By the Court:

Q. What are these little black things here?
A. These are hydrants, sir.

Further direct:

Q. I see some of the streets seem to be indicated by dotted lines, what does that mean?
A. That is where the land has been laid out into streets but has not been opened or accepted by the town.
Q. Where these sewers are indicated by the blue lines, are they covered or uncovered?
A. Partly covered.
Q. Can you indicate on this map in any way what parts of it are covered and what not?
A. No, sir.

Q. There is a brook that has been spoken of as the electric brook, do you know such a brook?

A. Not by that name.

Q. It is said to be the old raceway.

A. Yes, it is indicated; it begins at the location of the electric light plant which is on Essex street just north of the river and runs down in an easterly direction in the center of River street near Hudson and is covered the entire distance from Hudson street to the river, where it empties into the river just east of Mercer Street.

Q. A distance of four or five blocks?

A. Yes, sir.

By the Court:

Q. It does not seem to have any source?

A. It gathers the water that flows from the—there is a small opening at the dam.

Q. Mark that "A".

A. At "A"; this is the dam that the Canal Company keep in shape and with which they regulate the flow of the water through the canal basin and it flows from the point A eastwardly across the electric light company lot crossing Essex street and the block between Essex and Bergen and crossing Bergen; it is open from the point A to Hudson street, excepting where it crosses streets and those are arch culverts.

By Mr. Corbin:

Q. It returns to the river east of Mercer street?

A. East of Mercer Street.

Cross Examination by Mr. Corbin:

Q. Point out the place where the river is taken into the canal for the distance of three thousand

feet and indicate from what street to what street that is.

A. I did not say that. The river is diverted into the canal at the point marked A on the map which is at Morris street, and then from that point A to the lower part of the town, at the south east of Hooey street the water returns—

Q. Returns to what?

A. To the river, and also at Berry's brook which is shown on the map as being between Mercer Street and Lynn Street; those two streams carry back some of the water that flows over the canal, more than the canal is able to carry.

Q. The slack water navigation, where the canal and the river are the same are not in the points you have shown but are above that?

A. I noted where the dam was.

Q. From the dam how far is the slack water navigation where the river and the canal are in the same channel?

A. Above the dam is about 100 feet where the canal boats are put into the canal.

A. Yes, sir.

Q. From that dam the water is set back more than 100 feet both in the canal and the river?

A. Set back.

Q. Set back by the stream?

A. No, I think not.

Q. The point of the confluence of the two is only for a short distance, they separate right away?

A. Yes, sir.

Q. This (indicating) is the canal which runs up to what is called the canal basin?

A. Yes, sir.

Q. And the river is down nearer the railroad?

A. Further south, yes, sir.

Q. Does the canal cross the river at the point where the waters of the two co-mingle?

A. Yes, sir; it is south of the river west of that

point, and east of that point it is north of the river.

Q. And at times, when the water is so low that the canal requires the entire flow of the stream, those are the times when the river is dry for 3,000 feet?

A. Yes, sir.

Q. These ditches, of which I see four or five marked on the map—

A. Yes, sir.

Q. Look first at the one that runs through the Richardson Boynton Company to the west part of the town.

A. Yes, sir.

Q. That was an original watercourse was it not, a sort of a brook or stream?

A. Yes, sir, that was a brook.

Q. That is not covered is it?

A. In part.

Q. Take the next one, a short one south of the Dover pond—

A. I think that one is entirely covered.

Q. The one in Boynton's?

A. Yes, sir.

Q. Now take the short one to the south of the Dover pound which runs northerly to the stream is that also a little natural watercourse?

A. That is a natural watercourse, yes, sir.

Q. That third one which rises in the southerly part of the town near German street and runs northeasterly by the cemetery and through the Ford pond and follows the Lackawanna Railroad and finally enters into the river near the lower end of the town.

A. Yes, sir.

Q. That also was a natural brook was it not?

A. Yes, sir.

Q. And quite a large one?

A. Yes, sir. That one is partly covered from German street down past the cemetery here (indi-

cating); the town built that and covered it, but below that it is an open ditch which is known as the Roderer ditch.

Q. Right in the middle of the town near the canal company's dam—

A. On Sussex street.

Q. —there seems to be a short ditch running north?

A. Yes, sir.

Q. Was that a natural water course?

A. No, sir, it was not.

Q. What is that?

A. That is a flood water sewer which takes the drainage from Blackwell street, all of the drainage from Blackwell street from where the Lackawanna Railroad crosses Blackwell street down to Sussex Street.

Q. Built by, the town?

A. It was built by the town.

Q. To take off flood water in the time of flood?

A. Yes, sir, it takes all the drainage water off.

Q. It is a very short ditch is it not?

A. Yes, sir.

Q. A couple of hundred feet long?

A. About that.

Q. I see another short one flowing northwardly on Essex street and north of Essex street?

A. Yes, sir.

Q. Is that similar?

A. That is a drain similar to the other one and built and maintained by the town.

Q. For flood water?

A. Yes, sir, street water.

Q. There is another one arising in the middle of the town near East MacFarlan street and Mt. Hope avenue and flowing easterly and southerly into the river, several hundred feet long; that was a brook was it not, a natural water course?

A. I believe that was a brook, yes, sir.

Q. And that runs partly wholly through streets?

A. Where it runs through the street is where some years ago they diverted its course and built a box culvert and covered it.

Q. That is in Passaic Street and Richards Street.

A. Richards Avenue and Passaic Street and Bergen Street.

Q. That was done by the property owners when they were filling in and improving that land was it not?

A. I think it was but I think the covering on the ditch some of the covering was done by the town.

Q. A large stone drain is it not?

A. Yes, sir, a box culvert.

Q. And it takes the place of the old brook that was substantially in the same place?

A. Yes, sir.

Q. What is the stone drain parallel with that, under River street?

A. That is the electric broo-k, so-called.

Q. I think I have mentioned all shown in blue on the map have I not?

A. All excepting one north of the Morris & Essex Railroad which has its origin in the lumber yard of the Dover Lumber Company.

Q. Let us get that a little better located.

A. South of Blackwell Street, north of the Morris & Essex Railroad and it has its origin in the lumberyard of the Dover Lumber Company, it flows directly east parallel with the Morris and Essex Railroad to a natural brook which flows then in a northerly direction into the river, entering into the stream just east of a highway bridge on Blackwell street over the river.

Q. That ditch flows along the foot of the bank of the Lackawanna railroad does it not?

A. Yes, sir.

Q. Was there a natural water course there?

A. I think so, yes, sir, as far as my recollection goes.

Q. It is immediately at the foot of the slope is it not?

A. Yes, sir.

Re-direct examination:

Q. I notice you said one of these sewers ran past the cemetery, what cemetery do you refer to?

A. The cemetery known as Richard street cemetery, and so marked on the map.

Q. Is that a large cemetery?

A. Well, it is the principal cemetery in the Town.

Q. How is that situated with reference to the sewer as to elevation?

A. It is higher than the sewer, probably eight to ten feet higher than the sewer.

Q. I notice another cemetery, the Locus Hill cemetery?

A. Yes, sir. that is north side of the Town and is on one of the terrace hills.

Q. And the sewer that is shown in that neighborhood don't quite reach that cemetery?

A. No, sir.

Q. How is that cemetery—the elevation of that cemetery in reference to this sewer?

A. That cemetery is on a sloping hill, and the lower part of the hill is at an elevation of probably six or eight feet above that sewer, and then runs up to probably twenty or twenty-five feet to the summit.

Q. The cemetery runs?

A. Yes, sir.

Q. Now you spoke of the sewer, the short sewer in Sussex street, I think you said?

A. Yes, sir.

Q. That takes the house drainage, you say, of the portion of Sussex street as far up as the railroad?

Objected to as leading.

A. I said it took the street drainage.

Q. Well, do you now how those houses drain?

A. Some of them I do, into cesspools.

Q. Do you know whether any of them drain into this so as to go through this sewer?

A. No, sir.

Q. You don't?

A. I don't.

Q. How far is the canal from the river for this distance of three thousand feet that you speak of?

A. Its maximum distance away from the river is five hundred feet.

Q. And it is shown on this map—the Morris canal is marked Morris canal and the Rockaway river is shown on this map?

A. Yes, sir.

Q. Now the elevation of the land between the canal and river for that distance compares in what way—first, is the canal above the river there?

A. The canal is above the river, yes, sir.

Q. And the water then—any leakage from the canal passes across those five hundred feet and goes to the river?

A. Yes, sir.

Q. And what is the character of the land as to elevation between the canal and the river for that three thousand feet?

A. I think that the land is probably six to eight feet below the surface of the canal, there is a bank,—

Q. And the bed of the river is much below the land?

A. The bed of the river is below the land eight or ten I should judge.

Q. Eight or ten feet?

A. Yes, sir.

Recross.

Q. Counsel has spoken to you of these drains and water courses as sewers and you have once or twice mentioned one or two of them as sewers, do you know of any case in which the sewage from any house in Dover drains into any of these ditches that you have mentioned?

A. I do.

Q. Mention it?

A. Well, I don't feel that I am at liberty to mention it.

Q. Well, the court will decide that, I think it is a proper question to ask.

By Mr. Vredenburgh:

Q. Why are you not at liberty?

A. Well I might be putting the property holder in a position where he would be under expense, and he would put it up to me for testifying to that extent.

Mr. Corbin: It seems to me it is a proper question, if the Court please.

Mr. Vredenburgh: I haven't asked the witness that question.

Mr. Corbin: Counsel referred to one of these ditches as sewers, I say they are not, except surreptitiously used as such, and if they are I want to find out wherein and to what extent they are sewers.

The Court: Well, I have no doubt that the question is competent on cross examination.

A. Well, the sewage from the Swiss Knitting Company goes into the Roderer ditch.

Re-cross.

Q. What ditch?

A. The Roderer ditch.

Q. That is on what street or place?

A. That is on North Salem street.

Q. North Salem?

A. I beg your pardon, Spruce.

Q. North Spruce street?

A. Yes, sir.

Q. Any others?

A. The house sewage of David Glass near the new viaduct goes directly into the canal and from the canal into the river.

Q. What street?

A. West Blackwell.

Q. Near what street?

A. The new viaduct between West Blackwell street and the canal, it is a very small lot, the house occupies about all of the lot.

Q. Any other?

A. Well, I think that is all I recall now, there were others that used to drain into the river, but I am inclined to think that they don't do so now, but I am not sure, I cannot testify that they do or do not.

Q. Well, there are many that formerly drained into that river that have been changed?

A. Yes, sir, there are two large iron pipes now on North Morris street that formerly carried sewage from a number of houses.

Q. Now they are for surface drainage?

A. Sir?

Q. Do you know of any sewer going into them now?

A. I cannot testify that there is now.

Q. You know that sewage was formerly going into that and was cut off?

A. Yes, sir—I wouldn't say that it was cut off but it formerly entered it.

Q. During the last two or three years there have been a great many changes in that street in the way

of cutting off the sewage that went into the canal or river?

A. Yes, sir.

Q. Are you town engineer of Dover?

A. Yes, sir.

Q. For how long have you held that position?

A. I have held that position since about 1887, but not continuously.

Q. Is there a Board of Health there?

A. Yes, sir.

Q. That is all.

Re-direct.

Q. These cesspools you have spoken of, the sewage from them goes into the river, does it not?

A. Well, the character of the soil at Dover, that glacial soil is such that I should say yes, sir.

Further cross.

Q. You think the water percolating through the soil might carry some of the sewage with it?

A. It certainly does, it decidedly does.

Q. But with a cesspool properly lined there would be nothing of the kind?

A. They are not properly lined.

Q. Then they just trust to the soil itself to take care of it?

A. The cesspools built there are just stoned up with the ordinary boulder stones without any cement or anything of that kind, and it drains out through the soil.

Q. What is the soil to a depth of 4 or 5 feet that you strike there ordinarily?

A. It is gravel at the depth of 10 feet in some places, and more in others, and then we strike what we call hard pan, made up very thickly with gravel and boulders.

Q. But there is sand under a great deal of

Dover, is there not?

A. Not so much as this glacial drift, drift would be the term for it.

Q. There is sand in the interstices of the ground, is there not?

A. Yes, sir.

Q. That is good filter material, is it not?

A. Yes, sir, but it clogs up.

Q. There is clay under some portions of the land, is there not?

A. Only in the eastern part of the town that I have ever seen, down at Sammis street there is clay.

Q. Loamy soil on top of all of it, I suppose?

A. Not very much of soil.

Q. What is it on top?

A. Soil I say, but not very loamy.

Q. Do you mean of a sandy gravelly character that comes almost to the top?

A. Yes, sir.

Q. How many feet does it go?

A. Well, it varies. In some places there is no top soil at all, another place it may be 2 feet. I am not speaking of top soil, I mean glacial drift, it is very deep; we had tests made by borings at the car shops and found it 200 feet deep.

Q. That is a character of soil that water will percolate down through until it finds another level?

A. Yes, sir, it doesn't seem to percolate below the hard pan.

Q. Haw far down is that?

A. 8 to 10 feet.

Q. That seems to hold the water?

A. Yes, sir.

Q. How deep do you dig in this place before you find running water?

A. Well, that would depend upon what part of the town you were digging in.

Q. On the flats?

A. On the flats you don't go more than a couple of feet before you get into water.

Q. Flowing water?
A. Yes, sir.

By the Court.

Q. You mean flowing water?
A. Straight, flowing water.

Further direct.

Q. Rise up and down with the river?
A. I think the river does have an effect on that part of it.

Further cross.

Q. When counsel suggested to you that the water flowed up and down with the river, did you mean by your answer to say anything more than in times of heavy rain that would raise the river, those heavy rains also raise the water in those pits or vaults?
A. Well, I was referring to what we called ground water.
Q. That is exactly the answer I wanted. That is all.

Further direct.

Q. What do you mean by ground water?
A. I mean by ground water, water that is affected by the ordinary water level of the district and it is considerably variable, in its rise and fall, according to the conditions of the rainfall at that period.
Q. Suppose the rainfall is higher up the stream so as to increase or raise the stream at that higher point, what do you say as to the water then in this place to which you have referred?
A. Well, I should think it would affect the water in this place by raising it to the proportion as

the stream would rise.

Q. Have you ever made any special observation in regard to that?

A. Do you mean in the town of Dover?

A. Yes, sir, as to the rainfall further up the stream that did not fall on the ground at Dover, affecting these pits?

A. No, sir.

Q. Think a moment, Mr. Jenkins, you are an engineer; if a rainfall occurred up the mountain which did not fall on the ground at Dover at all and which would effect the surrounding stream at Dover for a time and lift it up, would it have any affect especially upon these vaults or upon the level of the ground water?

A. Yes, sir, it would. If it had such an effect upon the river, the character of the soil being such there, it would be apparent at once in these vaults, &c.

Q. You mean close to the river?

A. No, sir, at a considerable distance from it.

Q. Have you made any observations to that effect?

A. I can't recall that I have.

Q. You don't mean to say that the river leaks out of its banks into the ground all around the river?

A. Yes, sir, I do.

Q. Not to any great extent?

A. Yes, sir, it does, I recall a case now where we put in abutments in the bridge across McFarlane street, and were troubled in that way.

Q. Doesn't water follow the line of least resistance; you catch that, don't you?

A. Yes, sir.

Re-direct.

Q. You said you were an engineer; what character of engineer are you?

A. City engineer of the town of Dover, and I do general engineering work.

Q. Have you done mining engineering?

A. That is my specialty, mining engineering.

JAMES S. NOLAN sworn for Complainant.

Direct examination by Mr. Vredenburgh.

Q. Are you a member of the Board of Public Works at the present time?

A. Street and Water Board.

Q. At the present time?

A. Yes, sir.

Q. Of Jersey City?

A. Yes, sir.

Q. Were you a member of that Board at the time this water supply contract with Patrick H. Flynn was entered into?

A. Yes, sir.

Q. Were you then any officer of the Board other than a member—were you president of the Board at that time?

A. No, sir, just a member of the Board.

Q. Now at the time of the question of how the contamination of the water supply at Dover—water at Dover, could be prevented, if it came up—did the question of what plan Mr. Flynn had that prevented that contamination, come up in that Board, when Flynn or his representatives were present?

A. Yes, sir, not in the Board, but trips that we had up there.

Q. You went on trips?

A. Yes, sir; he was not president of the Board, but on our trips when we went up to Boonton, &c.

Q. Where did you take those trips?

A. Why, during the course of the contract they took us out there several times to show us where the dam would be and the location, &c.

Q. Was that before the contract was signed?

A. Before and during, yes, sir.

Q. Well, before the contract was signed. The Court confines my question to that. After Mr. Flynn's bid was put in and before you signed the contract, you did visit the water shed?

A. During the bidding, yes, sir.

Q. Did you ask what their plan was?

By Mr. Corbin: I object to that as too general. Let us know who you are talking about.

By the Court: *They* is too indefinite.

Q. Well, I am asking him if he asked anybody; I first want to know whether any questions were asked; then I propose to ask him who they were asked of.

By the Court: He says the matter was spoken of on their trips to Dover. Now you may ask him as you did in the other case, who composed the party.

Q. I will ask you that. When you made the trip after that bid, and before the contract was entered into, on whose invitation did you go?

A. Well, I suppose it was the Company's, and their lawyers and representatives of the Company.

Q. Well, do you mean Flynn, there was no company?

A. Yes, sir, or the Jersey City Water Company; whatever they called it, they put in such a bid.

Q. Do you remember the names of those who went with you?

A. Mr. Beldon, Mr. Connelly, Mr. Edwards, and sometimes Mr. Kennedy, one of the contractors.

Q. Who of your Board went?

A. Well, there would be different ones; Mr. Heintz, Commissioner Hauck, Commissioner Fogel-

man, I think at one time. You see they changed so often, one goes in and another goes out—and myself.

Q. Now, at that time was the question raised in your presence, either by you or others, as to what was their plan for preventing the contamination of the river of sewage from Dover?

By Mr. Corbin: I object to that as leading.

Q. Was there anything said about the contamination of the river?

A. After looking over the dam or so, we would take trips out, and they would tell us how they were going to take care of the sewage because that was the principal question around at that time. Now, they would sit in the train—(Interrupted)

By Mr. Corbin: Just one moment. I desire to object to this line of examination on the ground that it is not competent evidence, and all such conferences were merged into a written agreement, and evidence cannot be given to vary the terms of the written agreement.

Further direct.

Q. Now go on, what was said and who said it?

A. Well, I would not say just who said it, there was three men talking at all times, or at different times as we were going out there, and I could not at this date prove which one said it, but we were taken and shown Dover, and on the way back they spoke about it.

Q. What did they say as to the disposal works?

A. There would be a disposal works at Dover carried on a level plane outside of Dover, and the solids were to be used for manure, and the liquids to be run into the river clear and pure.

Q. What, if anything, did they say as to the rag mill at Powerville?

By Mr. Corbin: Same objection as before.

A. Well, I don't know what they said about that, I know what we said about it, that came up later on.

Q. Well, did you say it to them?

A. We would say that must be abolished and then later on they had some kind of a scheme or contract to abolish it.

Q. Now was there anything said as to Boonton that you recollect?

A. Boonton they were to have sewers at Boonton, one on the hill at Boonton was to run below the dam.

Q. Below the Boonton reservoir dam?

A. Yes, sir.

Cross examination. Mr. Corbin:

Q. On any of these visits to Dover and Boonton was Mr. Flynn present?

A. No, sir.

Q. About how many trips did you make out there before the Flynn contract was signed?

A. Oh, I cannot state exactly, might have been two or three.

Q. You went out there on previous biddings, did you not?

A. Yes, sir.

Q. And on this Flynn bidding—after he put in his bid in August, 1898, and before the contract was signed in February, 1899, during those six months you didn't go out but once, did you?

A. I suppose it would be about once.

Q. Do you remember who was along at that particular trip?

A. Well, there must have been three out of the

four, there might have been the four that I mentioned, because there was Mr. Edwards, Mr. Beldon and then Connelly and Kennedy; I used to get mixed up, they are the two contractors, and sometimes Kennedy would be there and Connolly most of the times.

A. After the Flynn contract was made you were on the water committee, weren't you?

A. No, sir.

Q. You were on the Water Board?

A. I am on the Board as chairman of the committee.

Q. And you have been there a great many times?

A. Yes, sir.

Q. After the Flynn contract was signed you followed it up pretty closely?

A. Yes, sir.

Q. Who in your Board were the ones that followed it up closely to watch it?

A. Commissioner Heinz would say, I am going to Boonton next Wednesday, and he would say all that is ready can go along.

Q. And you would go with him?

A. And Commissioner Hauck or whoever might be ready to go.

Q. And Commissioner Hauck?

A. Yes, sir, sometimes.

Q. You three were the ones who followed up the work after it was contracted?

A. Yes, sir, because some of them dropped out of the Board and others were elected.

Q. Did you continue to go there until the work was done?

A. Yes, sir.

Q. And afterwards finished?

A. Yes, sir. They say it is not finished yet, though.

Q. After the water commenced to run. You don't say it is not finished, do you?

A. I go by the advise of the engineer.

Q. And counsel. The engineer and counsel advised you?

A. They say it is not finished.

Q. Well, you think the works work all right?

A. There was a few little things we had a fight on.

Q. But outside of those they are good works?

Objected to.

Mr. Corbin: Then you can call it my testimony.

Q. Have they worked satisfactorily?

Objected to.

Mr. Corbin: I will put it in as direct.

The Court: No, I don't think it is proper. You may ask him as to the quality of the water at Dover.

Q. How is the quality of the water at Dover?

A. I would sooner say about the works.

Mr. Vredenburgh: Mr. Nolan does not profess to be a chemist or bacteriologist.

Q. Have there been any complaints of the quality of the water?

Objected to. He is not a man to receive complaints.

The Court: The witness can speak as to the quality of the water and what he has observed himself.

Q. What have you observed of the quality of the water since the new supply was given in Jersey City?

A. I think it is all right.

Q. You said you would rather speak of the works, what do you say about the works?

A. You asked me what I thought about them. I think they are built all right, the fight is on the water, not on the works, as far as I know the works seem to be built all right.

By the Court:

Q. There has not been any made that showed there was any defective work?

A. No, sir.

Q. Complaints used to be made to your board of the quality of water did there not?

A. Always.

Mr. Vredenburgh: I object to that.

The Court: I do not understand that there is any controversy over the character or quality of the water. I have not heard any testimony yet which indicates that the water as now delivered from the reservoir at Jersey City is unsatisfactory to the citizens at Jersey City. Until I hear something to the contrary I shall assume that the water, as it has been delivered at the reservoir in Jersey City, has been found satisfactory to the citizens of Jersey City generally.

FERDINAND HEINTZ sworn for the complainant.

Direct examination by Mr. Vredenburgh:

Q. You live in Jersey City?

A. Yes, sir.

Q. And have lived there many years?

A. Since 1859.

Q. You were a member of the Board of Street and Water Commissioners?

A. I was.

Q. Were you a member of that board at the time this question of the new water supply was brought up and the contract was entered into?

A. Yes, sir.

Q. How long before that had you been a member, just generally—three or four years.

A. I entered the Board in 1896.

Q. And you left the Board when?

A. The first of January of this year.

Q. And you were President of the Board for some time?

A. Last year, yes, sir.

Q. Last year?

A. Yes, sir.

Q. You were not president of the Board at the time this contract was signed?

A. No, sir.

Q. Who was president then, do you recollect?

A. Mr. Anthony Hauck.

Q. After the bid was put in by Mr. Flynn, but before the contract was signed did you visit the water shed at any time?

A. Yes, sir.

Q. Who was present on the part of Flynn when you went there?

A. Mr. Beldon, Mr. Kennedy and Mr. Edwards and several others, sometimes, I can't tell just exactly who was there on the different trips.

Q. Was anything said about the plan which they had for preventing the contamination of the river at Dover from the city of Dover?

A. Yes, sir.

Q. Who said it and what was said?

Mr. Corbin: I enter the same objection to the competency of this evidence, as an attempt to vary a written contract.

A. Mr. Beldon has said that they are going to dispose of the sewage at Dover entirely by building a disposal sewage.

Q. A sewage disposal works?

A. Yes, sir.

Q. Was anything said about the rag mill at Powerville?

A. Yes, sir.

Q. Who said that?

A. We asked them to take it up, as a board.

Q. Yes?

A. Yes, sir.

Q. What answer did they make?

A. Well, they did not want to do it but they finally agreed to it, that is Mr. Flynn did.

Q. Agreed to do what?

A. To take out the disposal works.

Q. To take out what?

A. To take out the rag mill I mean to say.

Q. Was there anything said at that time with respect to the sewage of Boonton?

A. Yes, sir.

Q. What?

A. They would take that out and lead it out below the dam.

Q. What dam do you refer to now?

A. The reservoir dam.

Cross examination by Mr. Corbin:

Q. When was it that Beldon spoke to you about disposal works for Dover?

A. I could not tell you exactly the time; before the contract was signed, before the contract was made.

Q. Was it in Jersey City or at——

A. At Dover, in Jersey City and most in any place where we came to speak about it.

Q. He said that to you did he?

A. He did, yes, sir.

Q. Was anybody else present?

A. Yes, sir; Mr. Edwards said it also.

Q. Who was to build the disposal works?

A. The contractor.

Q. Was there not something said about the town of Dover doing what was to be done.

A. They wanted the town to assist them, to help them to build it.

Q. There was some talk about that?

A. Yes, but they were to do it notwithstanding the town assisted them or not, so I understood it.

Q. It was spoken of as a disposal works was it?

A. Yes, sir, the disposal works at Dover.

Q. You say with regard to the rag mill at Powerville, they did not want to take it out but you people insisted they should, is that it; you say Flynn finally agreed to take it out?

A. Flynn agreed to do it before the contract was signed.

Q. That is the Flynn letter you refer to is it not, the letter he signed?

A. Yes, sir, at the Mayor's office before he signed the contract.

Q. Your Board had passed resolutions to give him the contract before that had you not?

A. Oh, yes, a resolution was passed.

Q. You had never seen Flynn before that time had you?

A. No, I never saw Mr. Flynn before the contract was signed.

Q. You were present when the contract was signed?

A. I was not.

Q. You were not?

A. No, sir.

Q. Were you present when Flynn signed the letter?

A. No, sir, only they got it, Mr. Hauck and the Mayor.

Q. As to Boonton, they said they would lead the

drainage down below the reservoir dam?

A. Yes, sir.

Q. Who said that?

A. I can't exactly tell you who said it, but it was said often enough by any of them, any of the contractors, the representatives of Mr. Flynn.

Q. Mr. Beldon whom you have mentioned is dead is he not?

A. So I hear, yes, sir.

Q. You went out there a good many times didn't you?

A. Yes, sir.

Q. And very frequently after the contract was signed?

A. Yes, sir, I was chairman of the committee.

Q. And you were the man on behalf of the city who followed the matter up closely after the work commenced?

A. I did, yes, sir.

Q. More than anyone else?

A. Yes, sir.

Q. Except the engineer.

A. Well, always some of the members were with me, very seldom I was alone.

Q. Did you continue to follow it up until the water was turned on in May, 1904?

A. I did.

Q. Have you seen the work since?

A. Yes, sir.

Q. What is the quality of the water delivered, according to your observation and knowledge.

Q. And the works as a whole, are they satisfactory according to your observation?

Mr. Vredenburgh: I object.

Objection sustained.

Q. At Boonton you say they said they would take the drainage down and empty it into the river below the dam, is that it?

A. Yes, sir.

Q. That is all.

ANTHONY HAUCK sworn.

Direct examination by Mr. Vredenburgh:

Q. Mr. Hauck, you were president of the Board of Street and Water Commissioners of Jersey City at the time this contract in question was signed?

A. I was.

Q. And were you president also at the time that the bids were received?

A. Yes, sir.

Q. Now between the time that the bid was received and the contract was signed, did you visit the water shed?

A. Yes, sir, several times.

Q. At whose request?

A. At the request of Flynn's representatives.

Q. Was that request made to the Board or to you personally?

A. To the Board.

Q. Now on that visit to which you refer was any inquiry made by you as to what was the plan by which the contamination of the river was to be prevented at Dover?

A. Yes, sir.

Q. Will you please state who you asked and what the answer was?

Mr. Corbin: I enter the same objection as to the same evidence in the testimony of the other witness.

A. At the invitation of Flynn's representatives, they took us over the entire water shed, showed us the rivers, the streams that runs into the rivers where the dam was to be located, showed us the town of Dover and Powerville, and all the different points that come in connection with this vast water works, and of course seeing the different conditions as they existed, we asked those questions, how

about the sewage and the pollution, what are you going to do about these things, and as far as Dover was concerned there was to be a sewage disposal works, the rag mill was to be eliminated, and at Boonton there was to be an intercepting sewer built and run the sewage below our dam. We were very much in favor or very heartily in favor of having the rag shop at Powerville removed, because we thought it was a great detriment to have a plant of that kind so close along side the banks of the river whereby this supply was going to come from, and a great many out houses was to be removed and different other things that we pointed out, and it was said all that should be removed and eliminated to make this water pure and wholesome.

Cross examination. By Mr. Corbin.

Q. Who was it speaking on behalf of Flynn?

A. Well, we had Mr. Beldon, Mr. Kennedy and Mr. Connelly and Mr. Edwards there, and of course on the different questions the different men spoke, and the time that has elapsed is so long that it is hard to remember which individual made those statements.

Q. With respect to Dover you say they spoke of disposal works?

A. Sewage disposal works, yes, sir.

Q. And as to Boonton, of an intercepting sewer to carry the drainage below your big dam?

A. Yes, sir.

Q. Wasn't the talk on the part of Beldon and the others in the line of making the city of Dover erect disposal works?

A. As far as I recollect there seemed to be a tendency as far as the contractor was concerned, not to have it embodied in the contract, so as to help them to have those different things done as easily as possible, that was my understanding in the case.

Q. Well, wasn't that their suggestion that the

City should do it, and that they would compel the city of Dover to do what was necessary?

A. No, I didn't understand it so. As far as I can remember the understanding was if we embodied this contract it will be a hold up one and there was to be a disposal works—

Q. What do you mean by a hold up?

A. Probably would cost the contractors a great deal more money.

Q. You mean hold up by Dover?

A. I presume so, by the Town, where the different disposal works and intercepting sewers was to be built.

Q. After this work was commenced you went repeatedly to Boonton to see the work did you not?

A. A great many times, yes, sir.

Q. You have seen the intercepting drain that was built at Boonton, have you not?

A. I saw a ditch running along there.

Q. I mean the intercepting drain which is a semi-circular drain with cement concrete which goes into the lower level of the canal?

A. Yes.

Q. That canal empties into the Rockaway river below the dam, doesn't it?

A. As far as the engineering standpoint of this case is concerned I am not very clear on it, counsellor, we trusted entirely upon our engineers and upon the experts in reference to the work and to the analysis of the water, and as far as the water was concerned, it being delivered pure and wholesome. We went up there and examined the construction during the course of erection of the work, and as laymen we were satisfied with the work, that it was going on all right, but we depended entirely upon our engineers in charge and the several men that were employed by the City to look out for the City's interest.

Q. And how is the water as delivered, as far as you know?

A. As far as I know our Board has only received one complaint that I know of, and that was one time there the water was very roily and appeared to have a great deal of vegetable matter in it, but in general the water seems to be palatable.

The Court inquired of defendant's counsel what position they proposed to take with regard to the Edwards and Flynn letter introduced in evidence yesterday, whether they proposed to regard it as part of the contract or otherwise and after some discussion Mr. Corbin said he would like to have an opportunity to consider it.

CHARLES A. VAN KEUREN sworn for complainant.

Direct examination by Mr. Vredenburgh:

Q. You occupy what position in Jersey City?

A. Chief engineer.

Q. What way are you connected with the municipal government?

A. I have charge of the engineering work of the city.

Q. How long have you been engineer of Jersey City?

A. I have been in my present position about eight years.

Q. Have you had anything to do with the execution of this water contract?

A. No, sir.

Q. Who was the engineer in charge of that?

A. Mr. Ferris.

Q. Have you at any time visited the water shed?

A. Yes, sir, I visited it two or three times.

Q. Did you ever make any tests with the water shed at Dover?

A. Only one and that was recently at the request of Mr. Record.

Q. At the request of Mr. Record you went to the city of Dover when?

A. The 1st of February.

Q. What did you do there?

A. I threw some red dye into a closet in one of the hotels or saloons in Dover adjacent to the railroad, I think it was on Morris street kept by a man named Muller; and in about twenty minutes it appeared in the river—it came through an iron pipe.

Q. Now please state a little more definitely into what you threw this dye?

A. Into the basin of the closet in the saloon.

Q. What kind of a closet, privy?

A. A privy, I threw it in the basin—water closet and I pulled the trap and allowed the water to run.

Q. Was it a place for people to sit down as well as a urinal?

A. Yes, sir.

Q. Which did you put the dye in, the water closet or the urinal?

A. The privy.

Q. After putting it in did you flush it?

A. Yes, sir, for about four or five minutes.

Q. Then what did you do?

A. I walked down to the river and waited for it to appear.

Q. Did you see it appear?

A. Yes, sir, and that is the only test I made.

Q. Who is the engineer of Jersey City that has charge of the mains?

A. I am.

Q. The water pipe mains?

A. In the city, yes, sir.

Q. Will you tell us whether the mains across from Belleville crossing the Hackensack meadows

and under the Hackensack river are or not adequate and fit for use at the present time?

Objected to.

The Court: What is your object, Mr. Vredenburgh?

Mr. Vredenburgh: The answer of the defendants say that they are inadequate and not fit for use. It is one of the issues. It is all italicized as though it were of some importance.

Admitted.

Question read.

A. One of them has water in. There has no analysis been made of the water but occasionally we flush the pipe, that is the 20-inch pipe. The 36-inch pipe was tested about a year and a half or two years ago and that was in good shape them. There is no water in it to-day but it has been caulked in places where it had been chafing so that it can be used.

Q. I don't think you heard my question. You haven't answered it.

A. I have answered it properly I think.

Q. You haven't yet.

A. One appears to be flushed thoroughly and the water pure clear and wholesome but no analysis has been made of it to prove that.

Q. No one asked you anything about any analysis.

A. You asked me if it was fit for use.

Q. Now wait a moment. Wait until the stenographer reads the question to you.

The stenographer read the question as follows: Will you tell us whether the mains across from Belleville crossing the Hackensack meadows and

under the Hackensack river are or not adequate and fit for use at the present time?

A. Two of them are.

Q. Are what?

A. Adequate and fit for use.

Q. Mr. VanKeuren, the high service force in Jersey City was discontinued when?

A. Well, they were reduced, they were not entirely dispensed with, there is a guard there at all times.

Q. Where?

A. Up to the high service; there is about one-third of the force employed there, I should judge or half.

Q. And is so still?

A. Yes, sir.

Q. Why is that necessary?

Objected to as not pertinent.

By the Court: What is the relevancy of this evidence?

By Mr. Vredenburgh: In their answer they say that by reason of this connection that was made for Montclair, the city was saved from the expense of maintaining a pumping station at high service. Now that is not accurate, and I am proving that is not accurate.

A. Well, we have only one supply pipe, that is a 6-foot pipe from Boonton, and high service is dependent upon that pipe, and in case of a break in that line it would be necessary to start the pumps, and underwriters have insisted upon it, and that is the reason we are maintaining a pumping station.

Cross examination by Mr. Corbin:

Q. The city has three mains across the Hackensack at Belleville, has it not?

A. Yes, sir.

Q. When was the first one, the two-inch main laid?

A. In 1854.

Q. 1854?

A. Yes, sir.

Q. Cast iron pipe?

A. Yes, sir.

Q. When was the next one laid, and what is it size and style?

A. In 1862 there was a 36-inch pipe.

Q. Of what material?

A. Iron.

Q. Cast iron?

A. Yes, sir.

Q. When was the third one laid and what did it consist of?

A. In 1872 that is a 36-inch combination cement pipe we called it sheet iron, lined inside and covered outside with cement.

Q. That latter one is one you did not test lately?

A. I think that would be of no use.

Q. What?

A. I don't think that could be used but it has not been tested.

Q. The city was receiving its supply through these three mains until the time when the East Jersey furnished the supply through the new six foot main in 1902?

A. Yes, sir.

Q. Up near upper Montclair?

A. Yes, sir.

Q. Up near upper Montclair?

A. Yes, sir.

Q. And since 1902 you had your supply through the six-foot main until the present moment?

A. Yes, sir.

Mr. Vredenburgh: 1902 or 1903?

Mr. Corbin: 1903, I think, I don't know just the day that was turned on.

Q. June 1903?

A. Yes.

Q. The contract was made in 1902?

A. Yes, sir.

Q. So the City has had its sole supply continuously through that six-foot new main for about three years?

A. Yes, sir.

Q. At your reservoirs in Bergen Hill you had a method of delivering water at two different heads, didn't you, first the head which the level of the reservoirs themselves afforded, and secondly a head which was attained by pumps which you had there?

A. You mean prior to the—

Q. Prior to the new supply, that is right, is it?

A. Yes, that is correct.

Q. The greater part of Jersey City was furnished with the supply from your local reservoirs about 127 feet above the sea, was it not?

A. Yes, that is correct.

Q. And your high service, as you call it, was the head afforded by the pumps of 210 feet, wasn't it?

A. That was above that.

Q. Wasn't that the nominal—

A. That is your contract, but we furnished water at a higher elevation.

Q. The high service mentioned in the Flynn contract is 210?

A. Yes, sir.

Q. That is what the city called for, for high service?

A. Yes, sir, it is, being delivered slightly over that.

Q. The Water Company is giving more than the specified head?

A. Well, we receive about 214 feet head.

Q. Well, your pumps there used to give that

high service which the Water company now gives by gravity?

A. Yes, we gave more.

Q. Gave more?

A. Yes, sir.

Mr. Vredenburgh:

Q. How much more?

A. About fifteen feet I guess.

Further Cross.

Q. You used to give them more than you nominally gave them, did you?

A. Yes, sir.

Q. Now, what proportion of the total supply of Jersey City goes down to the lower level,—127 foot level?

A. I will tell you that in a moment if you will give me a piece of paper.

Q. Yes, approximately.

A. About 225 feet head we used to deliver water.

Q. You can deliver water?

A. We did with the pumps.

Q. That was not my question. At the present time the water is being delivered at three different heads in Jersey City, isn't it?

A. Yes, sir.

Q. Now at the lowest head of 127 feet which is afforded by the reservoirs, what proportion of the whole is supplied?

A. You mean how much is used from the reservoir?

Q. Delivered at that head.

A. I will tell you in a moment.

Q. Suppose the whole thing is thirty five millions, tell us how many would be—

A. About sixteen or seventeen million.

Q. Now you have a middle head of 160 feet for the Bergen section?

A. Yes, sir.

Q. How much goes to that?

A. Between eight and ten probably—

Q. And the balance goes to high service—

A. I should say ten or a little over that, and that takes in Lafayette also.

Q. And to the high service the 210 or over the residue goes?

A. That would be in the neighborhood of eight millions.

Q. So it is really less than a quarter of all your water that goes to this maximum head of 210 or more?

A. Well, about a quarter of it.

Q. And the six-foot pipe of the Water Company furnishes by gravity the water for all these deliveries, doesn't it?

A. Yes, sir.

Q. How do you manage to make deliveries at different heads from the same pipe?

A. Well, the high service is a direct connection, and it is supplied into the reservoir by regulating valves and also one on the 170 foot head pipe—stand pipe in No. 3 reservoir.

Q. You have to reduce the pressure by valves?

A. Yes, sir.

Q. Now instead of doing that and so wasting the pressure, if you should put a turbine or a wheel and simply lift the eight millions which you need to lift at the top, your present six-foot pipe would deliver more water at Jersey City?

A. Probably.

Q. You could deliver over seventy millions a day, couldn't you through it?

A. Well, I haven't made any calculations on that?

Q. But you would be safe in saying that?

A. I wouldn't say it.

Q. There is a good deal of power there wasted that could be used is there not?

A. Yes, sir.

Q. You could use it for electric lighting could you not?

A. We had a proposition of that kind.

Q. Before this came in you had a great pumping station working night and day for this high service work hadn't you?

A. Yes, sir.

Q. And those pumps lie there idle do they not?

A. No, there is steam on at the pump.

Q. Do you mean to say that steam has been kept up all these three years?

A. No, this last year, since the fire underwriters got after us.

Q. You have not put in a turbine which would answer the same purpose?

A. No, sir.

Q. And you keep steam up night and day and have people there?

A. Yes, sir.

Q. You formerly also had a steam pumping plant in Belleville before the East Jersey came in 1896?

A. Yes, sir.

Q. You do not still keep steam up there do you?

A. No, sir.

Q. If the six-foot pipe should break down as you have suggested what possible use would your pumpers be on high service unless you have water at the Bellville end?

A. You are going to give us the water.

Q. Where from?

A. From Kearny, from Bellville, through these iron pipes I have just told you about. ,

Q. You mean you would ask for it through the East Jersey's pipe?

A. Yes, sir.

Q. You are not relying any more on the Passaic River?

A. Yes, sir.

Q. Do you still keep a force out at Bellville?

A. There are only two men there, they are caretakers only.

Q. That work has been idle since 1896 has it not?

A. Since you delivered the water, yes, sir.

Q. It has never been necessary to fire up there for any break has it?

A. I cannot remember. I think there was some pumping done there at the time the break occurred on the East Jersey line.

Q. When was that?

A. 1897, the winter of 1897, about Christmas.

Q. Christmas, 1897?

A. Yes, sir.

Q. Are you not mistaken about that?

A. Well, I was not in charge.

Q. Now you spoke of two of your old iron pipes across the river, the one made in '54 and one made in '62 as still being adequate to carry water; at what pressure to carry water? At what pressure to carry water?

A. Well, I have had ninety-six pounds on it.

Q. You would not consider them safe to rely on for your high service, would you, in Jersey City?

A. Well, you have delivered water to us through those pipes.

Q. Where was the ninety-six pounds taken, at the bottom of the Hackensack river?

A. No, the river bank.

Q. At about tide level?

A. Yes, sir.

Q. We did deliver, yes, and there were a number of breaks during the time we were delivering through them was there not?

A. Not on those two lines, no. Those two lines were always in good condition, the cement line was

the one that broke.

Q. But there were a number of breaks during the delivery?

A. Not of those two iron pipes; there might be leaks or something like that.

Q. Could you deliver through those two pipes in their present condition?

A. You delivered nineteen million.

Q. Jersey City's present average is about thirty-five per day?

A. Thirty-four or thirty-five is the average now.

By the Court:

Q. This large six foot pipe that has been spoken of is one of the pipes of the water company and not your pipe?

A. It is the water company's pipe, we have no control over it.

Further cross examination:

Q. Don't you know that before these contracts X and Y of March 1902 were made there had been frequent trouble with these old mains and that the city was in a very solicitious way about them?

A. Well, I know that they would not deliver enough water, we were in trouble.

Q. And also your carrying capacity had become—

A. We were about up to our limit, that was it.

Q. Even when they were doing their best you were up to your limit.

Q. What is the storage capacity which you have at Jersey City in the reservoirs which have the elevation 127?

A. 120 million gallons.

Q. This is less than four day's supply for Jersey City is it not?

A. A little less.

Q. You have no other storage?

A. No, but we could draw from the Bayonne line or from the Hackensack water company, possibly about five millions.

Q. Those are the possible resources you have in time of accident?

A. That is all.

Q. To borrow from the Hoboken line or from Bayonne?

A. From Bayonne.

Q. About five million gallons I think you said?

A. About five milion, that is all that could be spared.

Q. Since the delivery commenced through the six-foot main of the Jersey City Water Supply Company in June, 1903, it has been continuous to this day has it not?

A. Yes, sir.

Q. I asked you the question whether at the heads at which you are actually using the water at Jersey City you could not receive, with proper appliances, seventy millions of gallons of water a day through the existing six-foot pipe?

A. Well, we could increase it a great deal I know, we have got a proposition now—

Mr. Vredenburgh: I object on the ground that the witness is not called as a gentleman knowing anything about those things and was not examined about it.

Witness: I will say this, we expect to install that very thing, for high service, the upper territory.

Q. That would apply to about 12 miles of six-foot pipe from Jersey City to the Watchung tunnel and through the tunnel itself, but beyond that where there is pipe it would have to be enlarged would it not?

A. Yes, sir. Now let me explain this to you, you are a little mixed yourself, I think. The idea of

keeping steam up, the fires are banked, at high service, is in case of a break in your line, it is only a single pipe line and it is dangerous not to keep steam up and to be in a position to pump at a minutes notice in case of fire, that is the idea.

Q. Best for a small quantity?

A. Just for the full quantity.

Q. It would not help you any—

A. We have to start our three pumps.

Q. That is for high service?

A. Yes, sir, that is all. We have got our reservoirs for the other supply.

Q. In other words it is a fire device, a protection against fire is it not?

A. That is it exactly, you could not get any insurance if you did not have it.

Q. On the hill?

A. Yes, sir.

Q. If then, the six and a half miles of steel pipe above the Watchung tunnel were increased—

A. Well, I am not familiar with the line, don't bring me back to where I am not familiar with because I have never been over the line.

Q. Very well, I will withdraw the question.

A. I don't know anything about the line; I know the reservoir and I am familiar with the Jersey City portion of it.

Re-direct examination:

Q. I understand that one of the reasons for keeping up steam at high service is for the purpose of pumping water when for any reason the new supply does not work?

A. Yes, sir.

Q. And in that case of course it would follow, would it not, that the turbine would not work?

A. I imagine the turbine would be of no use in that case. But we propose to install one on account of your 210 foot head; you have not got your head

sufficiently high to deliver in certain portions of the city.

Q. As Jersey City is located can you supply the higher parts of the town always with water without the use of those pumps?

A. Well, there are three or four spots, maybe two or three blocks, where in the upper stories they do not receive water. I don't suppose there are over a dozen houses, and they are four stories in height, that do not get their supply.

Q. You spoke about the Hoboken supply, that comes from where?

A. The Hackensack river, the Hackensack water company.

Q. And the Bayonne supply comes from where?

A. The East Jersey Water Company or the Bayonne company.

Q. You spoke about there not being a break in the pipes. Was there not a break in this new pipe under the Hackensack river one time?

A. That broke during the test. They were making a test then.

Q. How long did it take to cure that break?

A. I do not know; I had no supervision over it at all.

Re-cross examination.

Q. That was before the water was turned on at Jersey City, was it not?

A. Yes, sir.

Q. I understand you to say that the head of two hundred and ten feet prescribed in the Flynn contract is not high enough to supply the top stories of all the buildings in Jersey City?

A. That is what I say; yes, sir.

Q. There are some few that are higher than that?

A. There are a few that are above that elevation.

GEORGE E. JENKINS recalled for the complainant.

Direct examination by Mr. Vredenburgh.

Q. Did you ever examine the mines known as the Hibernia mines; ever go down in them?

A. Yes, sir. I have been in them very frequently.

Q. Did you notice in what way the excrements from the men were taken care of in the mine?

A. The usual method of doing that and the method employed at Hibernia is for the men to use the sink in the mine which is a portion of the shaft that is sunk about from ten to twelve feet below the lowest level of the mine and where therefore there is always water, and they use that as a cesspool, and from that the water is pumped up.

Q. About how many men are there in that mine? Do you know?

Mr. Corbin: Which mine do you refer to? You have spoken of two already in the testimony.

Mr. Vredenburgh: I didn't know there were two mines.

Q. Are there two mines there at Hibernia?

A. Hibernia is a general term for all of the mines, it is one mine, but at one time those mines were owned by different owners and had different names, but now it is all owned by one man operating it, and we usually speak of Hibernia as one mine.

Q. That is the mine that I have reference to.

By Mr. Corbin:

Q. Well, is it all one mine?

A. It is all on the same deposit, yes, sir.

Further direct.

Q. How many men are there employed there?

A. Over five hundred.

Q. Is this one place that is used—that is intended to be used—is that for use for all the five hundred that you speak of?

A. No, sir. The mine has, I think it has, twelve shafts altogether on the deposit. The deposit has twelve shafts, twelve or more shafts on it, and each one of those shafts is sunk in that manner, and the men go to those places. The deposit is somewhat over a mile in length, and the work is divided up into different sections, so that one man would not go from—for example, what is known as the lower wood shaft to the No. 12 shaft, which is a mile further off, and those places are made convenient for the force that is working in the neighborhood of their place of employment.

Q. When it is pumped out, do you know where it goes to?

A. Into Hibernia brook.

Q. Do you know how far that is above where the brook enters the river?

A. Less than three miles.

Q. Mr. Jenkins, were the drains under the Boynton Stove Works laid by you?

A. Yes, sir; I surveyed them out and drew the specifications and superintended their construction.

Q. And where did they all empty?

A. They emptied into the Rockaway river, just above the railroad bridge crossing the Lackawanna Railroad over the Dover pond.

Q. I show you a small photograph and ask you if you recognize that in connection with the Boynton works?

A. Yes, sir.

Q. What does that show?

A. That is a view of the southeast corner of building No. 3 and of a building used as a water

closet for the use of the employees.

Q. Used for water closet purposes?

A. For the workmen; yes, sir.

Q. That shows it?

A. Yes, sir.

Q. What is the pipe that is shown there?

A. I don't see any pipe shown.

Q. Is there any drain going from that place to the river?

A. Yes, sir.

Q. Is it a covered drain or an open drain?

A. It is a covered drain.

Q. And is there any opening of it on the surface of the ground, under this building?

A. You mean the main drain, or from this building?

Q. From this building.

A. I think from that building they have a pipe that leads into the side drain, and then that side drain leads into the main drain, and from that into the river.

Mr. Vredenburgh: I offer that in evidence.

Marked Exhibit C98.

Q. You spoke of the small drain. Do you know what the purpose of that drain was?

A. Yes, sir; it disposed of the sewage from this privy.

Q. How long ago was it, if you know, when they commenced to use a wagon to take away the solids?

A. I don't know when they commenced that.

Q. That wasn't the original design, was it?

A. No, sir. When I constructed the drains the sewage went directly, both solids and liquids, into this drainage channel.

Q. When was it that you did build those?

A. We built that at the time that the works were constructed there, which was in the Fall of 1895

and the Spring of 1896.

Q. Now the water closets in the offices, for use of the office force, where do they discharge?

A. Into this same main drain.

Q. That discharge is not in a wagon or anything of that sort, is it?

A. No, sir; I believe not.

Cross-examination. Mr. Corbin:

Q. When were you last in the Hibernia mines?

A. I think it is about a year ago.

Q. You went there for the purpose of making any special observations with regard to sewage?

A. I was there in the capacity of engineer.

Q. For the miners?

A. For the company.

Q. How do these shafts go into the side of the hill?

A. They follow the dip of the ore deposit, which is almost vertical in some places.

Q. But slightly inclined?

A. A very little. Hibernia is set up on an end.

Q. How deep are the mines below the surface?

A. The deepest place is about 1,800 feet now, 800 feet below sea level.

Q. Are they all practically as deep as that?

A. That is the deepest.

Q. How about the shallowest?

A. The shallowest working is now about 1,400 feet—I think 1,400 or 1,600 feet.

Q. The whole working is below sea level then?

A. Yes, sir.

Q. Did you see or do you know anything about the arrangements made there within the last year or two for the men to use certain abandoned shafts and certain arrangements have been put in the mines for the men to use?

A. No, sir.

Q. You don't know anything about that?

A. No, sir.

Q. Do you know about the water from some of those pits you have mentioned being used for condensation purposes before it is pumped out?

A. No, sir; none of it is used for condensation purposes.

Q. Don't you know that now every drop of water pumped out at Hibernia is condensed before it is pumped?

A. No, sir; if that is the case it has been done since I was there.

Q. You have described conditions as you have seen them there in past years?

A. Yes, sir.

Q. And the usual practice that prevailed?

A. Yes, sir.

Q. You don't know anything about remedial work that has been undertaken there?

A. I don't know of any remedial work.

Q. You say you made sewers ten years ago or drains at the Boynton works?

A. Yes, sir.

Q. Of pipe or of stand drain?

A. No; stand drain box culvert.

Q. They were put there to drain the land before the buildings were erected, weren't they?

A. At the time the buildings were erected.

Q. Did they follow a natural water course, or were they intended to drain the whole field?

A. Well, the main ditch followed a natural water course, and then lateral ditches were put in to remove the ground water around some of the buildings where they were having trouble with the ground water.

Q. Was that a flat low piece of land?

A. One piece was, yes, sir, where No. 4 building is.

Q. Rather wet before they improved it?

A. Where four is.

Q. And your system was to render it dry and

suitable for the factories?

A. Yes, sir.

Q. Has it not been overflowed somewhat in freshets since factories were put there?

A. One building; yes, No. 4.

Q. The level of the ground is now much above the level of the river is it?

A. Well, we have got a very good flow in the main ditch, I think five feet would be a fair estimate to give, from the extreme end of the ditch down to where it enters into the stream.

Q. Now you spoke of a water closet in the office of the Boynton works?

A. Yes, sir.

Q. And that it originally discharged into this same drain. Are you unaware that a cesspool has been made and that it is connected with and carried into that cesspool?

A. No, sir; I am not aware of that.

Q. You hadn't anything to do with the change that has been made?

A. No, sir; not with any of the changes.

Q. Have you had anything to do there since the time you built the drainage system ten years ago?

A. No, sir.

Q. That is all.

Re-direct.

Q. You have been there I suppose since?

A. Oh, yes, sir; I was there about six years ago.

Q. Was there any change then?

A. No, sir, not apparent to the eye.

JAMES HAGAN sworn for Complainant.

Direct examination by Mr. Vredenburgh:

Q. You reside where, sir?

A. 82 MacFarlane street, Dover.

Q. And you have lived in Dover a number of years?

A. Yes, sir.

Q. About how long?

A. The last time since 1887.

Q. Did you live in 54 Union street?

A. Yes, sir.

Q. When did you move from there?

A. About five years ago.

Q. When you lived there where did the sewage from that house go, or from that house go?

A. I don't know, sir.

Q. Do you know where it went?

A. No, sir.

Q. Eh?

A. No, I could not say.

Q. Did you have a closet there and bathroom?

A. Nothing but water in the kitchen. There were no improvements there.

Q. You had a privy outside of it?

A. Yes, sir.

Q. Have you visited the property of Newton Ely, three houses now being constructed in Dover?

A. Yes, sir; they are being constructed right across the street.

Q. Did you see in what manner the sewage is being taken care of there?

A. They built a cesspool and a water closet at the back of each of the houses in a row.

Q. Were there no drains to the cesspool?

A. There seems to be drains from the cesspool to the main drains and another one from the water closet.

Q. What kind of a drain?

A. Stone.

Q. You say it leads to the main drain. What do you mean by that?

A. Well, he cut a drain from the main drain into McFarlane street up to his property, into his

New Jersey State Library

lot; and then there is a drain 2½ or 3 feet long from the water closet into that drain, and another from the cesspool.

Q. It is a drain from this water closet into this drain you speak of, and also from the water closet into the cesspool?

A. Yes, sir.

Q. How many houses has he? Three all built the same?

A. Yes, sir; three on that block.

Q. All built in the same way?

A. Well, I don't know about the other two; I don't know how he fixed things there.

Cross-examination by Mr. Corbin.

Q. What street do these houses front upon?

A. Lincoln avenue.

Q. What are the numbers?

A. I don't know, sir.

Q. Near what street?

A. Near the corner of McFarlane.

Q. Are they now in the course of erection?

A. Two is completed, and the other one will be ready in a few days.

Q. And this one not yet completed is the one you observed?

A. Yes, sir.

Q. Do I understand that the water closet led to the cesspool, and then there is a drain from the cesspool to what you call the main drain?

A. No, sir; I said Mr. Ely ran a drain from the main drain into his lot, and then ran a small drain from a cesspool down to that drain, and another one from his water closet so that the cesspool can empty into the main drain?

A. Yes, sir.

Q. Where is the main drain?

A. In McFarlane street.

Q. Underground, stone drain?

A. No, sir; it used to be, but it has been torn up and never fixed since.

Q. Open drain?

A. Yes, sir.

Re-direct.

Q. Where does this drain run into?

A. Well, it goes across McFarlane street in front of our house and down under the canal into Passaic street.

Q. And so on down to the river?

A. Yes, sir; down Reynolds avenue.

By Mr. Vredenburgh: I believe, may it please Your Honor, that is all, but there is in my mind the thought that there is some paper that I haven't offered. I cannot lay my hands on it now. With that exception I close, may it please Your Honor.

COMPLAINANT RESTS.

EDWARD LEB. GARDINER sworn for Defendants.

Direct examination by Mr. Corbin:

Q. Where do you reside?

A. Ridgewood, New Jersey.

Q. What is your profession?

A. Civil engineer.

Q. Do you hold an office in the Jersey City Water Supply Company?

A. Yes, sir; president.

Q. What was your education and instruction in civil engineering, if you had any?

A. I was engineer of the Dundee Water Power since 1880, in addition to having my education at college.

Q. What college?

A. Cornell university. I have also been vice-

president and controller of the East Jersey Water Company.

Q. When did you first have anything to do with the Jersey City Water Supply Company?

A. When I was approached in the fall of 1901 by Mr. Flynn, asking if any arrangement could be made by which we (interrupted).

Obected to.

By the Court: The time is what counsel asked you.

A. 1901, in the fall.

Further direct.

Q. When did you become an officer and director of the company?

A. About the 1st of March, 1902.

Q. Was that on the occasion of the making of these two contracts X & Y.

A. It was.

Q. Did the interests you represent have any interest in the Jersey City Water Supply Company before that time?

A. We had none.

Q. What was the condition of the work under the Flynn contract at the time you came into it?

A. It was practically at a standstill, a little bit of work was being done at the tunnel, but the real work had ceased for the lack of funds.

Q. Had any stone been laid in the dam?

A. None had been laid.

Q. Or any work done there?

A. There had been some excavation.

By Mr. Vredenburgh:

Q. You are speaking about March 1, 1902?

By Mr. Corbin: Yes, sir; March 31, 1902.

Q. Did you take charge of the company's affairs from that time on, Mr. Gardiner?

A. I did.

Q. How soon was the work recommenced?

A. Immediately.

Q. At the time these contracts X & Y of March 31, 1902, were made with Jersey City, were you present at the conference with the Mayor and Board of Street and Water Commissioners and the Finance Commissioners of Jersey City?

A. I was at a conference.

Q. Where?

A. In the Mayor's office in the City Hall.

Q. You say a conference. Was that at the time the papers were signed?

A. That is the time they were agreed upon.

Q. About the time they were consummated and signed?

A. Yes, sir; after that, the next day I think.

Q. Were these different boards there at that time?

A. They were there.

Q. Was Mayor Hoos there?

A. The present Mayor was there.

Q. Mayor Fagan.

A. Mayor Fagan was there.

Q.And the members of the two boards?

A. I don't know that all of them were there, but there was a large number of them present; I understood they were there.

Q. And the counsel of the city?

A. Yes, sir; counsel of the city, and I think the assistant counsel was there.

Q. At that interview you say the contracts were agreed upon. Was there any conversation between you and these officers as to what had passed and what the contracts were that were then in existence?

Objected to.

By Mr. Corbin: I propose to show that this subject of statements—verbal statements which counsel has introduced in the case—was the subject of conversation then and a direct understanding before the new capital was brought into this, and the *two* contracts were made.

Mr. Corbin: I offer to prove by this witness that at the time of the making of the contracts X and Y, March 31, 1902, and at the time they were agreed upon by the Mayor, the Board of Finance and the Board of Street and Water Commissioners on the one part, and the New Jersey General Security Company, and the East Jersey Water Company, and the Jersey City Water Supply Company and the other parties, on the other part, that Mr. Gardiner, representing these new interests, expressly asked in the presence of these boards whether there was any verbal or other understanding of any other contract than expressed in the Flynn contract and its written supplements, and was, before assenting to it, told by the City authorities that there was nothing else, and that on the strength of that statement the contracts of March 31, 1902, were signed, or that there were any other plans except those forming part of the Flynn contract.

The Court: If your offer was confined to your first proposition I should overrule it, but if your offer includes reference to plans I think that stands upon a different footing. I will let you prove that.

Mr. Vredenburgh: Of course, Your Honor understands that I object to it.

The Court: Certainly.

Q. At this interview, when the contracts of March 31, 1902, were agreed upon, state what was said between you and the Mayor about these two boards?

A. There was a general conversation between us in regard to the features of X and Y as proposed, and as to the amount of money that was going to be raised for the purpose and the time that it would take to effect the connection with the laying of the seventy-two-inch pipe, as far as Upper Montclair, so as to get them the water as promptly as possible, and growing out of that general discussion one or two of the members of the Board spoke up and said that Mr. Edwards—spoke directly to Mr. Edwards—and said: Why, Mr. Edwards, you know that you people agreed to build sewage works. Are you going to do this? And about the same time or within a minute or two afterwards an old gentleman, I cannot think of his name at the moment, took out a piece of paper and said that——

Q. Mr. Ringle, do you mean?

A. I think that was the name, and said that the dam should be built in a certain way, that he understood the dam was going to be raised in a certain way, and I got up and said: Now, gentlemen, this is a serious matter for us to put in this money and build these works, and I have had our engineers take the contract and estimate from the plans that we have seen and from the contract, and I know where I stand, and if there is to be anything more than this contract shows I am unwilling to put the money into it,—our people are not willing, nor would I be justified in asking them to agree, as we do in this contract, to finance this thing and complete the building of the works and Mr. ———, the City Attorney——

Q. Mr. McDermott?

A. No.

Q. Mr. Record?

A. Yes, got up and said: Mr. Gardiner, the contract as you see it is all that binds the company. There is nothing else beyond that contract, and you, Mr. Corbin, was there, you heard the same thing, and Mr. Edwards, and with that assurance I went

ahead. The matter was altogether in my hands.

Q. In that conversation between you and them was the subject of drains and sewers expressly mentioned?

A. The subject of sewers was mentioned—yes, sewers at Dover, in Boonton.

Q. What did you say as to that to them?

A. Why, I didn't make any specific remark except as to that one thing. I simply said that I would not stand for any—did not dare enter into a contract to provide money without knowing what was required, and that we knew what the contract said, and if there was anything further than that that I would not—in the contract—that I would not go into it at all.

Q. Was Dr. Leal also present?

A. Yes, sir; Dr. Leal was there, and Mr. Harrison was there.

Q. Was the contract assented to by the city at that time?

Objected to as leading.

Q. What was done by the city officials?

A. When I left there it was agreed upon that the contracts X and Y should be immediately printed and executed?

Q. And were they?

A. And you took them away, and they were prepared and executed right away.

Q. Up to that time had the people you represented put any money in or done anything?

A. Not a dollar.

Q. The big dam had been located before you took hold of it, had it not?

A. It had.

Q. And I think you said some excavations made?

A. Yes, sir.

Q. Did you examine the sectional lines showing the size and strength of the dam as it had been pro-

posed before that?

A. I did.

Q. Do you know from what it had been designed, from what other dam, if any?

A. The factor of safety of the Croton dam had been taken.

Q. Do you mean the great new Croton dam?

A. The Croton dam, about two-twenty I think.

Q. There were drawings showing that?

A. There were drawings showing that which the chief engineer of the Jersey City Water Supply Company, Mr. Harrison, had.

Q. What did you do with those?

A. I consulted our consulting engineer, Mr. Smith, and I increased the factor of safety to about two fifty, adding on about twenty thousand cubic yards of stone.

Q. Then you have a greater factor of safety than the Croton dam.

A. Greater than the Croton dam.

Mr. Vredenburg: That was objected to, and I was not allowed to prove that item of safety.

The Court: I do not think it is necessary for the defence to show that this dam is properly constructed for the purpose of holding its present contents unless the complainant has offered some evidence that the dam was properly constructed, and I do not recall any on that subject.

Of course there is a question connected with that dam which is the subject of investigation, and that is whether or not the water company was obliged to so widen the dam as that there might rest on top of it a superstructure so that the whole lake would contain more water.

Mr. Corbin: I do not offer it with that view; I was going to show what the dam really was.

The Court: I do not think it is worth while to show that the dam was properly constructed, for there is no evidence to show it was not.

Mr. Vredenburg: I understand what your Honor says, but your Honor does not state it quite fully so that it reaches both branches of the case. The question is not raised that the present dam will not withstand fifty million gallons of water; I did attempt to show that it was skimped and that it would just do it and no more, but your Honor said that was not relevant, and it was ruled out on the objection of the other side.

What we do claim, is that you cannot raise that dam to hold seventy million gallons, nor can you add to it from behind to make it hold seventy million gallons excepting at such expense that it renders it impracticable.

The Court: Any evidence which goes to show that this dam as it now stands is capable of having a superstructure built upon it without strengthening of course is competent.

But I understand the defendants contention is that they are under no obligation to do anything more than already done, that is to say to make a dam capable of holding a water supply as it is at present.

Mr. Corbin: That is our contention. They did not call upon us to make the bigger dam.

But we go further than that. We say the dam can be raised without disturbing the works at all.

The Court: Is not that a matter of detail? Suppose I should find that on a legal construction of this contract the water company was under obligations to construct this dam or strengthen it so that it would hold this superstructure without further construction, then I would have to make a refer-

ence to a Master to ascertain what the additional cost would be. I will allow you to go into general matters, but not the cost for estimates or anything of that sort.

Q. What is the weight per cubic foot of the masonry in the big dam?

Objected to as detail.

Objection overruled.

A. As I remember it is 175 pounds.
Q. Tests were made?
A. Tests were made, and the engineers can state what they were.
Q. What kind of cement was used in the big dam?

Objected to as detail.

Objection overruled.

A. Used Portland cement.
Q. The specifications called for Rosendale?
A. Rosendale.
Q. Was that better or poorer than Portland cement?
A. Portland cement is very much better.
Q. How much did that increase the cost at that time?
A. About $100,000.
Q. Were the cross-sections and plans for this dam submitted to the City Engineer, Mr. Ferris?

Objected to.

Objection overruled.

A. They were.

Q. Did he make any objection to them?

A. He made no objection except as to the strengthening of the dam in one point opposite where the two chambers went down to the outlet valves of the dam.

Q. That is on the side streets, the water?

A. Yes, sir.

Q. Did you do anything in response to that objection in respect to that?

A. We changed the plans and made them satisfactory.

Q. And thickened the dam?

A. Thickened the dam at that point.

Q. Made them as required by him?

A. Made them as required by him.

Q. The ends of the big dam are all earth, are they not, with a masonry core?

A. They are.

Q. How is the bank on the water side treated?

A. The bank on the water side is filled in a section equivalent to a dam of about 19 feet higher than the present dam.

Q. If the city should desire to raise that dam, then they could raise these earth banks without disturbing the water side?

A. Yes, sir; without drawing the water down in the reservoir.

By the Court:

Q. And they could raise it how much?

By Mr. Corbin: He said 19 feet.

Further direct.

Q. Could they raise it 19 feet 2 inches?

A. Yes, to a height of 19 feet 2 inches.

Q. The main stone dam if they desired to raise that to a smaller height, could that be done without

disturbing the draught of water?

A. It could be.

Objected to.

Q. The City Engineer, Mr. Ferris, also made some suggestions with reference to the location of the core wall in the back dyke, didn't he?

A. Yes, sir.

Q. Did you finally build it, locating the stone wall as he desired it?

A. He rejected the first plans that we made, and at a final conference between our engineers—between them—they decided on another plan of locating the core wall further back in the bank and increasing the size of the bank on the water side, and it was built in accordance with that final plan, which was approved by him.

By Mr. Vredenburgh:

Q. Wasn't that all in writing?

A. I don't know whether it was all in writing.

Further direct.

Q. Do you know whether the matter of this thickening of the big stone dam came up at the same time?

A. At that same time there was a question as to whether we should lay ashlar from the stone dam down to the mouth of the outlet gates, I mean the gates that draw the water to Jersey City, because the specifications stated that the exposed portions of the dam should be in ashlar, and Mr. Ferris seemed to think that it might be construed that as at some extreme time of drought the water might be drawn down to the lower gate, and that the upper surface of that dam might be exposed at that time, and that therefore it would be an exposed portion.

Q. And that temporary exposure might be construed to be an exposed portion?

A. Yes, sir; we maintained that the ashlar shall be laid down to the level of the water, and at the same time there was a question about the gate house; the whole thing was taken up together, and after consideration Mr. Ferris ruled in view of our building the dyke in conformity with his plan and locating the core wall at the rear side, and enlarging the front part of the dyke, he agreed that the ashlar should only go to the level of the water when the dam was full, and that the gate house should be made in accordance with our plan, as we had then made them and presented them to him.

By Mr. Vredenburgh: Of course this is all taken subject to my objection, your Honor.

Q. Was the dam built, the big dam, built as then finally agreed upon and settled in your conference?

A. Exactly.

Q. And in that final conference you adjusted all the differences of construction between the engineers on your side and him?

A. At that time we adjusted all the differences existing at that time.

Q. Did any other differences ever arise with respect to the big dam?

A. No, sir; the only one that arose after that was with respect to the bottom of the tunnel.

Q. Are you familiar with the Watchung tunnel?

A. I am.

Q. What did you encounter at the bottom of that tunnel in the way of material?

A. Solid rock.

Q. Can you say how the strata ran as compared with the gradient of your tunnel?

A. I haven't seen the bottom all the way through, but where I have seen it it ran very nearly on a horizontal plane.

By the Court:

Q. Is it trap rock?
A. It is trap rock at the beginning and at the two ends, but it is nearly all brown sand stone.

Mr. Vredenburgh:

Q. Nearly all what?
A. Brown sand stone; the large portion of it is brown sand stone.

Mr. Corbin:

Q. Did you see where water was coming into the tunnel from the sides and the top?
A. I haven't been all the way through it, so I haven't seen all the places, but there are other engineers that can testify more clearly about that.
Q. Mr. Gardiner, one of the suggestions in the specifications is that the bottom under certain conditions should be made smooth with concrete laid in Rosendale cement, with surface of two inches of Portland cement?
A. May be, is not that the language.
Q. Yes, may be. Under the conditions encountered, as you saw them in the bottom of that tunnel, was that a feasible method of finishing that tunnel?

Objected to.

Admitted.

A. It was not.
Q. Why not?
A. On account of the volume of water which flowed in the bottom of the tunnel and would prevent the setting of the cement.

RECESS.

Q. How did you finish the bottom of the Watchung tunnel?

A. We finished it by making it as near level as it could be by taking off the surface of the rock to grade, and in the little inequalities and crevices we put gravel.

Q. How wide did you make the tunnel as compared with the required width specified?

A. Two inches wider.

Q. How about the depth?

A. Two inches higher and somewhat—the crown was two inches higher and the bottom of it was four or five inches deeper than anticipated.

Q. When finished with gravel how was the bottom as compared with what it was to be? How much deeper?

A. Something like three or four inches deeper.

Q. Did the company save any money by building it the way they did build it instead of building it of the size and in the way the other side claims, with cement bottom?

Objected to.

Objection overruled.

A. I don't think they could have built it with a cement bottom, so that I don't see how I could make any comparison. I would say this, if the conditions had been such in the bottom that we could have built it with a cement bottom that the way we did build it was as expensive to build it as if it had a cement bottom, provided the bottom had been so that it was possible to put it in.

Q. The increased size added to the expense?

A. Added to the expense decidedly.

Q. In your opinion is it as good and serviceable a job as if it had been built with a concrete bottom as suggested?

A. I think it is.

Q. What did the works of the Jersey City Supply Company under the Flynn contract as complete to-day cost?

Objected to and overruled.

Q. Mr. Kuichling expressed doubts as to conduit No. 4 carrying seventy million gallons per day because of some roughness in the tunnel, provided, he said, that the water was always at least a foot from the top of the tunnel—of the conduit. Suppose, Mr. Gardiner, that you should see fit to put water through it so that there would be only ten inches or eleven inches of free space left at the top, would there be any doubt at all about its capacity to carry seventy million gallons?

A. I don't think there is any doubt about its capacity at the present time of section No. 4, but I think there certainly would not be any doubt about it if——

Q. Suppose there was a slight shortage of a million a day, say, because of roughness in the tunnel, as he has supposed, could you not get the seventy through by leaving the space at the top eleven or ten inches instead of twelve?

A. It would be eleven inches at the upper end and reducing as you came down toward the delivery end.

Q. Is there any objection in the world to doing that, if necessary, to get through?

A. There is no objection to even putting in a slight pressure on the tunnel.

Q. Have you not, in fact, in the test filled the conduit full and operated it under slight pressure? sure?

A. I think we have.

Q. So that all this talk about a slight shortage in the conduits is the theoretical carriage if the water is always kept twelve inches below the top?

A. Yes, sir.

Q. But in practice can readily be operated higher than that, can it not?

A. Yes, sir.

Q. Would there be any objection to it from an engineering standpoint?

A. There would be no objection providing the capacities of the pipes feeding the water to it were sufficient to give the head.

Q. Take this very point, the next pipe just above conduit No. 4, is how long?

A. About 6,200 feet.

Q. To operate a little more head you would have to have a little greater flow in that pipe?

A. Yes, sir.

Q. How much?

A. There is not flow enough now because the pipe is too small, it only has a capacity of fifty million.

Q. But when it is increased?

A. When it is increased by another pipe that other pipe would have to be an inch or a fraction larger than it would normally be to produce the carrying capacity of seventy millions to conduit number 4.

Q. That is it would make a little more head in conduit No. 4?

A. It would make a little bit more head in conduit No. 4.

Q. By the way, the pipe next above conduit No. 4 is 3,600 feet long, is it not?

A. Yes, I guess it is, I know it is a very short length.

By the Court:

Q. What is the object of leaving eleven or twelve inches between the top of the tunnel and the surface of the water?

A. I don't think there is any objection in the tunnel, but in the conduit the intention was that

there should at no time be a pressure on the interior of these conduits; in the tunnel I do not think it would do any harm because the tunnel is built right in the solid rock and you could not split the mountain open; but in the conduits, as they were built out of concrete and had very little resisting force to internal pressure it was intended they should be built with the gradients that were so that there would not be any likelihood of their not carrying the water without having any pressure on the interior. Of course there could be pressure of several feet there without doing any harm, but that was undoubtedly the reason.

Further Direct Examination:

Q. The concrete of which the conduit is made is reinforced with steel rods, is it not?

A. Yes, sir.

Q. And will in fact stand some pressure, will it not?

A. I don't know how much, but it will stand considerable.

Q. But it is designed to run them without any head?

A. It is designed to run them without any head.

Q. So as a practical matter if the tunnel with the 12-inch space is, say, a million short, as a practical matter would there be any difficulty about their operating the works so as to get the fifty million gallons there?

A. There would be no difficulty whatever?

Q. Next above that thirty-six hundred feet of steel pipe just above conduit No. 4, comes another conduit, does there not?

A. Yes, sir.

Q. Of how much in length?

A. I do not remember the length.

Q. Well, it is a mile or two, is it not?

A. It is quite a long conduit.

Q. If a little bit more head were put on that could you get your seventy million through that?

A. Yes, sir.

Q. Or fifty million, as the case might be?

A. Yes, sir.

Q. So that in operation the falling short that has been mentioned, if it exists, at the Watchung tunnel does not prevent getting through the maximum amount required by the contract, does it?

A. No.

Q. I mean without putting the conduits under pressure?

A. Without putting the conduits under pressure.

By the Court:

Q. Do you say they would not be under pressure until you reached the highest point in the arch?

A. Yes, sir.

Q. Or would the conduit be under pressure before the water got to the highest point in the arch?

A. It would have to get to the highest point, it would have to fill the entire cross section of the conduit before there would be an internal pressure.

Q. If there was even an inch there would be no pressure?

A. There would be no pressure, there would be the weight of the water as against the side of the arch, but as for a bursting strain in the common understanding, there would not be any.

Further Direct Examination:

Q. To bring on pressure you exclude the air entirely, don't you?

A. You exclude the air entirely.

Q. The conduits are laid upon a hydraulic gradient, are they not?

A. Yes, sir.

Q. That is on a true slant from the intake to Jersey City?

A. Yes, sir.

Q. Have the Jersey City authorities ever made any demand upon you or upon your company since March 21, 1902, to build any sewage disposal works or intercepting sewers or anything of that kind?

Objected to.

Objection overruled.

A. They never have.

Q. Did not the city serve upon your company a written list of individual sources of pollution which they thought required attention and which were taken up by your company afterwards?

A. They did.

Q. Were they taken up and treated?

A. They were.

Q. Do you know the date of that?

A. The latter part of 1904 or the early part of 1905, I do not remember exactly.

Q. I show you a copy of a letter dated October 8, 1904, purporting to be signed by G. C. Whipple and addressed to Mr. Garwood Ferris, engineer in charge. See if you recognize the handwriting of that copy?

A. This has been copied by Mr. Ferris, it is Mr. Ferris's handwriting.

Q. Is that the list of places they served upon you that you have referred to?

A. I don't remember having seen this letter. That certainly enumerates the things that they referred to in their communication.

Q. Do you think there was any communication besides this one?

A. Well, that don't follow—I know it was brought up to my attention through some other form; I knew of the communication and read it.

Mr. Corbin: I offer this copy of the letter in evidence, and ask that it be marked Exhibit D 1.

Mr. Vredenburgh: I object to it, because it don't bind the city at all; how can they bind the city by such a letter as this? It is apparently a letter addressed from Mr. Whipple to Garwood Feris, that is, the original must have been. This is supposed to be a copy.

The Court: Well, do you object to it on that ground?

Mr. Vredenburgh: I object to it on the ground that it is not legally proven.

The Court: I will over-rule it on that ground.

Mr. Corbin: It is the City Engineer's copy given to us. I ask you to produce the original in the possession of the City Engineer, to whom it is addressed. My own idea is that the copy is better evidence for our purpose than the original, because this is adopted by the city.

The Court: If that copy were shown to have been handed by an officer of the city to an officer of the Water Supply Company then I think it would be competent, but inasmuch as that proof has not yet been made—inasmuch as it don't appear that Mr. Garwood Ferris ever made any demand upon the company or anybody else, why the offer of the letter is premature. When it is proven I will admit the letter, but in the face of objection I cannot admit it now.

Mr. Corbin: I ask that it be marked for identification D 1.

The Court: Well, you better not mark it for identification.

Mr. Corbin: Very well.

Q. Is there another reservoir site in the Rockaway Valley above Boonton?

A. There is—well, there are several.

Q. But is there one specially along the valley?

A. There is, yes, sir.

Q. I observe in this contract Y, paragraph 5, page 87, an agreement that there shall be conveyed to Jersey City 502 acres of land situated in the Longwood valley, Township of Jefferson, County of Morris, commonly known as the Longwood valley reservoir site, being property now or lately owned by the S. U. M.; was that in fact conveyed?

Objected to.

Mr. Corbin: Well, I will ask another question.

Q. Is that the site you refer to as being the one above Boonton?

A. It is.

Q. Do you know whether that site was in fact conveyed to Jersey City?

Objected to.

Mr. Corbin: Well, I call on the other side to produce the original deed of conveyance to the Mayor and Aldermen of Jersey City shortly following May 31st, 1902, of the Longwood valley site.

Mr. Vredenburgh: I haven't the deed here, if there is any such deed.

Mr. Corbin: Oh, well, I will get a certified copy if you want it.

Mr. Vredenburgh: I don't want you to do that, if we have a deed I will produce it. The point I want to develop is how far that has any bearing on this case. Do you say there was such a deed delivered?

Mr. Corbin: Certainly, delivered by me, of 502 acres of land.

Mr. Vredenburgh: Do you know the parties?

Mr. Corbin: The grantor was Patrick H. Flynn and wife, and the grantee was the Mayor and Aldermen of Jersey City.

Mr. Record states to the Court that 500 acres in the Longwood valley was given to the city of Jersey City for the consideration of its waiving its claim of $500 a day penalty against Mr. Flynn for the non-fulfillment of his contract up to that point.

By the Court: I will admit the evidence.

By Mr. Corbin: I call upon the other side to produce the original deed from Flynn and wife to the Mayor and Aldermen of Jersey City for the Longwood valley reservoir site.

By Mr. Vredenburgh: We haven't it here, but we will produce it the next time we meet.

Q. Is that Longwood valley site a suitable one for the impounding of additional waters so as to bring the total supply up to 70 million gallons a day?

A. Ample for that purpose.

By Mr. Corbin: I think that is all with Mr. Gardiner now, but we reserve the right to call him again on a separate branch of the case.

Cross Examination by Mr. Vredenburgh:

Q. Mr. Gardiner, when did you become the controller and manager of the East Jersey Water Company?

A. I became the controller in 1895, but not the manager until about 1898, in the fall or spring of 1899.

Q. When did you become vice president of the Jersey City Water Supply Company?

A. I never was vice president of the Jersey City Water Supply Company.

Q. What office did you hold?

A. President.

Q. Didn't you say you were vice president of the Jersey City Supply Company?

A. I am the vice president of the East Jersey Water Company.

Q. And are those the only water companies you are connected with?

A. No, sir. I am connected with a great many others.

Q. What others?

Objected to and overruled.

Q. What day was it in 1901 when Mr. Flynn approached you?

A. It would be very hard for me to say the day, but he and Mr. McCarthy approached me some time in the fall, as I remember.

Q. Some time in the fall of 1901 do you mean?

A. Yes, sir.

Q. The early part of the fall or the latter part of the fall?

A. I think it was the latter part of the fall.

Q. Where were you when they approached you?

A. I was in No. 2 Wall street, in the office I had there at that time.

Q. The Water Company's office?

A. Yes, sir.

Q. Which water company?

A. It is the office of several water companies with which I was connected in one way or another. It was my office, and in that way it became the office of these various water companies with which I was connected, but not their principal office.

Q. Is that in the First National Bank Building?

A. No. 2 Wall street, yes, sir, it is.

Q. How long had you an office previous to this?

A. I had my office there since my connection with that company which was in 1895.

Q. What company?

A. Jersey City Water Supply Company.

Q. Did the East Jersey Water Company have an office there?

A. They hadn't their principal office there, but an engineer, a man by the name of Pershon and myself had offices there.

Q. Who brought Mr. Flynn in to you?

A. Who brought him in?

Q. Yes.

A. Well, the first man who came to see me was —I wish I could tell you his name, but I can't think of it, he had some connection with Mr. Flynn, and I had met him and was introduced to him by somebody, I don't know who now, and he came and spoke to me about this matter, and suggested that Mr. Flynn would like very much to have me finance this thing. I said if Mr. Flynn wanted to come and see me and talk about it he could do so.

Q. He came to you to finance it, did he?

A. He came to me to get me to finance it, yes; not personally, of course you understand, but to get me to get people together who would finance it.

Q. Were you then in the business of financing?

A. No, sir, I wasn't.

Q. I understood you to say that you submitted

a plan with reference to the Parsippany dyke to Mr. Ferris?

A. You mean that I personally submitted them?

Q. Yes.

A. Oh, no, I did not mean to say that.

Q. What did you mean?

A. I meant that the engineering force—the engineer of the company submitted it.

Q. What did you know about that?

A. About his submitting that?

Q. Yes, what personal knowledge have you of that?

A. I was not present when he submitted them.

Q. What do you know about his submitting any?

A. Any plans?

Q. Yes.

A. By his reports to me.

Q. By what he said to you?

A. Yes, sir.

Q. Have you any written report on the subject?

A. I am not sure that I have not written reports on the subject.

Q. Have you any?

A. I should have to refresh my memory by looking over the files; my impression is that I have got some.

Q. What you are telling us about the submitting of plans to Mr. Ferris is hearsay entirely, is it not?

A. Well, I have seen the actual plan that was submitted; it was discussed with me and the suggestion of Mr. Ferris was discussed with me as to the change of plan before we decided whether we would do anything; the engineers did not go ahead and decide these things without submitting them to me first.

Q. Who told you what the suggestions of Mr. Ferris were?

A. Mr. Harrison.

Q. What did he tell you they were?

A. What did he say they were?

Q. Yes.

A. He told me that the final suggestion was the acceptance—that would be satisfactory to him—the acceptance of this arrangement of putting the core wall towards the back part of the dyke and increasing the quantity of yardage in the front part of the dyke.

Q. So that all you mean to say is that the final thing was submitted to you, the final arrangement between Mr. Harrison and Mr. Ferris was submitted to you, is that what you mean?

A. I mean to say that both the original—the original one which Mr. Ferris suggested was submitted to me and then the final agreement between them in the form of this drawing was submitted to me before I said that we would go ahead with it and at the same time——

Q. Was there an agreement in writing?

A. Between Mr. Ferris and myself?

Q. Between Mr. Ferris and Mr. Harrison?

A. I do not think so, I think the letter——

Q. What agreement was there?

A. Agreement by word of mouth.

Q. Verbal you mean?

A. Verbal.

Q. Between whom was that agreement?

A. Between Mr. Ferris and Mr. Harrison, Mr. Harrison as chief engineer and Mr. Ferris as representing the city.

Q. That agreement you heard from Harrison, or did you hear it from Mr. Ferris, or whom did you hear it from?

A. I heard it from Mr. Harrison and I think I have a report in writing from Harrison; in fact I know I have. I have a letter; I had occasion to look it up a little while ago.

Q. A letter from Harrison to you?

A. Yes, sir.

Q. Have you it with you?

A. No, sir, I have not.

Q. You would not object to producing that I suppose?

A. Not at all, I think I can find it.

Q. The result was to build this core wall in a different position from that proposed by Mr. Harrison at first, was it not?

A. From that proposed in the original plan, and to increase the quantity of—the width of the bank.

Q. Why was that as you understood it?

A. Why was it done?

Q. Yes.

A. The request upon the part of the city was for this reason, that if the core wall had been left in its own location according to the first plans as submitted, it would have been impossible to raise that dyke without—unless you lower the water, without putting in a new core wall, an additional core wall, a second core wall, and Mr. Ferris objected that there would have to be put in a second core wall because he would have to excavate too deep at the back of the dyke to put it in.

Q. You didn't make yourself plain to me as to what you meant by "raise;" you used the word "raise," what did you mean by raise?

A. I mean build up, in any form that you see fit, the dyke, so as to get it high enough; nineteen feet and a fraction higher than it then was or than it now is.

Q. Well, why nineteen feet and two inches?

A. Nineteen feet two inches, because nineteen feet two inches we get an additional storage, which, together with which we now have, is considered commensurate for seventy million gallons delivery on certain basis of flow off from the drainage area.

Q. Now you say that the main dam has earthen and stone wings, if I understood you correctly, perhaps I didn't.

A. It has earthen wings with concrete cores.

Q. Earthen wings with concrete cores?

A. Yes, sir.

Q. On each side of the main dam?

A. On each side of the main dam.

Q. And the main dam is about how long, Mr. Gardiner?

A. The whole dam I think is about 3,500 feet, and the stone dam—it is pretty hard to remember exactly, but I should think it was about 2,700.

Q. Then the difference between the 2,700 feet if that is the proper estimate, and 3,500 feet, would be the length of these wings?

A. Yes. It is pretty hard to remember; I cannot say definitely, those are the figures, but that is approximate.

Q. Those wings are so built that you can raise water nineteen feet two inches higher by simply building on top of those wings?

A. By building on top of those wings, and by building on the down stream side also I think, I haven't investigated that fact, but I think you would have to also build on the down stream side; but the most important point is that core wall would not know whether any additional core wall would have to be put there.

Q. The building of that core wall, in that way didn't involve any larger expense to the Water Supply Company, did it?

A. It made a difference in the cost of the work of somewhere about $15,000; the core wall is a little larger than that originally intended and our original plans showed, and the quantity of yardage which was put in front of the dyke broadened the dyke that much, made that additional difference, I think it is $15,000 or $18,000 more.

Q. Your company spent that $15,000 or $18,000 more with the idea that this particular reservoir was to be made a reservoir to contain sufficient

water to give you a capacity of seventy million gallons a day?

A. Not at all. We spent that money additionally because by doing so we satisfied Mr. Ferris in regard to two or three things. One was that he agreed that the ashlar on the up-stream face of the dam need not extend lower than the height of the water when it as full, instead of extending away down to the bottom of the intake, and the other was that the gate houses, as we had designed them would be satisfactory to him and he would pass them as being all right; he previously having claimed that he wanted a larger gate house. There were several things, and that is the reason we did it.

Q. Now that talk was had directly between you and Mr. Ferris?

A. No, it was had between Mr. Harrison and Mr. Ferris.

Q. Were you present?

A. I wasn't.

Q. Then all you know about it is what Mr. Harrison said?

A. Was the report made to me by Mr. Harrison.

Q. Is that report in writing?

A. I don't think it is, I am not sure. I will look it up and see; it is quite possible it may be. Mr. Harrison reported to me constantly by word of mouth. I met him every day; he was our chief engineer and many things were returned to me that was not in writing.

Q. Did the building of the core wall for the Parsippany dyke cost you any more than building it in accordance with the original idea?

A. I think you just asked me about that. Do you mean just for the core wall itself? You just asked me about that Parsippany dyke, which included the core wall, and I told you that the core wall was built a little bit larger.

By the Court:

Q. Mr. Vredenburgh's questions, as I understood them, were directed to the two core walls which flanked the main dam, whereas your answer would now seem to have been to a supposed question about the Parsippany dyke?

A. Well, then, I thought you were referring to the back dyke all the time.

Mr. Vredenburgh:

Q. I was asking you with regard to the wings that you spoke of. You said you made them thicker, the core wall thicker?

A. No. we did not. I want to withdraw all I said. I supposed you were talking about the dyke all the time. We never made but the one design for the wings. We recognized the fact that if they ever wanted to increase the main dam there that they would want to have those wings wider, and we made them wider so that the water would not have to be let out of the reservoir in order to increase the height of the dam.

Q. Did that cost the company anything, that widening of those?

A. Didn't widen them; that is the way we planned them in the beginning.

Q. Well, you made then wider in order that they might raise the dam, I understood you to say —wider than you otherwise would?

The Court:

Q. The original plan made them wider, as I understand it.

A. We never had but the one plan.

Further Cross:

Q. I ask you whether the making of them wider,

according to the original plan, cost more than if you hadn't made them any wider than was sufficient for the fifty millions a day?

A. Well, is not that a self-evident fact; we never made any other plans, and if we put in any more earth it would cost more than if we hadn't.

By the Court:

Q. Well, your original plan, then, as I understand it, contemplated a plan that would ultimately contain enough to furnish seventy million gallons a day. That is the question as I understand it, that Mr. Vredenburgh wants to ask.

Mr. Vredenburgh: That is it.

A. The main dam as now built and planned by us can be raised nineteen feet and a fraction without disturbing the water inside of the dam; it was built that way and it can be done.

Q. In other words, if the ultimate capacity had been only fifty million gallons you would not have extended those wings as far?

A. Not as far, but as wide.

Q. Then the answer that you made with respect to the expense that you had been put to of some $18,000 for the core wall was with reference to the Parsippany dyke.

A. The Parsippany dyke and that referred not only to the core wall but to the earth as well.

Q. Perhaps, Mr. Gardiner, I was confused about the former question. I understood you to be referring to the Parsippany dyke when you said that Mr. Ferris objected to that dyke because as originally designed it could not be raised to hold seventy million gallons of water when that was desired.

Mr. Corbin: He didn't say so.

A. I said, without putting a second core wall. I said that he objected because it could not be raised without putting in a second core wall or else letting the water down. His objection was that in putting in a certain core wall it would be a dangerous thing to do—by digging down so deep in the ground behind the bank.

Q. And to obviate that, this core wall was to be moved back?

A. And more dirt put in front.

Q. And you did that at the expense to you of $16,000 or $18,000?

A. Yes, sir, to please him and in consideration for these other concessions.

Q. Now, Mr. Gardiner, as to the invert of conduit No. 4, the only part of that invert—of that tunnel No. 4 that doesn't have a cement bottom is the tunnel part, is it not?

A. I think you are speaking of section No. 4; we call it section No. 4.

Q. You call it section No. 4?

A. Yes, sir, that is what it is specified as.

Q. Well, does that include any part of the pipe, section No. 4?

A. No, sir, the section does not include any part of the pipe; they are called sections No. 1, No. 2, No. 3 and No. 4 and does not include pipe.

Q. But the pipes are called Nos. 1, 2, 3, and 4?

A. Yes, sir.

Q. And they are not called sections?

A. No, sir.

Q. Have you ever been through the tunnel?

A. No, sir, I stated I had never been entirely through the tunnel.

Q. When was the last time you went in the tunnel?

A. I went in the tunnel the last time was when we were just closing off the connections between the conduit parts and section No. 4 of the tunnel; when they were just completing and just getting

ready to take the stuff out and just beginning the work of closing up.

Q. Was there any water in there then?

A. In the tunnel?

Q. Yes.

A. Yes, sir, some water in the tunnel, a little on the bottom running out.

Q. Why was the tunnel made two inches wider?

A. Why was it made two inches wider?

Q. Yes.

A. Well, I don't know really, because it had been started before I came into the control of the company; I can only repeat what has been told me as the reason.

Q. Well, I don't care for what has been told you, yon don't know why?

A. No, sir.

Q. When you got into the company how much of the tunnel was built?

A. I should think about one-half of it.

Q. Complete?

A. No, sir, not complete, but the core was made, but it hadn't been all bricked up, and the invert had not been placed.

Q. I understand at that time no portion of the dam had been laid?

A. No portion of the dam had been laid.

Q. And the Parsippany dyke had not been built?

A. No, nor the plans even made.

Q. Was there any of the pipe there?

A. Part of the pipe had been laid.

Q. Which part?

A. The first and second sections had been laid.

Q. You said sections did not apply to pipes?

A. Well, we also called it pipe No. 1 and pipe No. 2.

Q. Those two had been laid?

A. Yes, sir.

Q. No. 3 and No. 4 had not been laid?

A. No, sir.

Q. Was the pipe there?

A. The pipe was not there. There was some of the pipe down at the river for the crossing; there was some in the yard of the pipe company.

Q. Why do you say that the placing of gravel in the invert was as expensive as cementing it with Rosendale cement and covering it with two inches of Portland cement?

By Mr. Corbin: I object to that because he did not say so.

By the Witness: I did not say so.

Q. That is not so in your judgment, is it?

A. Well, now, will you repeat the question if you want me to answer it. I did not consider it was a question.

Q. (The stenographer read the question.)

A. I did not say so. If you ask it again and leave out the first part of it, that will get it straight.

Q. Is it as expensive to fill in the invert of the tunnel—fill the unevenness of the invert of the tunnel with gravel as it would be to cement it with the Rosendale cement, and cover it with two inches of Portland cement?

A. Not in that location, I don't think so.

Q. Did you build the Hook Mountain tunnel —the invert to the Hook Mountain tunnel?

A. We did.

Q. Did you build it by having the bottom covered with gravel instead of cement?

Objected to and overruled.

A. We did not.

Q. Why not?

Objected to and overruled.

A. Because it was feasible, because we were able to put a cement bottom down; there was no water there.

Q. Well, did you read the specifications as to the ability of the contractors to build the invert of the Hook Mountain tunnel in that way?

A. I understood from the specifications, and was so advised by counsel that we could build it with concrete if we wanted to; that it was permissible.

Q. Did you build it because it was then permissible—did build it and cover it with Rosendale cement and then cover that with two inches of Portland cement?

A. Yes, sir.

Q. Yet the other way would have been cheaper?

A. What? To have put gravel in would have been cheaper?

Q. Yes.

A. I don't know what the conditions were, whether the gravel was convenient, but I believe it would have been.

Q. A great deal cheaper?

A. I would say there would have been some saving.

Q. Why didn't you build it?

Q. As to this dam site (and I used the word quite strongly) up at Longwood Valley, have you ever been on it?

A. I have.

Q. Have you ever known where this five hundred acres accurately is?

A. Do you mean have I ever traveled around on the borders myself on foot?

Q. Yes.

A. No, I have not.

Q. Do you know whether any more land would have to be bought if the reservoir was built there?

A. I believe a little more land would have to be bought, that is my impression.

Q. And is there any dam there?

A. There is, no.

Q. There is no dam?

A. That is no dam that could be used for this purpose. I think there is a little bit of a small mill dam, but nothing that could be used for this purpose.

Q. Nothing that would be a dam for the reservoir?

A. No.

Q. Do you know whether any of the rights of the owners of the streams below this dam site have been obtained?

A. You mean allowing you to—you would not divert the water from there, you know. There would be no diversion there. There is no intent of diversion—the water would simply flow over the dam.

Q. Well, I don't know whether there would or not, that would depend upon——

A. There have been no diversion rights below there obtained.

Q. It is said by counsel that that deed was from Patrick Flynn and wife. Did the East Jersey Water Company own it on March 21, 1902, at the time of this contract?

A. It was owned by the society for establishing useful manufactures, but I think was under agreement to be deeded to Flynn, and I am not sure but what the deed was in escrow. I am inclined to think that it had already been deeded and the deed was in escrow.

Q. It was then Flynn's property?

A. I think it was already Flynn's property, or Flynn's property by agreement, when he had completed certain things it became his property.

Q. If the depth of flow in conduit number four were increased to give seventy million gallons per day, would not this reduce correspondingly the

available storage capacity in the Boonton reservoir? ,

A. No, it would not.

Q. You said you set the water back by that means did you not?

A. But you would only set it back to the end of section number four and there it would be—this is assuming that that is unable to carry the seventy million at the proper height; if you raise the height in conduit number four,—section number four—an inch or two inches, I admit that there would not be any compensation between section number three which carries about ninety million gallons through that thirty-six hundred feet of pipe there would have to be compensation in a little greater increased size of pipe which would not have anything to do with the reservoir and would not affect it in the slightest degree. If the intervening sections of the conduit were of insufficient capacity so that they could not carry full seventy—and they carry more than seventy,—considerably more than seventy—then it might carry back that slight elevation clear to the reservoir itself.

Q. That is if the conduits were able to carry just seventy?

A. Just barely seventy.

Q. Then it would send it back?

A. It would send it back two or three inches, it would be such trifling matter as hardly to be figured out.

Q. Do you insist that the present gravel bottom or invert in this Watchung tunnel is as good and serviceable as if a cement bottom was there?

A. I think it is as good and serviceable.

Q. Can such a gravel bottom be readily cleaned?

A. I think it can.

Q. How?

A. By sweeping.

Q. By what?

A. By lowering the water and going through

there and brushing it with a brush, whatever gets on it; there are going to be no deposits on there anyway; you are assuming that there is a deposit of dirt there, but there is none.

Q. Suppose there is a deposit of any kind, growth or what not or dirt, do you mean to say that you can go through with a broom and sweep it off the gravel?

A. I think you can go through—mind you, you are talking as though this was little fine gravel; it is large coarse gravel, and it could be stirred up so as to be carried off from this gravel, any deposit, that could collect there could be stirred up so as to be carried off by the flow of the stream.

Q. In sweeping it you would sweep the gravel, too?

A. If it is fine I would sweep it, too, but you don't understand what I mean by sweeping, I don't mean going down and brushing the gravel and everything up, I mean going lightly over the top and stirring up whatever sediment there is.

Q. Have the maids go through there—

A. Yes, have the maids go through with their dusters if you like to put it in that way.

Q. But could not the bottom of this conduit be much more expeditiously cleaned if it were a smooth cement bottom?

A. If such a bottom was collecting material, such as dirt, in appreciable quantities, and had to be cleaned often I should say yes, the smoother it was the easier it could be cleaned.

Q. That would seem to follow necessarily.

A. That would seem to be the natural conclusion.

Q. Is there not a growth, an organic growth in the Watchung tunnel already?

A. I suppose there is a slight—this is hearsay, I am told so; but I am told there is no growth on the bottom.

Q. You have not actually been there?

A. I have not been there myself to see it, no.

Q. Do you know about the tunnels for the public water of Boston—the conduits there, do you happen to know anything about them?

A. I do not know personally about them, but I understand they are brick lined, but I don't know personally.

Q. Well, you know of their being cleaned several times already because of the growth upon them?

A. I do not; I did not know of that fact.

Q. Mr. Gardiner, did you mean to say that the crown of this tunnel was two inches higher than the remainder of the conduit?

A. You mean in the adjoining part of section No. 4.

Q. Of the same section, yes.

A. I think it is, yes, a little bit higher than the crown of that conduit, that is my impression.

Q. Have you any definite recollection?

A. I haven't, I haven't examined it to see.

Q. Then of course you don't know how high it is?

A. No.

Redirect Examination.

Q. You said it was not expected to divert water at the Longwood valley reservoir as against the property owners below, where would that water run from the Longwood valley and how?

A. It would run directly into the reservoir and continue down the Rockaway river into the Boonton reservoir.

Q. Then it would be a sustaining reservoir?

A. Simply a sustaining reservoir to feed the reservoir from which the water is taken into the pipe line.

Q. Now you say that the purchase to the S. U.

M. of the Longwood valley deed had not been completed—

By the Court:

Q. You would have to have a pipe.

A. The Chancellor means whether the Riparian owners below would object to its being fed irregular from the reservoir rather than flowed originally in its natural way. I presume that is the nature of the question.

Q. If there was to be a pipe and the water was to be taken by pipe into this other reservoir, or in some other part of the plant, then of course the lower Riparian owners would have a grievance. If, on the other hand, the dam was to be used simply for the purpose of flowing it back, then I take it that the flow would be advantageous to the lower Riparian owners because it would make it more regular.

A. No pipe would be contemplated because there is some twenty miles distance.

Redirect.

Q. It was proposed to feed the lower reservoir from the upper reservoir?

A. That is it, that is all.

Q. That is a common way of constructing a storage reservoir?

A. Yes, in the Newark water shed, the Canister water shed feels the Oakridge Reservoir.

Q. Yet you count the storage in each?

A. Yes, sir.

Q. Now, Mr. Gardiner, go back to the Flynn deed. Who did complete the purchase and pay the money to the S. U. M.?

A. The money was paid by the Jersey City Water Supply Company finally.

Q. At the time of your taking possession?

A. Yes, it was very largely paid before, but the final payments were made——

Q. Now you say—upon which side was the extension of the wing—earthen walls of the main dyke made, on the land side or the water side of the reservoir?

A. On the water side.

Q. Why was it made on the water side and not on the land side?

A. Because the land side could be extended without lowering the water in the reservoir, and they considered that coming under the head of raising the dyke.

Q. And on the inside it couldn't be so?

A. On the inside it could not have been, without putting in a new core wall.

Q. That is all.

ALLAN W. CUDDELBACK sworn.

Direct Examination. By Mr. Edwards.

Q. Where do you reside?

A. Paterson.

Q. What is your business?

A. Connected with the Water Company there in Patterson—Jersey City Water Supply Co.

Q. In what capacity?

A. Superintendent.

Q. Are you an engineer?

A. Yes, sir.

Q. Have you had occasion to visit the Watchung tunnel recently?

A. I have.

Q. When did you visit it?

A. Last Tuesday, the 21st of May I think it was.

Q. How far into the tunnel did you go?

A. Went in about five hundred feet.

Q. From which end?

A. From the west end.

Q. And did you observe the condition of the bottom of the tunnel?

A. I did.

Q. Was there any vegetable growth there?

A. Not any, no, sir.

Q. Or any dirt?

A. Just a very slight covering of slime on the gravel which composed the bottom.

Q. And would you expect that?

A. Yes, sir.

Q. Does that facilitate—that covering of slime facilitate the movement of the water?

Objected to as leading.

Q. What effect has that slime?

A. I should say it had the effect of smoothing up the tunnel.

Q. Can you tell whether there was more of that slime on the side or on the bottom?

A. I think there was slightly more on the side than on the bottom, I should judge so.

Cross-Examination. By Mr. Vredenburgh.

Q. When did you go in the tunnel?

A. Last Tuesday, I think, May 22nd.

Q. For what purpose did you go in?

A. Went in to examine the condition of the inside of the tunnel.

Q. Why?

A. To find out what the present condition is.

Q. For the purpose of this suit?

A. For the purpose of finding out what the present condition is.

Q. For the purpose of being a witness in this suit?

A. If necessary.

Q. What do you say?

A. I say I went in to find out the present condition of the tunnel.

Q. I asked you whether you went in there for the purpose of being a witness in this suit?

A. Not primarily, not necessarily. I went in to inform myself of the condition, if asked about it I could say about it.

Q. Who asked you to go in?

A. Why nobody asked me to go in. It occurred to me after the talk at this suit.

Q. What say?

A. Nobody asked me to go in particularly, it occurred to me after the conversation in this suit.

By the Court:

Q. You mean after hearing some of the evidence?

A. Yes, I wanted to satisfy myself as to the present condition of the inside of the tunnel.

Further Cross.

Q. Did you consult with anybody before you went in?

A. Why, I consulted Mr. Merian, who went in with me.

Q. Did you consult with any one else?

A. No.

Q. You and Mr. Merian made up your minds because of hearing something in this suit that you would go inside of the tunnel, is that what you want us to understand?

A. Yes, sir.

Q. You never said a word to anybody about it?

A. I may have talked to somebody else about it?

Q. Well, who?

A. Well, I think I talked to Mr. Smith about it, the consulting engineer of the company.

Q. Didn't you go through at their request?

A. No, sir.

Q. What?

A. Not particularly at their request, we suggested this thing ourselves.

Q. You suggested it to Mr. Smith?

A. We talked about it. Yes.

Q. And Mr. Smith told you you had better do it?

A. Why, he didn't make any objection when I talked to him about it.

Q. Well, why did you happen to want to go into this tunnel just at that time?

A. I said the testimony in the suit suggested that it might be a good thing to find out the present condition of the inside of the tunnel.

Q. Well now which end of the tunnel did you go in?

A. The west end.

Q. How did you go in?

A. I went in a boat.

Q. In a boat?

A. Yes, sir.

Q. How deep was the water in the tunnel?

A. I should say between three and three and a half feet.

Q. And you found that there was some growth on the gravel underneath, did you?

A. No, I didn't find any growth on the gravel.

Q. What did you find?

A. A very slight collection of slime.

Q. What is slime?

A. Well, it is the usual—it is a deposit that is usually seen in the bottom of a stream.

By the Court:

Q. Didn't take any samples, did you?

A. No, there was not enough of it to get any sample of, you could not collect a sample.

Re-cross.

Q. Eh?
A. You could not collect a sample, there wasn't enough there to get it.
Q. Could you see it?
A. You could see it, yes.
Q. How could you see it?
A. We had a lamp.
Q. A lamp?
A. Yes, sir.
Q. You put that down at the bottom?
A. No, sir.
Q. How did you see?
A. Through the water.
Q. By means of this lamp?
A. Yes, sir, you could see it distinctly.
Q. Could see what very distinctly?
A. The bottom.
Q. How deep did you say it was?
A. Possibly three feet.
Q. Three feet?
A. Yes, sir, perhaps not quite three feet, I didn't measure the depth.
Q. Well, could you see the slime distinctly?
A. Yes, sir.
Q. What was the color?
A. Brownish color.
Q. And you couldn't get enough of it, notwithstanding you saw it there, you couldn't get enough of it to make a sample?
A. I don't suppose there was a thirty second of an inch covering, just a very slight slime.
Q. How did you know it was slime?
A. Feeling it on the side walls and the bottom.
Q. Then you felt something on the side wall and you judged that it was the same thing you saw on the bottom?
A. Yes, sir.

Q. Well now, to return, wasn't it a vegetable growth?

A. I don't know what it is, I am sure.

Q. How far in the tunnel did you go?

A. Five hundred feet.

Q. Did it continue the whole distance in or not?

A. Well, at the various points where we examined it it was the same.

Q. Wherever you examined it, and how often in that five hundred feet did you examine it?

A. We examined it closely, two or three times, in the five hundred feet, about three times I think.

Q. Did you see any gravel?

A. Yes, sir, I could see the gravel.

Q. Do you know how deep the gravel is?

A. No, I don't.

Q. Didn't measure it, did you?

A. No, sir.

Redirect examination.

Q. Who was with you?

A. Mr. Merian.

Q. Did you get out of the boat?

A. Yes, sir.

Q. Did you walk on the bottom?

A. Yes, sir, in my stocking feet.

Q. Did you have any boots on?

A. No, sir, my stocking feet.

Q. Now was this slime such as you saw in the bottom of brooks?

A. Well, about the same perhaps, same appearance, but not as much as you find in the bottom of a brook.

Adjourned until Monday, May 28th, 1906, at 9.45 A. M.

THADIUS MERRIMAN sworn.

Direct examination.. By Mr. Edwards:

Q. Where do you reside?
A. At Shokan, New York.
Q. What is your profession?
A. Civil enginer.
Q. And with what work are you now connected?
A. The Board of Water Supply of the City of New York, on the additional supply from the Catskill Mountains.
Q. And under who?
A. The Board of Water Supply of the City of New York.
Q. What position do you hold?
A. That of Assistant engineer.
Q. Are you in charge of the work up in Ulster county?
A. In charge of a portion of it.
Q. Were you connected with the Jersey City Water Supply Company in the erection of the works at Boonton?
A. I was.
Q. In what capacity?
A. Assistant engineer.
Q. You are familiar with the work from Boonton to Jersey City I suppose?
A. Yes, sir.
Q. Have you had occasion to visit the Watchung tunnel recently?
A. Yes, sir.
Q. When did you visit it?
A. On Tuesday last.
Q. And with whom?
A. Mr. Cuttleback.
Q. For what purpose?
A. For the purpose of examining the interior conditions.
Q. And how far into the tunnel did you go?

A. About five hundred feet.

Q. And by what method of conveyance?

A. By means of a boat.

Q. And from which end?

A. From the upstream or west end.

Q. Did you observe the condition of the bottom of the tunnel?

A. Yes, sir.

Q. And what was it?

A. The invert of the tunnel was covered with gravel, and the gravel appeared to be clean except in so far as it was covered with a very slight deposit of sediment; that sediment was very thin apparently, and you might almost say it was impalpable.

Q. How about the sides of the tunnel?

A. The sides of the tunnel were covered with more or less growth, that is in the region of the water line where the water had been standing for some time, as it has been, there was more or less vegetable growth I should say the thickness might have been as much as a sixteenth of an inch.

Q. Is that what you would expect to find?

A. Yes, sir.

Q. Well, this covering at the bottom what was the nature of it?

A. It appeared to be simply a deposit from the water.

Q. Slimy?

A. No, sir, I don't think it could be classed as vegetable.

Q. What effect would that have on the movement of the water?

A. I think it would accelerate the movement of the water. Of course the gravel itself is smooth and the accelerating effect might not be very great.

Q. Did you find anything in the tunnel to retard the flow or to effect the condition of the water?

A. Nothing to effect the condition of the water and nothing to retard the flow further than the

sides and the bottom of the tunnel, as they now exist.

Q. And what would you say as an engineer as to the capacity of the tunnel to carry water now compared with the day that the water was turned on?

A. I should say that it would be practically the same.

Q. That is all.

Cross examination. Mr. Vredenburgh:

Q. Have you been waiting here from day to day, Mr. Merriman?

A. Yes, sir, I have been in the Court room here from day to day.

Q. Were you here before last Tuesday?

A. Yes, sir.

Q. And in whose employment were you then?

A. At present—well I am here on leave of absence from the city of New York.

Q. Won't you speak a little louder?

A. I am here on leave of absence from the City of New York.

Q. In whose employment were you then is the question?

A. In the employment of the Jersey City Water Supply Company I presume.

Q. And when were you employed by them to come here?

A. Well, I was never directly employed, I was asked to come here some time last February I believe.

Q. When did you get leave of absence from New York to come here?

A. On this trip I got leave of absence about two weeks ago.

Q. For how long?

A. For a period of about as long as might be necessary on this case.

Q. Who gave you that leave?

A. Department Engineer Davis.

Q. Written was it or verbal?

A. Verbal.

Q. At whose suggestion did you go last Tuesday?

A. At the suggestion of Mr. Cuttleback.

Q. And where did you go into the conduit?

A. At the west end of the Watchung tunnel through the gate house.

Q. Is there a gate house between the conduit and the tunnel?

A. No, sir.

Q. Well how did you get in the tunnel?

A. There is a gate house between the steel pipe and the tunnel, and we got in through that gate house.

Q. There is a gate house on the westerly end of conduit No. 4?

A. Yes, sir.

Q. And you went in from that point about 500 feet?

A. Yes, sir.

By the Court:

Q. Well, is that right. Went into the tunnel. The witness says he went into the tunnel five hundred feet.

A. Well, I understand it that the word conduit embraces the tunnel, that is the upper end of the section 4 of the tunnel as we call it, the Watchung tunnel below that has a section of about 5,000 feet of concrete tunnel, you might say it is a continuation.

By Mr. Edwards:

Q. How near to the Watchung Mountain of the tunnel is this gate house?

A. Right on the slope of the Watchung Mountain.

Q. Just where the conduit enters the tunnel?
A. Yes—one minute, it is where the steel pipe enters the tunnel.

By the Court:

Q. Well now, we are getting mixed up, because so far the meaning of the word conduit and tunnel has been distinct. This witness says five hundred feet from the mouth of the tunnel.

By Mr. Edwards:

Q. How far is that from the mouth of the tunnel?

Mr. Vredenburgh: Well, now, if your Honor please, I should like to go on with the cross examination.

By the Witness: I would like to explain that.

By the Court: You better answer Mr. Vredenburgh's question and stop.

Further cross.

Q. You say you entered this conduit where the pipe ends and the conduit commences?
A. Yes, sir, meaning by that word conduit there, tunnel.
Q. What do you mean by pipe?
A. The 72-inch steel pipe.
Q. Where the steel pipe ends and the cement conduit commences?
A. Where the brick conduit commenced, or tunnel.

By the Court: The difficulty is the witness is applying the word conduit in a different way than

has heretofore been employed by the engineers of the complainant.

Q. What do you mean by conduit?

A. The conduit is all that part of the acqueduct which lies on or near the hydraulic drain, and is constructed of masonry or brick.

By Mr. Edwards:

Q. Bricked tunnel?

A. Yes, sir.

Further cross.

Q. You went into the gate house, that is, at the end of the iron pipe, and went from that gate house about 500 feet; is that correct?

A. Yes, sir.

Q. How did you determine that was 500 feet?

A. There was a rope attached to the boat the length of about 500 feet; this rope is attached to the boat, and we went in at the end of that rope.

Q. Did you measure the rope?

A. No, sir, not strictly, but it was bought for 500 feet of rope.

Q. Did you buy it?

A. No, sir.

Q. Were you present when it was bought?

A. No, sir.

Q. When were you previously in that part of the conduit?

A. I never had been there before.

Q. How long were you in there?

A. About three-quarters of an hour I should judge.

Q. At what speed was the water running?

A. Perhaps two feet per second or thereabouts, I did not measure it.

Q. Then how do you know that?

A. I made some computations on the velocity of flow through that tunnel, and I judged from the results of those computations that the velocity was about 2 feet per second.

Q. When did you make those computations?

A. At various times during the past two years.

Q. Could you see the bottom and did you see the bottom from the place you went in to the place where you turned to come back?

A. No, sir, I did not see it continuously, of course.

Q. Was it dark in there?

A. Yes, sir, very dark.

Q. Would the vegetable growth on the sides be likely to increase?

A. That is in the future—do you mean in the future?

Q. Yes, of course I mean in the future?

A. Yes, I think probably that they might increase to some extent.

Q. In your judgment would it require removal at sometime?

A. It might.

Q. Could it not in your judgment be removed easier and quicker by mechanical means if the tunnel had a smooth bottom?

A. No, sir, I don't think there would be any appreciable difference in the time.

Q. What is the length of the tunnel?

A. About 7,300 feet as I recall it.

Q. Did you reach a point where there was a large infiltration in the tunnel?

A. No, sir.

Q. Do you know where that is in the tunnel?

A. No, sir.

Q. Then it was still east of where you went in?

A. It must have been.

Q. That is all.

J. WALDO SMITH, a witness sworn for the defendants.

Direct examination by Mr. Corbin:

Q. Where do you reside, Mr. Smith?
A. New York City.
Q. What is your profession?
A. I am a civil engineer.
Q. What is your present employment, occupation?
A. Chief engineer of the Board of Water Supply of the City of New York.
Q. Have you in charge the new work for the City of New York, obtaining the supply from the Catskill Mountains?
A. This Board is charged with building a new and additional water supply for the city, which is to come from the Catskill mountains. The supply from the present comes at the rate of 500,000,000 gallons a day.
Q. Are you the Chief Engineer in charge of that work?
A. I am the Chief Engineer in charge.
Q. That involves the construction of what works?
A. Of dams and reservoirs, and aqueducts and tunnels, and appurtenances.
Q. Aqueducts to what length?
A. The main aqueduct line is about 85 miles long, ending at Yonkers.
Q. Does it involve the construction of intake reservoir?
A. Intake reservoir and storage reservoir.
Q. Of what capacity?
A. One reservoir is calculated to be about 170 billion gallons.
Q. Is that the one at Shokan?
A. The one at Shokan, which is to be the main reservoir, and also the intake reservoir.

Q. You say that is to be the intake reservoir?

A. Yes, sir.

Q. That is the lower end of the water shed impounded, then?

A. Yes, sir.

Q. That is the same plan of impounding and intaking as the Rockaway works, is it not?

A. Same principle.

Q. Of course, on a much larger scale?

A. Yes. The supply is to be not less than 500,000,000 gallons a day; not less than that.

Q. And that intake reservoir has what capacity?

A. It may have a capacity of 170 billion gallons. It is not fixed yet, but it is going to be very large; probably not less than 100 billion at the least, and not over 170 billion at the greatest.

Q. That is as against the seven billions, I think, the Boonton reservoir has?

A. Yes.

Q. Which serves the same objects for the Jersey City works?

A. The same.

Q. For a storage and intake reservoir?

A. Just the same.

Q. What offices does such a reservoir serve in a water supply?

A. It serves as a sedimentation basin in times of freshet, when the water is carrying a good deal of sediment. It also serves to improve the water supply from bleaching out and elimination of bacteria, both harmless and harmful. It has always been held and found that these large reservoirs tend to benefit the quality of the water.

Q. And then, as a storage reservoir, of course, it serves?

A. Serves to store the flood waters for the time of drought.

Q. What was your former experience in constructing water works before you went with the New York board?

A. For two years previous I had been the Chief Engineer of the Aqueduct Commissioners who were charged with the work in the Croton Valley; building dams and reservoirs, and the aqueduct of New York.

Q. Did you have charge of the completion of the great Quaker Bridge dam?

A. The new Croton dam?

Q. The new Croton dam.

A. I did, and other dams in the valley.

Q. And before that, Mr. Smith?

A. Before that, I was with the East Jersey Water Company for many years from the time they commenced the construction of the Newark work up to 1897, and then again from 1900 to 1903, during the period in which the Jersey City works were constructed. And the other period, between 1897 and 1900, I was with the water companies in Paterson and other companies under the same general management.

Q. What had you to do with the construction of the Newark water works?

A. I started in as assistant engineer, and finally was the principal assistant engineer.

Q. Did you have charge of the construction of the dams for their reservoirs?

A. I was resident engineer on the dams and reservoirs.

Q. Which one?

A. The intake reservoir at Macopin; the Clinton dam and reservoir; and the Oak Ridge and Canastoga; Echo Lake.

Q. All of them, then?

A. All of them, yes.

Q. Did you have to do with the construction of their steel pipe lines?

A. The second one. The first one I didn't have anything to do with, because on another part of the work.

Q. You supervised the construction of the second?

A. The second line and other lines.

Q. How long a line is that?

A. Twenty-two miles.

Q. What other lines?

A. The line across the river from Belleville to the Jersey City Reservoirs, some two miles; the line, Little Falls to Paterson, which was six or seven miles; and I think that is all.

Q. Did you have to do with the East Jersey's new line from Little Falls to ?

A. No, I was in Paterson at the time on the work; knew about it and was on the work, but—

Q. What did you have to do with the construction of the Jersey City Water Supply Company's works in question in this case?

A. I was consulting engineer, and had the final decision on all important features of the work.

Q. What did you have to do with the dam at Boonton?

A. I was the consulting engineer, and was there frequently, and it was practically under my direction.

Q. Throughout the whole work?

A. Yes, from the time the Jersey City Water Supply Company and the East Jersey Water Company undertook to finish the work.

Q. That is, after the contracts X and Y?

A. Yes, sir.

Q. At that time there had been no stone laid on that dam, had there?

A. No.

Q. Had you anything to do with the design of that dam?

A. I had, sir. The design was made under my direction, and I was the Chief Engineer.

Q. How did the design of that dam compare with the new Croton dam?

A. It is a stronger section, a thicker section, than the design of the new Croton dam.

Q. It is about the same height, isn't it, Mr. Smith?

A. No, it isn't nearly as high, even above the natural surface.

Q. I mean above the surface of the stream.

A. No. It is not as high as the Croton by considerable. It is a thicker section; bigger factor of safety.

Q. Did you have to do with the designing of the Parsippany dike?

A. I did.

Q. Did you assist in the designing of that?

A. I did.

Q. And did you supervise the construction?

A. I did.

Q. Now, as to the construction of the conduits, including tunnels? Did you have to do with those, and what?

A. I had, sir. I had the general supervision.

Q. You assisted in the design, and calculation of their capacities?

A. I did.

Q. Now, with respect to the Boonton stone dam. Were the plans and sections of that submitted to the city's engineer, Mr. Ferris?

A. They were, I believe, sir.

Q. What suggestions, if any, did he make? What changes did he suggest, and what was done in respect to it?

A. Suggested a thickening of the dam at the steel pipes which went through the dam—pipes which were designed to take care of the water while the dam was being constructed, and also to draw off the available storage of the reservoir if it ever became necessary to lower it.

Q. Was that change made as suggested by him?

A. It was made.

Q. Did he suggest any other changes as far as you know?

A. Not that I am aware of.

Q. Did you see Mr. Ferris, the city engineer, at times pending this work?

A. Yes, sir, while the work was going on I used to see him from time to time.

Q. Was that dam laid—in what kind of cement?

A. Portland cement throughout.

Q. The specifications spoke of making in the face of it masonry similar to the Macopin intake dam; what kind of masonry is that?

A. The face of the overflow of that dam is all broken range ashlar, and the main dam across the river has a face of rubble.

Q. How is the Boonton dam built?

A. It is laid in cross range ashlar.

Q. Is that superior or inferior to Macopin?

A. Superior in appearance and at considerable greater cost.

Q. Better then?

A. I suppose it is better, but the other one is all right, but it might have been built a great deal cheaper.

Q. What is the face masonry worth per yard—square yard?

A. I have in my mind cubic yards more than square yards.

Q. Well?

A. $6 or $8.

Q. And in the Macopin dam how much?

A. The face of the main dam cost about $2.50 to $5.

Q. And the rest of it even less?

A. Well, no; that was about the cost.

Q. Did you have to do with the tests and calculations as to the capacity—tests of this work?

A. They were all made under my direction.

Q. Now the Boonton dam and the back dyke which together impound the water of the Rockaway

at Boonton as they are constructed, is there any difficulty about raising them 19 feet so that they shall impound more water?

A. None whatever, sir.

Q. That back dyke, how would the raising actually be done?

A. It would be done by raising the core wall and increasing the earth sections on both sides.

Q. Increasing it where, back and front?

A. On top and on the opposite side from the water.

Q. And on the wing earth walls—well, that is substantially as shown by Mr. Ferris's plan?

A. Yes, sir.

Q. Well, now, the wing walls of Boonton earth dam, how would they be enlarged?

A. Increased by raising the core wall and adding to the earth on top.

Q. The same way as the other?

A. Just the same way.

Q. How would the stone part of the Boonton dam be enlarged, in what ways may it be done?

A. It can be done by adding to the top only, or it can be done by adding to the face and to the top, or it can be done by adding to the face instead of continuous height on the face by putting in heavy buttresses at intervals.

Q. By the face you mean the down stream side?

A. Yes, sir.

Q. And with the earth banks there are various ways it can be done?

A. Yes, sir.

Q. With cement extensions and so on?

A. Yes, sir.

Q. Is the stone dam built so that it can be readily enlarged?

A. I don't see anything to prevent it being enlarged in all those ways.

Q. Is there any difficulty about making a union

between these ends of the thickened wall with the old?

A. I think you could make a union that would be efficient—the dam acts by gravity anyway.

Q. It is a matter of weight, is it not?

A. Yes, sir.

Q. The necessary tightness is there now?

A. Yes, sir, the necessary tightness is there now.

Q. How is it in fact as to tightness?

A. Very, very tight.

Q. What is the thickness of the present dam at the bottom of the stream approximately?

A. 17 feet on top, and well something like 80 feet at the bottom. We have the sections here, and I don't like to speak from memory.

Q. Solid stone masonry?

A. Yes, sir.

Q. Solid cement?

A. Yes, sir, masonry. Of course I don't mean of one piece cement and stone put in there.

Q. Was the capacity which that reservoir was to have calculated by you before it was built?

A. No, sir, but those calculations of capacity were made previously.

Q. Now coming to conduit No. 4, which includes the Watchung tunnel, are you familiar with that?

A. I am.

Q. Did you make tests of its capacity after it was done, Mr. Smith?

A. Yes, sir, tests were made.

Q. What did you find it would carry under the conditions prescribed, that is, with one foot flow at the top?

By Mr. Vredenburgh: I don't understand Mr. Smith to say he made them.

Q. What did you find it would carry under the conditions prescribed, that is with one foot free at the top?

Mr. Vredenburgh: I didn't understand Mr. Smith to say he made them.

Q. Were they made under your direction?

A. They were made under my direction, yes, sir. I found the capacity was slightly in excess of seventy million gallons.

Q. That is one foot free at the top?

A. Yes, sir.

Q. As a matter of fact, Mr. Smith, could that conduit be operated with a greater head of water than that?

A. It would make a slight difference practically.

Q. Suppose you left only eleven or six inches at the top, would it operate equally as well?

A. Yes, sir.

Q. Suppose you filled it full and put a head on it?

A. It would be perfectly safe.

Q. How much head?

A. You could put a great deal on, because the pressure would equalize itself on the brick work anyway.

Q. Then it must have a capacity of greater than seventy millions if operated so?

A. I think so.

Q. Are you familiar with the conditions of rock which were encountered in that tunnel?

A. I am.

Q. With those conditions was it feasible to finish the bottom or invert in the way suggested by complainant, of Rosendale cement with a skim of Portland cement on top of it?

A. I don't think it was.

Q. Would that have been a proper or a good engineering job, in your judgment to have finished it that way, under the conditions there found?

A. I don't think it could have been done that way, sir.

Q. Under the conditions found, what, in your

judgment, was the best way to finish the invert?

A. Why as good a way as it could be, I think would be by putting in the gravel, as it was done.

Q. You think it was done in a proper way?

A. Yes, sir, certainly, it is a good engineering structure.

Q. Now as to the gravel that is in the bottom, is that any more likely to collect growths than cement would be?

A. In my judgment it is not. I have never seen in a brook or open stream where the gravelly bottom tended to collect dirt or sediment, I think it has a tendency to keep clean as far as I have been able to observe it naturally.

Q. Is the gravel bottom as is in that conduit similar to the open brook conditions where there is gravel on the bottom

A. Yes; I have seen many conditions in brooks very similar. I don't see where any sediment is coming from any way, to collect there, in the first place,

Q. Is the flow in that tunnel fast or slow?

A. Why it has the same rate as the rest of the conduit, something like a couple of feet a second or so, but the water—most all but the finest of the sediment came out in the reservoir, and the velocity in the conduit is going to be much greater than it is in the reservoir, and I cannot see any tendency for sediment to collect.

Q. Now, with regard to that very thing. When you take the water from the reservoir how much depth is there below your intake where these deposits may settle before you take the water in?

A. Something like fifty feet as I remember it.

Q. From your lowest point of intake?

A. Yes, something like that.

Q. And your suggestion then is, as I understand you, that the sediments that would take place there would take these deposits?

A. Yes, sir.

Q. If some sediment does enter the pipe where does that deposit—have you had experience which indicates that?

A. I think in a pipe would go through to a reservoir, would never get any chance to settle if there was any.

Q. Did you make any observations in the Newark pipe with respect to that matter?

A. Yes, I have been in the Newark pipe a great many times, and I never found any deposit of sediment along the bottom. The only place where there would be any possible tendency would be where there was an enlargement of the aqueduct, such places where the steel pipe joins the cement conduit, and there the area is greater and the velocity is slightly slower.

Q. There are several such places, are there not?

A. Yes, sir, there are a number of such places.

Q. As I understand it, from the intake down to the tunnel there is a succession of steel pipes and masonry conduits, is there not?

A. Yes, sir.

Q. And the water flows some nine or ten miles before it gets to the Watchung tunnel?

A. Yes, fully that.

By the Court:

Q. Where the steel pipe is depressed is not there a tendency in the lowest part to form a deposit?

A. I don't think so, your Honor. The sediment is carried along by the velocity of the water, and it depends on the velocity how coarse material will be carried. Now we have this large reservoir, and all but the very fine settles out there, and when it is once started in aqueducts the velocity is so much greater than the reservoir that I cannot see where there is any tendency to settle in any part of it. I have often been in the Newark pipes that come down from Marketville, and I never found any sediment gathered on the bot-

tom, either the depression or any other part, and I don't see why there should be any. You can get a velocity of five or six feet and it will take quite a large stone with it, and then when you get down to the very fine clay, almost no velocity would carry it along.

Further direct.

Q. Mr. Smith, suppose Jersey City desired to increase its supply to seventy million gallons a day, and therefore wanted the necessary additional storage, which, in your judgment would be the better engineering plan, to raise the big dam or to build the dam along the valley?

A. Why I should say by all odds to go to the Longwood valley and build other storage reservoirs.

Q. Why?

A. Why it seems to me a more practicable arrangement, and easier job. The City owns land there.

Q. But they could do either, could they not?

A. They could do either.

Q. Or both?

A. Or both; there is nothing whatever to prevent them raising the Boonton dam if they want to raise it.

By the Court:

Q. What would you do with the water in the Longwood Valley reservoir?

A. It would have to come down the main river channel, the same as it does in the Newark system of reservoirs. This is quite different from that. Their reservoirs are all at a distance from the intake, and the intake is a very small reservoir which doesn't hold a day supply, and here the conditions were such that it was easier to build your main storage reservoir at the lower end, and that has some advantages.

Further direct.

Q. Let me ask you whether if the Longwood Valley site were let out into the stream, as you say, whether that would not enable the City to keep a more uniform depth in the lower reservoir?

A. Well, they could keep up the lower reservoir by emptying that one, and keep it at a higher level than they otherwise could, because part of the storage depletion would come from the Longwood reservoir.

Q. Would it also have an effect upon the daily flow of the stream to a certain extent, if let out in dry weather?

A. Above Boonton, yes, sir.

Q. Have you observed the conditions at the Parsippany back dyke during the construction and after the completion of the reservoir?

A. Yes, sir, frequently.

Q. What have you to say about that back dyke, whether it was a success and properly built?

A. I think it was a great success.

Q. Have you observed the conditions there since the reservoir was filled, as to seepage or leakage?

A. Yes, sir.

Q. What have you to say as to its tightness and as to results obtained?

A. It seems tight, it is wet on the opposite side from the water which is almost always the case.

Q. Is generally the case?

A. Yes, sir; it brings the ground water up to the surface, and there is no flow through and nothing which is perfectly solid and substantial and lasting.

Q. You say it brings the ground water up to the surface, where then, in your judgment, does that water come from which makes the ground wet back of the dyke?

A. I don't believe anyone knows, but I believe

it is ground water brought to the surface, I don't believe anyone ever can tell.

Q. Is there anything extra-ordinary or unusual about the quantity of wetness you observed there?

A. No, I don't think so.

Q. May the water that is seen there come from a shutting off by the core of the ground waters which would otherwise flow the other way?

A. Yes, might easily be that.

Q. In your judgment has that everything to do with it?

A. Yes, I say the ground water has been brought to the surface.

By the Court:

Q. Well, the way it strikes me would be this,—that the earth itself being a water basin, the water from the acqueduct would sink into the ground, and it would tend to keep the basin full of water

A. Yes.

Q. And the basin up to a certain level at least, would be invariably full of water in the neighborhood of the reservoir, and that being so rain which fell on the land outside of the reservoir would not sink in times of drought as it otherwise would sink, and the consequence would be that the rain water which was participating on that surface would stay there, so much of it as would not evaporate, and the general result would be, as you say, that the surface of the ground in the neighborhood of the reservoir would be wetter than ordinary, for the simple reason that the water would not go down,—keep going down in dry weather and flowing off; there would be a constant renewal of the lower stratum from the reservoir, is that right

A. I think your Honor is entirely correct in your theory.

Q. Well, that is the way it would strike me.

A. Yes, sir.

Q. Of course, I suppose local conditions might change that?

A. Yes, sir.

Q. There might be an impervious bed of clay—suppose there was an impervious bed of clay under the reservoir and that there could be no dropping down of the water,—but I suppose that would be a thing which would only be theoretical?

A. That is so, and in this case there apparently was an old water course down underneath the dam, we found a lot of very course gravel and it was carrying water, and of course it cannot carry it in that direction any more.

Further direct.

Q. Mr. Smith, in building that back dyke, as I understand it, there are two banks of earth,—sloping banks of earth, one on the side of the core wall towards the water and the other on the side of the core wall towards the hill—down stream?

A. Yes, sir.

Q. Now, is there any difference in the way those two banks of earth are made?

A. Yes, sir.

Q. What is the object of each?

A. A difference in the specifications. The earth on the water side is specified and was put on in layers and wet and rolled very carefully and of selected material. On the opposite side where you only need the wet against the core wall it was stated and was allowed to be put in on differing materials and the rolling was not so particularly specified.

Q. That is more like a railroad bank on that side?

A. Well, it is a great deal better than a railroad bank, it had to be compact and put in good shape so that there would not be material settle-

ment, and we were perfectly willing to put coarse material there.

Q. Why do you compact it so carefully on the water side, and are willing to put porus material on the other side?

A. To make it impervious.

Q. But on the lower side you don't care to make it impervious?

A. If it goes by the core wall you might just as well let it go on out, in fact it is better, but if any water should pass the core wall, let it go all through, but the bank on the water side is expected to be put in so carefully that the water won't reach the core wall.

Q. How thick is the whole bank at the bottom in the deep place?

A. Well, let me see, it is perhaps a hundred and fifty feet on slopes of two to one, about ten or fifteen feet wide on top and slopes two to one, and thirty feet higher at the highest point.

Q. In getting sites for core walls and earth banks, do you know of cases where they have been put upon fine sand foundations?

A. Well, let me see, it has been done a great many times.

Q. How about the Boston Water Works?

A. The Boston Water Works is probably the most notable example there is of building a big earth dam on a fine sand foundation.

Q. Was it successfully done?

A. It was.

By the Witness: The same engineers as built the Boston Water Works are advocating a dam of the same character in Panama.

Q. Are you familiar with the Rockaway water shed?

A. Why, yes, reasonably familiar.

Q. Are you familiar with the Pequannock water shed?

A. Yes, sir.

Q. What have you to say as to the conditions of the Rockaway water shed in respect to its suitableness for a municipal water supply—to supply these works that were made?

A. Why, it would appear to me to be as suitable water shed as could be obtained, available for Jersey City, and about the same as the Pequannock.

Q. The Pequannock has been operated since 1892?

A. Been operated since the spring of 1892.

Q. And as to the virtue and purity of a water supply, what do you say as to these two water supplies?

Objected to.

By the Court: Didn't he say they were similar?

By the Witness: Perhaps that would not be exactly right. I size those two water sheds up in this way, there is less watershed in the Pequannock for the supply of the Newark works, as it existed a few months ago. The intake, as it existed a few months ago—the population above the intake is practically insignificant; most of the population on that water shed is below the storage reservoir, so that any pollution that would reach the stream must go down very rapidly through the intake reservoir into the pipe, and as I remember the intake reservoir holds about 35 million gallons. On the Rockaway water shed the population is greater, but the main, only storage reservoir is directly at the intake, so that the water at the pipe in 2 places, I should think, would have equal chance of being pure.

Q. How about the flow of the Rockaway as compared with that of the Pequannock?

A. It would be nearly twice as great because the Pequannock works only impound the water from the water shed of about 63 square miles, whereas

the Rockaway has a water shed of about 120.

Q. Let me correct you in that. Although the Pequannock has 63 miles of water shed, it does not impound all the water from that?

A. No, I mean the total area above the intake dam.

Q. The reservoir is so placed that it does not impound much more than one-half of that?

A. Nearly one-half of the drainage reservoir.

Q. Now in case of the Rockaway, it impounds from what?

A. That is from the whole of it.

Q. So that the natural flow there from which impounding may be had of the Rockaway, must be 4 times the natural flow from that which impounding may be had in the Pequannock, is it not?

A. Well, that makes it so, yes, sir.

Q. You spoke of the advantage of an impounding reservoir at the intake, and one of them you spoke of was the bleaching of the water; what was that?

A. Diminution of the color.

Q. Does it perceptibly remove the color?

A. Experiments have shown that it often does and generally does.

Q. So that you would expect the water to come out of the spigots of Jersey City whiter and clearer that they went in the reservoir?

A. I would expect so.

By the Court:

Q. To what depth does the bleaching process go on?

A. Well, I can't tell that, your Honor, but the State Board of Health of Massachusetts and the Boston Water Works have made a great many observations and that was their general conclusion at the end that there was a bleaching and sedimentation and improvement in bacterial conditions from the storage of the water, and I think it must necessarily be so.

Q. These great works you have spoken of in which you are interested in the Catskills for the City of New York water supply, is there any purification provided for at all except from sedimentation, thus far?

A. There is none contemplated at present.

Q. Haven't you in the Croton water shed destroyed villages?

A. Around the reservoir I know of no villages being destroyed except those that came within the reservoir reservation.

Further direct.

Q. How many reservoirs are there in the Croton water shed?

By the Court: Well a reservoir reservation and a reservoir are two different things.

A. Well, their practice has been to take two or three hundred feet outside of the flow line of each reservoir, and in some individual cases I think the Boards of Health have taken property near a portion of the streams, but the villages destroyed have been within the reservoir itself which was to be flooded or within the extra trip two or three hundred feet, and there was only one village I think of now, and that is the old vilage of Pactola, which village was taken away and moved a mile from the location but is still within 500 feet of the flow line.

Further direct.

Q. Still within the water shed?

A. Yes, sir, very close to the reservoir still.

Q. Are there many villages in the Croton water shed?

A. Yes, sir, a good many.

Q. How large is the water shed and Croton dam, about, if you know?

A. 360 square miles.

Q. How much water per day can you get out of it to supply the people with?

A. We have 3 supplies, estimated to be about 300 million gallons a day, and that is being increased very slightly by the addition of more reservoirs, but the ultimate capacity cannot be much greater than 325 millions a day.

Q. How does that reservoir compare with the Rockaway for a water supply, mile for mile?

A. It is less steep than the Rockaway, I should expect the Rockaway to yield a little higher percentage of rainfall than the Croton.

Q. Aside from the question of population now, are these water sheds of New Jersey like the Pequannock and Rockaway well adapted for a municipal water supply?

A. Particularly well, it seems to me.

Q. The natural quality of the water, is it soft or hard?

A. Soft.

Q. These specifications which Jersey City puts forward and which are attached to this contract, are they specifications which particularly apply to the Rockaway water shed, or are they specifications which would apply anywhere to work of similar character?

Objected to.

Objection over-ruled.

Q. They are general specifications not drawn with reference to any water shed, as I understand it.

Q. Equally applicable to your work in the Catskills, or are they not?

A. I should want to examine them a little more

carefully before I answer that question, but they are very general in their terms.

Q. Such specifications are purposely left flexible, are they not so as to meet unexpected conditions, which may be found?

A. I think they must be for schemes of this kind, it is not where they are asking for bids of a definite structure where they specify exactly the way they want it; I don't see how they could be drawn in any other way than in general terms; it could not be otherwise.

Q. The steel pipe that you put in, I understand it has an internal diameter of 72 inches?

A. Yes, sir.

Q. How many miles are there of it?

A. 17 or 18 miles of it, I think.

Q. Has there any pipe of so great a size for any considerable length ever been before laid on this globe?

Objected to.

Objection over-ruled.

A. I have no knowledge of any line of that size of that length or approaching that length.

Q. There has been something said about a 76-inch pipe being contemplated; what is the difficulty of laying pipes of very great size?

Objected to.

By Mr. Vredenburgh: I object to this evidence. I understand that your Honor intends to allow evidence of this kind to go in, therefore I do not like to interrupt counsel in his examination by cutting in all the time, but I would like to make a general objection to all this line of examination as not within the issues at all.

By Mr. Corbin: I won't spend much time on it.

By Mr. Vredenburgh: My only point is that the contract provides for a 76-inch pipe, and you have given us a 72-inch pipe, and I ask that we be allowed for the difference in cost on that account.

(Question withdrawn.)

Q. Was the steel which was in these steel pipes of the thickness indicated by the specifications or thicker?

Objected to.

Objection over-ruled.

A. Thicker in places.
Q. How much?
A. I can't say exactly; none was made less than 5/16ths, and in some places a very thin sheet would have held the pressure.
Q. You made none of it less than 5/16ths?
A. No, sir.
Q. Under these specifications you need not have made it any more than a quarter, need you?
A. No, sir.
Q. The pipe you laid of 72-inches has a greater gradient than would have been required for a 76-inch pipe?
A. Yes, sir.
Q. Has it an equal carrying capacity?
A. Yes, sir, the carrying capacity is positively stated in the specifications and the rule by which it shall be determined.
Q. About the carrying capacity?
A. Yes, sir.
Q. There is nothing in the specifications as to the size of the pipe?

A. No, sir, only the rule by which it shall be determined.

Q. The velocity I suppose is greater in the smaller pipe?

A. Yes, sir, it is a steeper grade.

Q. Is this an advantage or disadvantage to have the velocity greater?

A. I think it is an advantage to have the greater velocity.

Q. Which is the more costly a masonry conduit foot by foot or a 72-inch steel pipe?

Objected to.

Objection overruled.

A. That depends upon the cost of the material largely; at times there is none.

Q. Take a place where it is substituted in this case?

A. In this case the masonry conduit was the most expensive and a great deal better.

Q. What is its carrying capacity as compared to the other?

A. Seventy millions instead of fifty millions.

Q. How many miles of masonry conduit did you substitute for 76-inch pipe?

A. Conduit and tunnel between 6 and 7 miles.

Q. And there was to have been as first designed how much?

A. There could not have been any more than 2 tunnels, one 1,500 feet and the other 7,400 feet, a little less than 2 miles.

Q. Can you state the difference in cost per foot of masonry conduit as constructed and the 76-inch main?

A. I can't say it offhand; I haven't the figures in mind nor have I looked at them for a long time.

Q. Would the reservoir and the dam site there moved up stream and the other changes which were

incidental to them—did that increase or diminish the hydraulic gradient which was intended?

A. It must have increased them because it went up stream.

Q. Was the substitution of an 8½-foot masonry conduit and the hydraulic gradient in the place of steel pipe an advantage or disadvantage to the works?

A. A decided advantage because you have a permanent construction which will last forever.

Q. If the whole works could have been built of masonry conduit, the hydraulic gradient would have been more or less valuable than now?

A. Far more valuable.

Q. Is that the more desirable construction where you can get it?

A. Yes, sir.

Q. As the works were finally completed did you get all that you could?

A. Yes, sir.

Q. Convenient to the figuration of the country?

A. Yes, sir, we carried it just as far as we could.

By the Court:

Q. What do you mean by that?

A. Well, I would like to qualify that answer. I said as far as we could, I mean as far as they could conveniently go with this masonry conduit —there might have been slightly more perhaps added, which would add further cost to the work, and going around long distances, but as far as the masonry conduit was concerned, we practically put in all we could.

Further Direct:

Q. What, according to your observation and opinion, Mr. Smith, is the tendency of the flow of

water in the reservoir after it goes into it at the mouth of the Rockaway river or at the inlet from the Rockaway river, would it be directly across to the intake pipes or elsewhere?

A. I don't think so, I think it would circulate around the reservoir pretty well.

Q. How far below the surface of the reservoir is the water ordinarily taken for use in Jersey City?

A. About 50 feet as I recollect.

Q. Fifty feet from the surface?

A. Fifty feet from the surface.

Q. They take it from different points, don't they?

A. Yes, sir, you can take it at the surface and at 2 or 3 points below the surface.

Q. But as a matter of practice do they draw the water at the surface or below the surface.

A. Generally below the surface.

Q. And here you say you can take it as low as 50 feet below the surface?

A. Yes, sir, I don't know how they are operating the works there to-day, I have never inquired, but they started to take it from the bottom when they began operating the works, they used the bottom gate at that time, I don't know what they are doing now.

Q. How many sets of gates are there?

A. Two sets beside where they raise it to take it from the top. There was a gate put in between the upper level and the lower level of the Morris Canal near the incline plane at Boonton.

Q. Under your direction?

A. No, sir.

Q. Well, were the plans submitted to you?

A. Yes, sir, I looked at them.

Q. Did you approve of them?

A. I did and I went up to see the work one day.

Q. What is your judgment of them as to

whether they were suitable gates for your purpose or not?

A. I think they were and they seemed to work successfully at the time I saw them.

Q. Was there any back flow when you saw them?

A. No permanent back flow, but a canal boat came down the plane and went into the canal and created a disturbance as the waters went over against these gates they closed.

A. Well, the closing of the gates prevents back water?

A. Yes, sir, but just these waves from the canal boat closed these gates at the time, there was no continuous back flow.

Q. When did you see them working?

A. I don't remember exactly, but it was within a year I should say, some time last fall, I am not certain about the date.

Q. In your judgment were they at that time suitable and sufficient for their purpose?

A. They were.

Q. Taking these works as a whole, Mr. Smith, taking their construction, their size, sufficiency and character and the condition of the water shed and everything else that ought to be considered, in your judgment how well are they adapted to their purpose in giving 50 million of gallons of water a day pure and wholesome, to Jersey City?

Objected to and withdrawn.

Q. How much of the steel pipe had been laid before you came on the work in 1902?

A. I think about 6 miles.

Q. And the rest of it was laid under your direction, wasn't it?

A. Yes, sir.

Q. Did the city engineer, Mr. Ferris, and his men inspect it and test it during the progress of it?

A. Yes, sir, he was often on the ground himself, and he had a corps of inspectors under his direction.

Q. Were they there constantly during the progress of the work?

A. I believe they were, I saw them very frequently.

Q. Do you know whether they had their inspectors also at the mills when the steel pipe was made?

A. I was not aware of that fact.

Q. But they had them on the ground?

A. I never saw them at the mills although I heard they were there.

Q. How long did that steel pipe laying go on after you came on the work?

A. From 1902 to 1903, portions of both years.

Q. Did Mr. Ferris require you to re-lay some of that pipe which had been lifted by the flood through the swamp upon the upper Rockaway, and was it changed under his direction?

A. Some of it had lifted by the floods, and we had to put it back at its original grade.

Q. That pipe was empty pipe, I suppose?

A. Yes, sir, it was lifted by the buoyancy of the pipe.

Q. Where was that?

A. In the Great Piece swamp, or branches of it through which the pipe was laid up near Fairfield.

Q. And that had been laid before you went on the works?

A. Yes, sir.

Cross Examination by Mr. Vredenburgh:

Q. Mr. Smith, you were employed in connection with the new water supply at Jersey City at what date?

A. At the time Flynn gave it up, and the new arrangements were made, and contracts X and Y.

Q. Those contracts are dated March 31, 1902?

A. Yes.

Q. Can you tell whether it was before or after the execution of that contract?

A. Well, it was at that time or after the execution of the contract. I had looked over this proposition for Mr. Gardiner to give him certain information concerning the arrangement.

Q. In whose employment were you at that time?

A. I was in the employ of the East Jersey Water Company.

Q. And you continued in their employment during all this time?

A. Yes.

Q. Now, at that time, Mr. Smith, how much of the conduit was constructed?

A. The steel?

Q. No, the masonry conduit?

A. There was none of it constructed at that time.

Q. How did you determine how much of it was to be masonry and how much pipe?

A. It had been laid out at that time. The different sections of steel pipe and the different sections of tunnel and concrete aqueduct.

Q. Had been laid out? Do you mean, had been designed by some one previous to that date?

A. I don't think the sections had been designed at that time. But the length over which it was to go. As I remember it, the Hook Mountain tunnel had been driven through, but not entirely trimmed up; and the Watchung tunnel, the heading had been driven a portion of the distance, but that hadn't been trimmed. But none of the cement work had been done.

Q. Then, as I understand you, some one had determined how much of the cement work was to be built, but none had been done?

A. That is the way I understand it, sir.

Q. Was the amount of cement work that was

done greater or less than the amount of cement work that had been determined to be done when you came there?

A. As far as I know, it was the same. I don't think it was changed.

Q. Now, when were you last in the city of Dover?

A. Well, it is quite a while ago; I can't give you the date, but I should say it was two or three years.

Q. When were you last at this place that you say is a site for the dam in the Longwood valley?

A. I think probably the same time. Maybe three years ago. I have driven through that valley quite a number of times.

Q. About three years ago was the last time?

A. I haven't been there since then.

Q. Did you make an estimate of what it would cost to build a dam for the Longwood Reservoir?

A. I never made such an estimate.

Q. Do you know the length of it?

A. The length of the reservoir?

Q. The length of the dam to be built?

A. I can't say, sir. I looked into the question of the location, and cost of the dam and reservoir, say six or seven years ago, when some bids were made for Jersey City; and that is the only figures I have ever made.

Q. Well, the plan then was to bring the water by a pipe from that Longwood Reservoir, wasn't it?

A. No, there was no pipe to run there, it was to run up the stream some distance.

Q. Wasn't the water from the reservoir in the Longwood valley site to be taken over to the reservoir in the Beach Glen site by a pipe?

A. That may be so, there was a pipe—connecting pipe through.

Q. Well now that estimate, can you recollect how much that estimate was?

A. Oh, no, it is too long a time ago, I haven't

thought about it since, I couldn't even guess at it.

Q. You couldn't even guess at it?

A. No.

Q. Then you have really no fair way of even guessing at what a reservoir would cost up in the Longwood valley at the present time?

A. No, I cannot say what it would cost, without going back and hunting up those figures and going into it again.

Q. As to the number of acres to be covered by the reservoir, I suppose you hardly can guess at that?

A. I cannot say what it would be, not at this time.

Q. You spoke about the run off of the water in the Rockaway valley, do you know at what rate per second it does run off?

Mr. Corbin: He said nothing about run off in my examination. Rain fall is what I asked him.

The Court: You may ask the question.

Q. (Question repeated.)

A. They have had measurements for some period of time there, and it has varied through very wide ranges. My previous statement was that we would expect a greater run off than we would from the Croton river on account of greater elevation.

Q. Well, what is the answer to the question as to what is the run off?

A. Various rates.

Q. Well, give us the greatest and the least?

A. I cannot state you the exact figures, I would be very glad to look those up and state the greatest we find, and the least we find, up to date.

Q. Well, I would like you to tell us so that we can judge of what you answered to Mr. Corbin's question.

A. I cannot tell you now.

Q. What had you in mind when you answered his question?

A. I had in mind, sir, that certain water sheds yield larger proportion of the rain fall than other water sheds, and that seems to depend somewhat on the steepness and on the average elevation.

Q. Then you cannot tell us the run off in the Rockaway valley now?

A. I cannot.

Q. Cannot tell the speed with which it would run off?

Mr. Corbin: What day? It varies every day in the year.

A. No, I cannot tell you the speed.

Q. Cannot give us any judgment as to the speed, have no facts from which you can give us any judgment as to the speed with which it runs off?

Mr. Corbin: Do you mean miles per hour, or what, Mr. Vredenburgh?

A. I cannot tell you the speed, sir, and I don't think anyone else can.

Q. For what distance is the Pequannock water supply, through what you term the more populace portion of that water shed?

A. I should say about five or six miles, Mr. Vredenburgh?

Q. And for that distance is it an open stream?

A. It is.

Q. How near is the nearest privy to that water stream, in that five or six miles?

A. I haven't knowledge of sufficient detail to answer that question.

Q. Do you know of any within fifty feet?

A. I don't know anything about that question, sir.

Q. Have you ever examined the Pequannock watershed with reference to the impurities that may be put in the water?

A. Only generally from my knowledge during the construction of the work and from visits since.

Q. When have you been up—when were you last up to the Pequannock water shed?

A. A few weeks ago I was through a portion of it.

Q. You didn't then examine into the question which I have asked you?

A. No, I wasn't there for that purpose, sir.

Q. When were you up last to examine as to those questions, if ever?

A. I never examined them, except generally.

Q. You said that at one time you were engineer, assistant, I think you said—assistant engineer of the Croton Water Supply of New York City?

A. I was chief engineer of the Aqueduct Commission, which have only construction work to do.

Q. Were you ever connected with the present Croton water supply of New York City?

A. Yes, as the chief engineer of the Aqueduct Commissioners.

Q. That is governed by a commission?

A. Yes.

Q. Consisting of a body of gentlemen appointed for that purpose?

A. Yes, sir.

Q. And you left their employ when, Mr. Smith?

A. In August, 1905.

Q. Well, had they not in several of their reports recommended that there should be filter works erected for filtering the Croton water?

A. There had been reports made recommending it.

Q. By that commission?

A. Yes.

Q. You spoke, Mr. Smith, about the sedimentation of the Watchung tunnel. I wanted to ask you

about the growth—vegetable and animal in such a tunnel. Would not in your judgment such a growth occur?

A. I think there would, vegetable growth, possibly animal, too.

Q. Would it, in your judgment, increase as years go by—would that growth increase?

A. I don't think it would increase much after the first two years or three years.

Q. Do you think such growth would be increased by a gravel bottom?

A. I do not.

Q. Over the growth in the smooth bottom?

A. I do not, sir.

Q. Where do they usually grow, on the bottom or on the sides and tops?

A. Well, I have always found the most growth on the sides and tops than on the bottom in pipe lines; in aqueducts of course they grow on the top very well.

Q. Well, do you mean to say if the top is moistened by infiltration that there won't be a growth on the top also?

A. Oh, there might be a growth there. I hadn't noticed any in the cases where I had examined them.

Q. Have you examined these tunnels to find out whether such growth does grow from the top and sides?

A. Not very recently.

Q. When last?

A. In 1903 and 1904 I saw portions.

Q. Before the water was turned on?

A. No, afterwards, sir.

Q. After May 24, 1904?

A. Yes.

Q. And how did you go in the tunnel to examine it?

A. Well, we looked in the manholes and at the gate houses where you could see a distance in.

Q. Well, was that where this infiltration occurred?

A. No, I don't think at any point where there was any infiltration.

Q. Didn't you find, Mr. Smith, that there was quite a large growth—organic growth in the upper part of the Newark pipes?

A. Yes, I found it the entire length of the Newark pipes, sir.

Q. Did you have to clean it out?

A. No, sir.

Q. What did you do with it?

A. Left it there.

Q. How long was that after the pipes had been put in use?

A. It was there immediately from the time the pipes were in use; always is.

Q. Don't you know, Mr. Smith, that in the Boston conduits they have had to be repeatedly cleaned because of the growth of these vegetable or organic matters?

A. I know they have cleaned them, but I don't know that they have had to be cleaned.

Q. How often have you known that they cleaned them?

A. I don't know how often, I know that they have been cleaned a number of times.

Q. Are they iron pipe or conduits?

A. They have cleaned both.

Q. They have both iron pipes and conduits?

A. Yes, sir.

Q. And they have had to clean both?

A. They have cleaned both.

Q. They have cleaned them?

A. Yes.

Q. Do you know, Mr. Smith, whether that cleaning is done by mechanical methods, one reason being perhaps that it shall be done quickly?

A. I think they have cleaned it by getting inside and sweeping or scraping the aqueduct.

Q. By mechanical scrapers?

A. Why mostly by good hard work, I guess, by hand, as I understand it.

Q. You think it has been done by hand?

A. Largely, yes. Some big cast iron pipes I think they do in the same way. I think they scrape them over by hand.

Q. Do I understand you, Mr. Smith, to say that the City of New York did not acquire the land along the Croton Tributaries?

A. I said the Aqueduct Commission in carrying out their work did not.

Q. What is that?

A. I said the Aqueduct Commission did not acquire any land along the tributaries except what was necessary for their reservoirs and a certain distance outside the flow line.

Q. But the City of New York did afterwards, didn't it?

A. I think the Board of Health has taken individual pieces along certain points or streams.

Q. And the tributaries?

A. Some tributaries.

Q. Wasn't that the removal of the villages of which the Chancellor spoke to you?

A. No. I know of no case where any villages have been removed, either for the construction purposes or for sanitary purposes. Some buildings have been removed, but no villages, except those that came within the reservoir basins and its immediate appertinent territory—those few hundred feet that was taken outside.

By the Court:

Q. Well, is there any town along the course of the Croton river as large as Dover?

A. No. Brewster is quite a little town and that is immediately on the stream, that is about the largest town.

Further Cross:

Q. Haven't they purifying works at Brewster?
A. They have a little arrangement there.
Q. Well, the town is little, isn't it?
A. The town is quite a little town.
Q. And they have purifying works there, do they?
A. They have some sort of an arrangement I am not at all familiar with.
Q. Who has that?
A. Why, I suppose that work is all under the supervision of the Department of the Water Supply.
Q. Do you know of any town that sewers into the Croton river?
A. There are no sewer systems anywhere in the Croton that I am aware of.
Q. So you know of none that drains into the tributary?
A. Yes, they drain in, but there is no sewage system there, as far as I know.
Q. What town is it that sewers into the Croton water supply?
Mr. Corbin: There is no evidence that there is any that sewers. He said that there was no sewage system, that they drained in.
A. They drain in, natural drainage, and of course that must be true of every house or collection of houses on that water shed.
Q. Do you say that from these houses sewage goes into the stream?
A. I do not, sir, I wouldn't say that it did or did not, it has never been under my supervision.
Q. You have never examined that subject at all, then, I suppose, Mr. Smith?
A. No, sir, I haven't.
Q. This arangement—I think it was called a gate or gates, at the lower level canal, is intended to keep the water from flowing from the lower level

canal into the raceway, that leads to the mills that are lower down?

A. That is the intention.

Q. At the point where the gate is the waters meet. Some water flows into the canal—ordinarily flows into the lower level canal, and some of the water goes on down to the mills below?

A. Why, as I understand it, generally, or almost always the water flows into the lower level canal from this raceway which feeds certain mills. Objection was made on the part of the city that there were rare occasions when the water from the lower level canal was drained back and through the wheels of the mill, and this gate was erected to prevent that rare occurrence.

Q. That was when the water in the raceway leading to those works—these mills—would be lower than the water in the lower level canal?

A. Well, when the supply which came down that canal was insufficient to feed the mills, then there would be in that case a tendency to draw water back from the lower level canal—there would have been.

Q. If any water runs from the lower level canal into that raceway it passes on down to the Rockaway river, does it not?

A. I would like that repeated, please?

Q. (Question repeated.)

A. I suppose it would if it was drained through those mills—they discharge into the river.

Q. Well, now, you happened to be there at one time when the canal boat came down the inclined level?

A. Yes, sir.

Q. And struck the water of the lower level canal?

A. Yes, sir.

Q. And at that time it raised the water in the lower level so that it ran over into the raceway?

A. No it didn't. It created waves, as it natural-

ly would, when it struck the lower level, and as those waves went over to the gates they closed up tight. I stayed there purposely to watch what would happen, and I waited there for some time to see whether there would be a——

Q. Well, at that time then the water in the raceway was higher than the water in the lower level canal?

A. Well, I don't know about that, I don't think it was, it wasn't higher when these waves struck the gate anyway. The lower level must have been high at that time.

By the Court:

Q. Do these gates close automatically?

A. Yes, if there is any water—if there is practically no obstruction of the water always feeding the canal that the mills have—there is a surplus running through in the lower level canal, except the gates are weighted they push open like flap gates, but immediately when there is a tendency to flow in the other direction they close up, and at this particular time I was with Mr. Merriman and I said, I never seen your gates work, Mr. Merriman was the designer, and we waited around for some time to see how they were going to operate.

Further Cross:

Q. Mr. Smith, are the lower gates automatic as well as the upper ones?

A. The lower gates are permanent, regular water works gate valve.

Q. They can be opened or closed as may be needed for the mills below?

A. Well, they can be opened or closed, if they want to empty.

Q. But the gates on top of those gates are automatic?

A. Yes, sir.

Q. About what is their height?

A. They are not very high, I should say eight or ten or twelve inches.

Q. Then the lower gates, which are not automatic, extend to about twelve inches from the surface of the water?

A. Down in the bottom of this bulkhead.

Q. Down in the bottom and up to about twelve inches, and then that twelve inches is occupied by these automatic gates you speak of?

A. Yes, sir, they are at the ordinary level of the water about high enough to take in the variations in the height of the two canals.

Re-direct Examination:

Q. Mr. Smith, I show you a plan entitled Jersey City Water Supply Company, Jersey City, New Jersey, proposed method of diverting pollution of Brook Street brook, April 23, 1904. Look at that map. Does that show the locations you have been talking about with this upper and lower level of the canal and raceway, etc.?

A. Yes.

Q. Indicate on that where this automatic gate is?

The Court: He will have to indicate it by a letter or something.

Mr. Corbin: With the permission of the Court we will mark it.

A. I will mark it with the word "gate" on the plan.

Q. Now, is the incline plane of the canal shown here?

A. Yes, it is shown by these lines up here (indicating).

Q. Now explain how the water ordinarily flows from the level of the canal which is at the head of the incline plane?

A. Why——

Q. In the first place that water is used to operate the plane?

A. Yes, sir.

Q. Where is the wheel, and where does the water go from the wheel which operates the plane?

A. This (indicating) I think is the operating house for the plant, and that water discharges down through the second level of the canal, this little pole here, and other water comes in there too, and that is taken from this level (indicating) to the lower level.

Q. Lower level of the canal?

A. Yes, sir.

By the Court:

Q. You are now pointing to what word?

A. Lower level, that is, the canal is on the same level as the level at the foot of the plane, as I stated a few minutes ago, the mill drew from here (indicating).

Q. From here, is from the lower level?

A. From the lower level, and this bulkhead was put in to prevent them drawing any of this water back. You see if this don't balance there might be occasions when they didn't have quite sufficient water, and then of course it must feed from there.

Further Direct:

Q. This lower level of the canal reaches all the way to Montville?

A. Yes, sir.

Q. And the gate is indicated to prevent water being drawn back from Montville?

A. Yes, sir.

Q. And it will be only such as comes in from the level above?

A. Yes, sir.

Q. Where do the mills take out from the lower level for their wheel?

A. The mills are on this side of the gate, right along here (indicating).

Q. Well, right along here don't mean anything.

A. Well, I will mark mills in here. I have indicated here by the blue pencil line and the word mills.

By the Court:

Q. I notice to the left of the gate a break in what seems to be the section of the lower level of the canal, what is that?

A. I think that is a bridge across there, your Honor.

Q. Well, indicate it by the letter B.

A. (Witness does so). The mills are all on this side of the bulkhead.

Q. On which side, the south or north?

A. On the upstream side.

Further Re-direct:

Q. Mr. Smith, is there any feeder to this lower level of the canal except this feeder you have indicated from the upper level?

A. No.

Q. Then all the water from here down to Montville has to be supplied through this course you have indicated?

A. Yes.

Q. And from this upper end of the lower level the mills also take their supply at Boonton, do they?

A. Yes, sir.

Q. How long is that upper portion of the lower level from which they draw and which is shown on this map, that is from your gates westward?

A. About a couple of thousand feet.

Q. And at the lower end of those two thousand feet is the automatic gate which you put in, is that it?

A. Yes.

Q. Now that gate, Mr. Smith, then is intended to prevent a back flow of any impure water which might be in the lower canal, is that it?

A. It does prevent it.

Q. Where does the semi-circular drain that was put in at Boonton empty into the lower level of the canal?

A. I will make a point there.

Q. Draw right across it where the drain is, anything you like. I understand there is a cement drain which you put in?

A. Yes. I will mark that "drain."

Q. It runs up alongside of the plane to Brook street, does it?

A. Yes, sir, it runs up between the tracks where the boats are carried.

The Court: I don't quite understand where the rest of the water comes down, all the water that does not pass through what is indicated on that map as second level canal.

Q. Where does the flow of the Rockaway river from Powerville down to Boonton go, which is not taken into the canal?

A. Why it runs out here.

Q. You mean down the river?

A. Yes, sir.

Q. Follows the natural bed of the stream?

A. Yes, sir.

Q. How much of a lift is there at this incline plane at Boonton?

A. I haven't got those figures in my head now.

Q. Can you tell approximately?

A. Seventy or eighty feet, I think.

Q. Now at the lower end of what we call the lower level of the canal, that is down at Montville, is there another drop there?

A. Yes, sir.

Q. By what, lock or incline plane?

A. I am not entirely familiar with that, I think it is a lock.

Q. Is not there also a lock near Boonton?

A. A few thousand feet from Boonton there is a lock.

Q. And there is a by-pass to that lock, is there not, so that the water can flow around it?

A. Yes, sir.

The Court: The witness has not as yet stated what I suppose of course is the fact, that the dotted lines opposite the word river indicate the race-way.

Q. Is this the tail race of the mills?

A. Yes, this is where the water is drained into the mill at this point and then discharged out into the river.

Q. Is that tail race there? (indicating).

A. That is what I understand it to be.

Q. Well, put down tail race there?

A. (Witness does so.)

Q. Now is this the head race up near the canal?

A. Yes, sir.

Q. Mark it head race?

A. (Witness does so.)

Q. Now, down at Montville, do you happen to know whether there are mills there which are operated by water drained constantly from the canal?

A. Yes, Capsticks.

Q. In this lower level of the canal from Boonton to Montville is there or is there not a stream flowing towards Montville—a current flowing towards Montville?

A. Yes, there is.

Q. Do you know how much per second Capsticks takes at Montville from the canal?

A. I don't know, it is a good large mile.

Mr. Corbin: I offer this plan in evidence.

Marked Exhibit D 2.

Q. Where are the Cooper-Lord mills in Boonton, so-called?

A. I can't point them out on that map, but somewhere along here.

Q. What is called the second level canal?

A. I never knew the boundaries of their property; I never had occasion to look into it.

Further Cross:

Q. I notice on this map also running in the second level canal what is marked on the blue print as a ditch, the Brook Street brook, and I ask you what that indicates?

A. Why, the explanation is right here on the blue print, it is an overflow provided for any excessive overflow.

Q. Well, there was a provision for an overflow in case this ditch or drain was not sufficient to carry the overflow, it would go down into the second level?

A. Yes, sir.

Q. And this shows the provision made for that purpose?

A. Yes, sir.

Q. Now I would like to ask you one question I forgot, if the Court will permit me to. You spoke about the plans of this stone dam, which counsel called it, of the Boonton reservoir having been sent to Mr. Ferris; now I show you plans which he has produced and I ask you whether those

are the plans to which you refer. There are two plans here. First I will show you one of them?

A. These appear to be (indicating)—that one appears to be.

Q. I am asking you about two. This one you have looked at now appears to be what?

A. Appears to be one of the working drawings. This is one that must have been submitted to Mr. Ferris by Mr. Harrison. I never submitted any to him directly.

Q. Look at the other one which I show you, and say whether that is also—what have you to say as to this one?

A. Yes, this was submitted to him, but I don't know as it was the final one. It was submitted by Mr. Harrison. I never submitted anything directly to Mr. Ferris, and it was marked that this was corrected at a later date.

Q. Now read the title so that we can identify it?

A. The first one I looked at is Jersey City Water Supply Co., Jersey City, N. J., contract No. 3 main dam at Boonton, plan, details, etc.

Q. Dated?

A. Approved April 14, 1902. Edlow W. Harrison, Chief Engineer. Sheets corrected to June 20, 1902.

Q. Now the other map?

A. Jersey City Water Supply Company, Jersey City, N. J. Contract No. 3, main dam at Boonton, standard scale 1 inch to 20 feet. Approved April 14, 1902. Edlow W. Harrison, Chief Engineer. This is also a corrected sheet, corrected to June 20, 1902.

Q. Now, will you please tell us whether the dam was built in accordance with these detail drawings?

A. No, sir, it was not.

Q. In what respect was it not so built?

A. Well, this change was the addition that was put in by Mr. Ferris's suggestion, and I don't think

it shows the details of the overflow as they were finally considered, in fact it could not because there was a corrected sheet referred to here.

Q. What addition do you refer to that Mr. Ferris asked for?

A. Addition on account of the steel pipes running through the dam.

Q. Could you see it on Mr.——(interrupted).

Q. Well, that is on the addition to the plan you have referred, this plan being the first plan shown to you?

A. I don't think so.

Q. What was that addition as you remember it?

A. Something like 4 feet I should think.

Q. Four feet of what?

A. Out from the face of the dam.

Q. Where?

A. Directly back of the point where the pipes went through the bottom of the dam.

Q. How wide was that addition of 4 feet?

A. Well, I haven't looked at that in a long time, and I would not like to say. There are drawings and I can show you the drawings, if you like.

Q. Have you the drawings with you?

A. I haven't; I know it came to nothing at the top, as I remember it.

Q. Yes?

A. And a considerable amount down at the bottom?

Q. How wide was it at the bottom?

A. I cannot tell you now.

Q. About?

A. Well, whatever Mr. Ferris thought necessary.

Q. Well, now, about what was it?

A. Well, as I recall it, very roughly about 4 feet, and perhaps 18 to 20 feet long.

Q. Fifteen to 20 feet long, 4 feet thick, and sloping up to the top right in the rear of the pipes?

A. Whatever was agreed upon at that time.

Q. Now, with this exception, do you say the dam was built in accordance with these drawings, and perhaps a little changed in the spillway?

A. I think so, sir, but I want to take this and compare it carefully with another plan.

Q. Is that your judgment now after looking at it?

A. Yes, sir; that was built substantially as shown here after looking at this one alluded to.

(Witness, continuing). I see an indication of that buttress here, Mr. Vredenburgh, that has been spoken of. It is very faint.

Mr. Corbin: Is that the line of red ink?

Witness: No. That line of buttress. That is the position it was in.

(By Mr. Vredenburgh):

Q. So you find that also on this detail plan that I show you. Now, Mr. Smith, leaving the plans. I understod you to say that there was no difficulty in raising this dam so that the flow line thereof would be at an elevation of 307½ feet?

Mr. Corbin: Adding nineteen feet to it.

Mr. Edwards: That plan isn't possible, because it was on the old Kingsland dam. It is 305 feet now; that would be only two feet.

Q. I will change that question, Mr. Smith, at the suggestion of the other side. I understood you to say that there was no difficulty in raising this dam so that the flow line thereof would be at an elevation of 324 feet and 35 one-hundredths?

A. No difficulty, I think.

Q. And how would you raise it?

A. Well, I think I would raise it in either one of——

Q. When you speak of raising the dam. I refer to that.

Mr. Corbin: He has mentioned three ways. Now you ask him which one.

Mr. Vredenburgh: I am referring to raising it; building on top of the dam.

Q. Now, you used the word "raising." Do you mean building on top of the present dam?

A. No, I refer to building a structure which would be proper if the water were raised nineteen feet and two inches, or whatever the amount is, necessary for the 70,000,000 gallons.

Q. Would it be possible, Mr. Smith, to build on the top of the present dam a structure which would impound this 70,000,000 of gallons a day, or be at a flow line height of 324.35 feet?

A. Oh, yes; that is possible, sir.

Q. Of what material would you build it?

A. I would build it of the same sort of material the rest is built of.

Q. And how high would that have to be?

A. I haven't gone into that calculation. I can't tell you, sir.

Q. It could be done, but it would have to be about 109 feet higher than the present structure, would it not?

A. I don't think as high as that. I should think about thirty feet perhaps ought to do it.

Q. You haven't figured that out carefully?

A. No, I haven't figured it out.

Q. Now, when have you been to that dam last?

A. Well, some time in the Fall, Mr. Vredenburgh, is the last time I remember.

Q. In what other way, Mr. Smith, would you

raise the dam? I think you said there were three ways. The second way?

A. The second way is to add a slice of masonry to the entire face, and carry that up to the present height and then continue up a proper height above.

Q. Now, the slice you would add to the present dam would be of what thickness?

A. Well, I haven't calculated that out. It would be five or six feet thick, I should estimate roughly. It would be much thicker at the bottom, probably, than at the top.

Q. If the water from the reservoir should get between the present dam and the additional slice which you were going to add to it, in such quantities as to fill the space between, wouldn't a much greater slice of dam be required than if the water was not there?

A. I wouldn't let it be there.

Q. If the dam leaked to the extent that I have mentioned, that would add very materially to the cost of adding this additional slice, unless in some way you could stop the leak?

A. No. It would not.

Q. Won't you please explain why not?

A. I should drain that slice, Mr. Vredenburgh, so that you couldn't get a water pressure there.

Q. You would put a drain there?

A. I would avoid any possibility——

Q. Where would that drain be?

A. That would be little openings at frequent intervals, so as to insure the draining of that. And, as to that, I would say that a very distinguished engineer has advocated building all dams with a drainage system in them; a thin wall on the water side and then providing a drainage system at that point, so that the rest of the masonry never could have any seepage or anything through it, and would act by its weight the way dams are calculated to act.

Q. You don't provide any such drainage in this dam?

A. No. It has never been done in any dam.

Q. Why not?

A. I don't know. It makes the dam a great deal more expensive.

Q. This slice you would add. You say, you don't know what thickness it would be yet?

A. I haven't calculated yet; but I think it would be something like five feet or six feet.

Q. And how far would that have to be carried down?

A. Carried down on a solid foundation.

Q. To the same elevation as the foundation of the present dam?

A. Not necessarily. So that you had got rock of sufficient supporting power. The present dam has cut off the water, so that no water gets underneath it. And this other slice needn't necessarily go, until you got a sufficient foundation to bear the weight. We carried that down quite a distance to insure cutting off a seepage under the dam. That has been cut off now.

Q. What was the third plan?

A. The third plan was, instead of making this a continuous slice on the dam, to build bigger masses of masonry and put them in buttresses, perhaps with fifty feet clear space between them, or something like that. You would have then a piece of masonry of greater thickness.

Q. How would that compare in expense with your second plan?

A. Well, I shouldn't expect it to vary materially from that plan. I don't see any reason why it should.

Q. Do you remember, Mr. Smith, of any dam that is comparable in size with this dam, to which a slice has been added in the way you suggest?

A. I haven't any in mind.

Q. Now, just one minute. Mr. Smith, you were

talking about the lower level gate, and I happen to have a photograph here which I will show you and ask you whether that tends at all to make the matter clearer there?

A. (Examining photograph.) I think that is the photograph of that gate, sir.

Q. And is the gate shown there in any way?

A. The upper gate is shown.

Q. Suppose you just mark where the upper gate is, with the letter "G."

(Witness marks "G" upon photograph accordingly.)

Q. Mr. Smith, do you know whether, if those gates which you have marked there were open, both the automatic gates and those you say are not automatic, which way the water would flow?

A. Why, it would generally flow into the navigation canal from the power canal.

Q. Wouldn't it flow down the raceway into the river?

A. I have been there a great many times. I have never seen the direction of the current that way. It has always been flowing that way, and I suppose I have been there a hundred times in the last three or four years; and it has always been flowing the other direction.

Q. How were the gates? Open or shut?

A. That was before there was any bulkhead put in. I don't remember being there but once since I was the time I spoke about.

Q. Wasn't there these lower gates there always? Those that are not automatic?

A. No. They were not there. There was a bulkhead put in, and they were put in the same time these automatic ones were put in.

By Mr. Vredenburgh: I offer this photograph in evidence. Marked Exhibit C 99.

I also offer 2 maps in evidence. Marked Exhibit C 100 and C 101.

Re-direct:

Q. Before the bulkhead and gates were put in at the foot of the Boonton plane as shown here on Exhibit C 99, was there any dam or rear bulkhead or any stop whatever to baffle the flow of water there?

A. None that I am aware of, I don't recollect any.

Q. I mean below the head race of the mills?

A. No, that was an open channel where I have marked the bulkhead line.

Q. There were gates at the head race of the mill?

A. Yes, sir.

Q. I refer to these drawings recently offered, Exhibit C 100 and C 101; is that thickening of the Boonton dam which was determined upon by you and Mr. Gardiner to increase the factor of safety?

A. No, sir, it is not.

Q. The dam is thicker than this drawing shows?

A. I think this is the drawing with the full thickness on; without a careful examination I would not want to say certainly. They were made in our office after March, when there was a change in the company, and I think those are the new sections.

Q. You think these show it?

A. Yes, sir, there were other drawings made in Mr. Harrison's office afterwards; I think they show the improvement.

Q. Speaking of the foundation of the Boonton dam and the slice which was to be put upon it, is there rock all the way across the valley there as far as the stone dam extends?

A. Yes, sir.

Q. How near does that come up to the bottom of the river?

A. Why, it was very near the bed of the river, you did not have to go very deep.

Q. It was a good firm foundation, was it?

A. Yes sir, I think perhaps at the extreme end to step out of the earth, but it was only a short distance there.

Q. That was where the dam was not very high?

A. Yes, sir.

Q. And not very deep?

A. Yes, sir, I think it was only the core wall.

Q. Speaking of this slice you put in, that was merely on account of weight, was it not?

A. Yes, sir.

Q. If you piled stones up on the top of it to a great height, it would be with the same object of making weight?

A. Yes, sir.

Q. Not to make it any tighter?

A. Well, of course you could make it tight too.

Q. Suppose this additional slice you put on was full of holes, so that the water would leak through, the dam would still be good?

A. Yes, sir, but I would not build it that way.

Q. You would not attempt to build the new slice water tight?

A. Yes, sir, I would build it as tight as I could and make definite places and definite plans for thorough seepage.

Q. What do you call those?

A. Weep holes; I would build the masonry just as good as the rest of it is built; I would study out the plans and thoroughly drain that slice.

Q. On this blue print map D 2, I don't see any indication—is there any indication of the channel that you made down that plane?

A. I understand this is it (indicating).

Q. The dotted lines down the plane?

A. Yes, sir.

Q. Is that right down the face of the plane in fact?

A. Yes, sir.

Q. Right down between the rails and one-half

way down opposite what is called the second level canal there is an overflow?

A. Yes, sir.

Q. What is the object of that?

A. Why, it is marked very plainly on the blue print, an over-flow provided for excessive flow.

Q. In cases of great storm or something of that kind?

A. Yes, sir.

Q. Do you remember the capacity of the channel along that plane?

A. I don't remember that; it was designed so that no over-flow would take place except in very heavy rains, and of course under a natural condition of affairs that would not take place for a considerable period.

Q. Suppose an excessive rainfall did come and finally the ditch filled up so that it did overflow at the Second River canal, would that be objectionable to the water supply in your judgment?

Objected to.

Q. Would that in your opinion be objectionable?

A. It would not.

Q. Why not?

A. The drain would be thoroughly washed out before the overflow came; I don't think there would be any objectionable sewage in it at that time, and perhaps not at any time.

Q. Is that the usual construction in engineering to have an overflow for drainage?

A. It is very generally used—fixing a place where the overflow would have to go and not allowing it to go otherwise.

Cross examination.

Q. Is that the usual construction of sewers?

A. I think very often sewer water overflows are provided in some sewers and under some conditions.

Q. Open sewers?

A. There are not many open sewers built.

By the Court:

Q. I suppose you could make drains so large that they would carry off all the water, but on the score of economy you make them smaller and then provide for any overflow?

A. Yes, sir, that is done, and sometimes it is provided as a measure of safety for unusual conditions—where it is made as in this case it would come so great that this drain cannot carry it down, and they don't want it to overflow on the ground and cut it out, so they fix a place where it must go.

Further direct.

Q. Was it so placed as a matter of fact by the Canal Company as a matter of safety?

A. I don't know.

Further cross.

Q. In point of fact have you ever been there when there was an overflow?

A. Yes, sir.

Q. Well, the overflow is practically on the earth of the incline plane, is it not?

A. It is right at the angle of the drain, right on the incline.

Q. So that it does not protect the drain itself in case of overflow, does it?

A. Why yes.

Q. How?

A. Why, if the water goes above a certain

height, it overflows into this overflow, and is carried over into the raceway.

Q. The overflow itself is an earthen concern, is it not, not bricks or cement or anything of that kind?

A. Yes, sir, the overflow is.

Q. But the drain from the overflow I mean?

A. I don't think it is all cement, but it is cement from the beginning of it; at any rate it serves its purpose all right.

Q. I have a photograph of it here, I show it to you; now by looking at it can you recall it?

A. Yes, sir, that looks natural, and it appears to be cement work in between the tracks there up to this point (indicating).

Q. It does not show upon the map?

A. No, sir, but between the tracks there it is evidently cement work.

Recess.

After recess.

EDLOW W. HARRISON, a witness sworn for the defendants.

Direct examination by Mr. Corbin:

Q. Where do you reside, Mr. Harrison?

A. Jersey City.

Q. What is your occupation?

A. Civil engineer.

Q. How long have you been a civil engineer?

A. 35 years.

Q. What has been the line of your practice?

A. About one-third of my work has been

hydraulic, and about one-third railroad; and the other third general engineering work, construction of docks, wharves, piers, buildings, &c.

Q. When did you first take up the matter of water supply for Jersey City and other north Jersey towns?

A. I was assistant engineer to the Street and Water Board from 1881 to the Spring of 1884, and was appointed especially with a view to the remedying of the supply, to see what could be done towards improving the quality of the water. We were then pumping from the Passaic River, and the water had got very bad. After that, about 1886 or 1887, I was employed by the Bartlett syndicate, that is the originator really of the East Jersey Water Company, and I made a report in connection with Mr. Clement Herschel and Mr. George Howell on the three different powers owning and controlling the water supply in the Passaic valley, as to their relative ability in the matter of supplying water: the Morris Canal Company, the Montclair Water Company and the Society for Useful Manufactures. I was employed by the Lehigh Valley, or Morris Canal Company, in making propositions and examinations as to the cost of the water then pumped from the Passaic River, and as to whether the company could supply water from the Morris Canal and other holdings it had in the water shed. After that the East Jersey Water Company was formed. Jersey City advertised for bids for water under different plans. I became then engineer in connection with the company called the Rockaway and Hudson Company. We made three bids; I think all of them were the lowest. And at the time all the bids were thrown out. We made bids for, I believe, the 35,000,000 one time; then they raised it to 50,000,000, and I think we made a bid on the 50,000,000 and 70,000,000, on the Rockaway Water Shed. Our company was working in connection with the Cooper-Lord estate, and the Continental

Trust Company of New York, and the Maryland Steel Company of Baltimore. After Flynn made his bid, which had been accepted, under which the work is done now, I was employed in the Summer of 1889 as consulting engineer to go over his plans, look into his work, and to assist in revising and preparing the actual working drawings. I examined the original dam site as proposed, and also other sites in the valley; examined the borings that had been made. And I think I may say I practically located the present dam; had it moved up-stream to the first point up-stream where rock could be found.

Q. Did you become the engineer in charge of the Jersey City Water Supply Company?

A. There was an engineer. There was a Mr. Hume acting for Mr. Connolly at that time. I don't think he ever had any title as Chief Engineer. But I acted as consulting engineer and nearly all the matters connected between the company and the city passed through my hands.

Q. Until what time?

A. Until the Spring of 1902. Then I became Chief Engineer of the company, and all the matters which the company had in connection with the work between the company and the city (through the engineer of the city) passed through me. I was the medium of communication between the company and the city. All plans passed through my hands to the city, and as Chief Engineer I had to approve them all.

Q. Did you continue in charge until the works were done?

A. I am to-day.

Q. In the course of these employments you have mentioned, did you make explorations and studies of the Rockaway water shed?

A. Yes, sir.

Q. Personally?

A. Personally. I think there is hardly any

point of the Rockaway water shed I haven't been over and looked into; measured a great many streams, examined positions for dams, dikes and reservoir sites. I want to say that I revised and made the changes in the Flynn plan as proposed, which included the concrete conduits on the hydraulic grade, and a 72-inch pipe on a greater grade than his original plan.

Q. Are those the changes which were made at the time the supplementary contract was made in July, 1901?

A. No. Those changes were made when the dam was changed. And a letter was written by Mr. Flynn, which appears in the minutes already introduced. I wrote that letter and Flynn signed it.

Q. That letter is in evidence, isn't it?

A. That is in evidence; the letter in the Street and Water Board's minutes. It was read by Mr. Ferris.

Q. You have said that you were the medium of communication between the company and the city?

A. Yes, sir.

Q. And who, on behalf of the city, was the medium of communication?

A. Mr. Garwood Ferris.

Q. I show a map entitled: "Jersey City Water Supply Company. Plan and Sections of Masonry Dam and Gate Houses at Boonton, N. J. Scales 50 feet and 20 feet to 1 inch. May, 1900. P. Hume, Chief Engineer." Did you have that map in your possession?

A. I had the prints from it. The white prints from it.

Q. What did you do with them?

A. I send a full set of copies to Mr. Ferris.

Q. On what date.

A. I have the letter of transmission here.

(Consults letter press copy-book). Letter of August 1st, 1900.

Did you send a letter of transmission with the map to Mr. Ferris?

A. Yes, sir.

Q. Have you your letter book copy of it?

A. I have.

Mr. Corbin: I ask the other side to produce the original. In the meantime I ask leave to use the copy.

Q. With the permission of the court, I ask that you read the letter of transmission of August 1st to Mr. Ferris.

(Witness reads from letter-press copy-book as follows:

"Mr. Garwood Ferris, Dear Sir:

"I send you herewith by courtesy of Mr. Bowley the following plans for your approval:

"(1) F 359. General plan, showing dam and horizontal section, with various cross-sections, and also the spill-way."

Witness: I think that is the one you have in your hand. (Reading):

"(2) F 361. Section and elevation of the intake wells and gate chambers.

"(3) F 357. Bottom drainage pipes, or sluiceway.

"(4) F 319. Standard dam section at highest point.

Witness: The rest of the letter refers to the area of the reservoir.

Mr. Corbin: I don't care about it, unless the others want it.

Mr. Edwards: Read the whole letter.

(Witness continues reading, as follows):

"Mr. Godfrey's re-calculation of the area and section of the reservoir site shows that in order to obtain a storage for 70,000,000 gallons without allowing any excavation of the material used in the back dike or the prism formed by the inside slopes of the back dike, or the prism formed by the batter at the back of the dam, would require the raising of the water line at the dam about .15. That is, it needs about 200,000 cubic yards additional cubic contents. The plans sent to you have the elevation as originally established. The excavation necessary to furnish material for the back dykes and also such excavation as we shall make to carry out your ideas in regard to side slopes, I am satisfied, will furnish the necessary additional cubic contents. Ifnot, it is merely a matter of raising the dam from nothing to 15 hundredths of a foot higher.

"Very truly yours,

E. W. HARRISON,

Cons. Eng. J. C. W. S. Co."

Q. Is this map which you have produced the map referred to in your letter as F 359?

A. Yes. Horizontal section.

Q. Does this map show sections of the stone dam as it was proposed to be built?

A. Yes, sir.

Q. Does it show it with the thickening which was actually put on, or without that thickening?

A. It shows it without the thickening which was

put on after 1902. The plan was revised after 1902, and the thickness of the top made 17 feet instead of 12 feet as here.

Q. Are these sections of the dam otherwise correct with the exception of thickening?

A. Practically correct, except the thickening, the change including the change in the angle of the main slope.

Q. Does this map show also the section of the earth walls at the wings of this dam?

A. Yes, sir.

Q. Were they built as shown here?

A. The section of the core wall, but not the same as it is there, we adopted finally a core wall of about the section of the Clinton dam.

Q. Look at this sheet and say how many sections of the stone dam there are shown on this paper?

A. 7 sections of the stone dam.

Q. Do these sections show the proposed method of raising the dam to 70 millions?

A. Yes, sir.

Q. And that method was by doing what?

A. That is shown by the dotted lines, by raising the top and thickening the down stream side of the dam.

Q. Is that what you call the slice, in the language of Mr. Smith?

A. Yes, sir, the same as Mr. Smith spoke of.

By Mr. Corbin: I offer this map in evidence and ask it to be marked Exhibit D3.

Q. Does this map also show the proposed method of raising the rear walls or earth walls, earth wings of the dam?

A. Yes, sir, that map was made before the vote was taken as to whether it should be 70 or 50 millions.

Q. Vote of the city, you mean?

A. Yes, sir.

Q. Now, I understand it is about two years after

the making or presentation of this map before you decided upon the thickening of the walls by giving it a greater—what do you call it, ratio of safety, factor of safety, and the thickening required by Mr. Ferris?

A. That was in April. We decided to change the section, making the top of the dam 17 feet and practically changing the co-efficient of safety from that of 2.10 which is about the co-efficient of the Croton dam, and changing it to about 2.50 or 2.80. In the spring of 1902 after the new capital came into the work—

Q. With the exception of that change requested by Mr. Ferris of thickening the front of the dam, was there ever any demand by him or by the city for any other change in the dam?

A. I think the change I have mentioned in my last answer but that was a change not made by the suggestion of Mr. Ferris but by Mr. Gardiner, the president of our company.

Q. Referring to the other change in the dam where you thickened it at Mr. Ferris' suggestion opposite the pipes that went down through the dam, did he ever ask for any other changes before that?

A. No, sir, I submitted the plan revised to take the place of this one—I will give you my letter if you like. (Referring to letter). I submitted a revised plan with a 17 foot top on January 28, 1902. Will I read the letter?

By the Court: Will you read your letter, and the other side can verify it afterwards?

A. Mr. Garwood Ferris, Supervising Engineer, City Hall, Jersey City, N. J.—I would say that Mr. Garwood Ferris is made by this letter, and I suppose by the type-writer, the engineer of the Jersey City Water Supply Company. J. C. W. S. Co., City Hall, Jersey City, N. J. I was detained in New York so late yesterday afternoon that I was unable to get off plans to you. I send you 2 sets of white prints with revised and corrected draw-

ings, of the dam, also a white print and profile of the pipe line station 784 to 800; 800 to 815; 816 to 832; also 2 sets of blue prints and plans of abatement on the other side of the mill race at Franklin and Kingsland; also 2 sets of blue prints of the proposed method of connection with the East Jersey—with the—Jersey City Water Supply Co.'s pipe in upper Montclair. Please advise me early of any suggestions you may have to make on these plans.

Very truly yours,

E. W. HARRISON,

Chief Engineer J. C. W. S. Co."

Q. Here are plans which the complainant offered in evidence to-day, and which are marked Exhibits C 100 and C 101—are they the plans referred to in your letter of transmission?

A. Yes, sir, those are the ones. Well, the original of these were sent in, but after I sent the plans which I referred to in that letter Mr. Ferris sent me a letter objecting to certain features, the principal feature being that he thought the back of the dam behind the well—

Q. Well, are these the plans which you sent with this letter of June 30, 1902?

A. Yes, sir.

Q. Now some changes were made by agreement between you, afterwards, were they?

A. Some changes were made because he wrote me and said he wanted certain changes made.

Q. Have you got his letter?

A. No, sir, I have not, it was returned to him at his request.

Q. What was the change in general which was desired and which was made?

A. He asked me to have the back of the dam reinforced behind the wells.

Q. And by back you mean the water side?

A. The water side.

Q. Was that done?

A. That was done, and I sent him the revised plans and got a letter back. We agreed to all his objections.

Mr. Corbin: I offer in evidence the letter dated June 30, 1902, by Garwood Ferris, engineer in charge to Mr. E. W. Harrison, chief engineer, J. C. W. Supply Co. and ask that it be marked Exhibit D4. The following of which is a copy:

"Yours of 28th and 30th instant received concerning plans, etc., as stated. I have not had time as yet to go over them, but will give the matter early attention. I notice, however, in the plans for the dyke portion of the main dam that nothing is said about paving or otherwise satisfactorily protecting the slopes on the water side above elevation 310.25. As your plans as now filed provide for a buttress at back of sluice well section the main dam though in bulk as I figure it, it is a little short of being equivalent to the space lost in dam proper by reason of the sluice gate wells. You may return me my letter to you of June 4th, and I will destroy it and cancel on letter book. This will leave, as I understand it the question of inlet chamber and receiving basin plans to be taken up by you and me hereafter. Yours truly, Garwood Ferris, Engineer in Charge."

Marked Exhibit D4.

Q. Were the changes which were desired by Mr. Ferris made?

A. Yes, sir, just as he says in his letter. That letter of June 5th was a letter making objections.

Q. Did he ever make other demands for changes submitted in 1900, except as you stated?

A. No, sir.

Q. You say that it was you who advised the change in the location of the dam and re-located the new dam?

A. Yes, sir.

Q. Why did you relocate it further up stream, Mr. Harrison?

A. The site proposed in the original proposition of Mr. Flynn turned out to be a case where there was a gravel bed—it was in the bottom of an old valley, and there was gravel below, and it ran down over a hundred feet before any hard rock could be reached. Where he proposed and thought he would put the side of the dam—into the hills there, there was nothing but a gravel hill. The dam to be constructed there would have to be equal to the great dam constructed for the Croton, or else it would not be safe, that is, it would have cost the whole amount of the contract to put a dam there, and another thing was, that the dam so placed would make a reservoir—the upper part of it would be the upper part of our reservoir, but the water line would be some fifteen or sixteen feet lower than the present high water line, so that the place where we now have twenty-five feet of water we would only have ten feet of water, that is, there would be a shallow reservoir at the upper end. I knew at the time no survey had been made of this reservoir site. Up to that time no survey was made, but a survey was then going on. We moved the dam further up stream, and attempted to find a point further up where we would get rock. The place where the dam is now situated is right close to the edge where the rock breaks off into this deep place in the valley, just about as close as it can be gotten with safety, and the furthest down the river the dam could be placed having a good foundation. Of course that meant—putting the dam up there meant raising the height of the dam, and the result

was that instead of a shallow reservoir we got a very deep one.

Q. Was that an advantage or otherwise?

A. It was an enormous advantage. The specifications required that it cannot be over a certain percentage of the reservoir, less than a certain depth—eight or ten feet—and we have gotten away inside of that.

Q. Did you get any greater head by going up there?

A. By going up there we made the pipe line a mile longer for conduit pipe, and I found that I was able to get a certain amount of supported grade, that is, get a conduit—a masonry conduit instead of steel pipe. A masonry conduit enabled me to use a gradient of six inches in a mile, where as the steel pipe required nearly three feet, that is I could save about two feet six inches on every mile of head for every mile of masonry conduit I could secure, and that enabled me to get more velocity in a pipe and a smaller pipe. The original pipe of seventy-six inches on the grade as originally called for would be of very low velocity, and it also was a very awkward size, and it was actually an experiment in pipes. (The largest pipe then laid was only six feet, and only a short distance of that was laid. I considered the more masonry conduit I could secure the greater advantage it would be to the City, and though it didn't save any money to the company on the plan, as they proposed, it saved an enormous amount of money to the company by not having to build a dam down in that gravel pit.

Q. But you say the conduit itself was not any larger than it would have been?

A. No, we didn't save any money by it, we put in masonry conduits which cost $15. and $16. a foot in place of steel pipe which would only cost about—six foot pipe cost about $11. the contract price. This cost about $20,000 more a mile, and

you see the position the company were in they had to go up stream or else spend all their money for a dam.

Q. What data did you have from which to figure the size which a steel pipe must be?

A. The specifications give a co-efficient—pipes were all figured on that, and also conduits.

Q. And the steeper the grade you had of course the smaller the pipe would be?

A. Yes, sir.

Q. Did you get as good a reservoir by the changed dam as you would have got with the dam below?

A. Much better; I say we got a deeper reservoir, and another thing, we got a reservoir with steeper sides.

Q. How much conduit were you enabled to build on this new hydraulic gradient all told?

A. We have about four miles of conduit.

Q. Did that include the tunnels?

A. About four miles of conduit, and we also, by the change in the conduit, were enabled to shorten the tunnels down by new lines—shorten the tunnels from three miles of tunnel down to about two miles, that is, I saved about a mile of tunnel. I got four miles of conduit and I saved three miles of pipe.

Q. Did you get any shorter line on the whole?

A. No, the lines increased, the line is a mile longer, just about the distance we had to go up stream.

Q. This matter was submitted to the Board of Street and Water Commissioners, wasn't it?

A. I submitted it in a letter from Patrick H. Flynn accompanied by a letter from Mr. Ferris.

Mr. Corbin: I offer in evidence the book of minutes. Printed copy of Jersey City, called Manual of the Board of Street & Water Commissioners for 1899 and 1900, page 235, containing first a com-

munication dated October 23, 1899, from Garwood Ferris engineer in charge of construction of new water works, to the Board of Street & Water Commissioners, to which is appended a letter signed P. H. Flynn, Jersey City Water Supply Co.; M. J. Kennedy, vice president, being a communication directed to Garwood Ferris, supervising engineer, received and referred to the committee on new water works. Also page 251, being part of the Minutes of October 31, 1899. The report of the Committee on new Water Works presented the following—with permission of the Court I will read that report, it is very brief.

'Whereas in the provisions of specifications and contract for a new water supply heretofore adopted and entered into by the City, the contractor for the building of new water works and the furnishing of such supply is permitted to change the location of reservoir site from that offered in his bid if certain physical conditions are such as to warrant such change, and the site and reservoir so to be substituted therefor is "of equal value and efficiency" etc., and

"Whereas the agent of the Board, namely, the engineer in charge of construction of such water works, has, comformably with his duty, notified this body of the desire of the contractor to make such change, and that he, the said engineer in charge, etc., believes that the best interest of the City would be conserved by the permitting of such change and substitution,—

"Resolved, That the change and substitution as suggested by, be acquiesced in and agreed to by this Board provided that no additional charge therefore should be made to the City, and that all responsibility for lack of storage capacity efficiency or for the proper and speedy completion of the works as a whole, which may hereafter appear as resultant from such change and substitution, shall be assumed and borne wholly by the contractor, and all de-

fects and deficiencies which may be made by such change, fully corrected by him at his own expense, and

"Resolved, That the engineer in charge be, and he is hereby directed to notify the contractor of this action.

"The foregoing was separately adopted by the following vote, on a call for the ayes and nays. Ayes, all the members of the Board, five in number."

By Mr. Corbin: I desire to read part of Mr. Ferris communication. He transmits a letter of the Jersey City Water Supply Co. and Mr. Flynn. Mr. Ferris goes into a discussion of the change, and he submits it to the Board.

By Mr. Vredenburgh: You don't want this to go into the record.

By Mr. Corbin: No, I don't think so. (Mr. Corbin then reads down to the words "take action in the matter.")

Q. Is there any difficulty, Mr. Harrison, from an engineering point of view, in raising the stone dam, as indicated on this map, Exhibit D 3, and as indicated by Mr. Smith, by adding a slice to it?

A. It would cost more to raise it now and hereafter than it would at the time we were working at it.

Q. Otherwise it can be?

A. Do you mean to make a dam capable of holding 70 millions?

Q. Yes.

A. It can be filled up on the back; you can make a quarry there and get rock and make a rock dam in front of it the same as they do out west.

Q. On the land side?

A. Yes, sir, filled in rock, but upstream using the

present dam the same as a core wall, to keep the water back.

Q. Are you familiar with the Longwood valley reservoir site?

A. Yes, sir, I figured two or three times there on reservoirs at different periods.

Q. What have you to say of that, as to its being an available place for Jersey City?

A. I considered it one of the best reservoir sites in the state.

Q. What capacity would it have?

A. Four thousand to forty-five hundred million gallons easily stored, and I think you could raise the dam to get it up to 5,000 millions.

Q. What is the drainage area of that reservoir?

A. About 22 to 23 square miles, and it was recommended as one of the drainage sites by the state geologist,—as one of the storage reservoirs.

Q. What additional draught would that reservoir afford per day to Jersey City?

A. Taken with the present draught of the present reservoir it would increase so that it would be sufficient for 70 million gallons a day at the dryest period. The present reservoir without anything additional will give you 70 million gallons a day 15 years out of 16.

Q. You say it won't or it will?

A. The present reservoir will give a draft of 70 million gallons a day 15 years out of every 16 the way the things have been running in this state for the last 25 or 30 years.

Q. And only in very dry years it would be short?

A. Only in a year that has not happened since 1805, the dry period of 1805, early in the century, that was a very dry period in Philadelphia and New York, and that is the place that Mr. Vermale gives in his report. That was what was known as the dyest period?

A. The dryest period known.

Q. How often is the dryest period known to occur?

A. Well, Mr. Vermule gives it there on which he formulate his basis (interrupted).

Objected to.

Q. How often is it supposed to occur?

A. There is only one record of a dry period on which this formula was based, and that was early in the last century.

Q. When was that?

A. Very early in the century—1805.

Q. Do you know about the dry periods of 1881 and 1882?

A. Yes, sir; I was with the Jersey City water department at that time.

Q. And those are the dryest periods within the last how many years?

A. Well, they were dry but nothing in comparison with 1805. I haven't figured out the period of 1881 and 1882; I figured out how it would act upon the reservoir in detail, and I have figured out the dryest period between—or rather between 1890 and 1900, from the Pequannock, and that was in 1896, we had exact data there, I took the run-off the Pequannock just alongside the Rockaway water shed, and considered to be not quite as good in the way of run off, and I found the run of the Pequannock and Rockaway water shed in 1896 when the least draught on the reservoir was 70 million gallons a day, that the present reservoir would be left with 497 million gallons when it commenced to fill up again, nearly 500 million gallons.

Q. Was 1896 a dry year?

A. It was a dry year; the rainfall that year in upper New Jersey was only 35 inches generally, and the run off only 19 inches; that was the dryest year of that decade.

Q. How long is it since we had such a dry year as that?

A. We had one in 1901, and you have a year like that perhaps every 10 years.

Q. What state of dryness has been taken as a basis with regard to this Boonton reservoir in order to get your 70 million gallons data?

A. It is the flow at Philadelphia and run off at Philadelphia, Philadelphia evaporation and Philadelphia rainfall, and the dryest period of the 19th century; that is of course for the whole century and Philadelphia and New York do not give as good a rainfall as we have up here, nor as good a run-off.

Q. Do you know how many inches of rainfall were reckoned in that calculation?

A. I don't remember but it is on record, I think it was between 17 and 18 inches of rainfall.

Q. Have you made a study of the question of the effect of a deep reservoir on the quality of the water?

A. Well, I am not a sanitary engineer by profession, but I have been called in and have been associated in that matter as consulting engineer—in sanitary matters, and my study of the subject has led me to the conclusion that I think is accepted by scientific men and engineers, that deep reservoirs with long storage, kills off the bacteria, clarifies the water, bleaches the water, and brings it nearer to sterilizing and nearer to actual purity than anythink else, that is, I believe, acknowledged all over; I know that all experiments show it.

Q. When did you begin to fill the Boonton reservoir with water?

A. We commenced that work in 1899 and 1900, that is clearing the ground.

Q. You did not understand my question, when did you begin to impound the water?

A. Oh?

Q. When the works were about completed?

A. I think we commenced getting water in them in 1903—regulating it by the gates and sluiceways.

Q. Do you remember the date when you turned it on for use in Jersey City—I guess that has been proved anyway?

A. No, sir, but there is a record here.

Q. May, 1904?

A. Yes, sir.

Q. And after that time do you recollect giving the city notice that the works were done?

By Mr. Corbin: I will ask you to produce that notice.

By. Mr. Vredenburgh: Yes, I remember the notice being given that the work was done.

By. Mr. Corbin: I offer in evidence the minutes of the Board of Street and Water Commissioners of Jersey City, a printed copy entitled Manual 1904 book 451, and with permission of the Court, I would like to read this now. It is somewhat lengthy, and I don't care to have it put on the minutes, it can be copied in afterwards. November 25, 1904. This is a communication from Garwood Ferris, Chief Engineer in charge of the water works, to the Honorable Board of Street & Water Commissioners—(Counsel read same).

Adjourned until Thursday, May 31, 1906, at 9.45 A. M.

EDLOW W. HARRISON recalled for further direct examination by Mr. Corbin:

Q. Mr. Harrison, has there been an actual record kept of the rainfall and run-off of the Rockaway river?

A. Of the Rockaway river, no, only for the last two or three years it has been kept, and at Dover a record was kept of the rainfall for the same years.

Q. What data are there from which you can reckon the rainfall and run-off at the Rockaway Valley?

A. The data used for making up the specifications, was the Philadelphia record of rainfall, not as I stated the other day for 1805, but running from 1825 down to the present time there was a record kept of the rainfall and corrected by formula, and the result of the run-off calculated by an arbitrary formula, taking into consideration evaporation and plant absorption and ground storage and other elements—it was reduced by this arbitrary formula to a run-off per month, and from that run-off formula like the Passaic river (interrupted)

By Mr. Vredenburgh: I object to this.

Objection over-ruled.

Q. Have you further studied the matter since these specifications were framed?

A. Yes, sir.

Q. You stated the other day that the present dam at Boonton would in 15 out of 16 years afford Jersey City 70 millions of water per day?

A. It would according to the record, and from all the records we have, it would afford better than that; that was rather a conservative statement. I stated it without having the record before me. There has been only one period in 80 years, by the Philadelphia record, in which this reservoir

would have been drawn down under a 70 million draught—I mean the present reservoir without raising it; by the New York record, which is another record running from about 1830, it would only have been drawn down once. The Philadelphia record would have drawn it down to just the requirements of the specification, and the New York record would have drawn it down so that it only would have required a 2-foot raise of dam.

Q. In the light of the present knowledge of rainfall and run-off, how much must that dam be raised in order to give Jersey City an assured draught of 70 million gallons per day forever?

A. From the present record, 8½ to 9 feet.

Q. That would be to meet times of extreme drought?

A. That would cover the greatest drought since 1825 which was for the Passaic Valley from 1889 to 1892. The raise of 8½ and 9 feet is based upon and refers to the actual flow of the river. The 19 feet raise of dam is based upon a theoretical statement, based upon the Philadelphia record.

Q. That was the only dry period in the last 80 years when you say the reservoir would have been drawn to exhaustion?

A. The dryest combination was from December, 1879, to December, 1882, that was the dryest combination; there have been dryer single years, but in order to produce a shortage at the reservoir, it would require a combination; there are great flows in certain parts of the year, and very slack flows in some other parts; there may be a slack flow one summer and it may run over to the next summer; ordinarily the water raises in the winter, but if it does not it produced a combination of dry periods.

Q. Well, you mean when two dry seasons come adjacent to each other?

A. Well, they would be dry seasons considered from a water supply standpoint, but both those

years did not show extreme lowness as to rainfall; the trouble was they came together in dry months; there were several months when it was very low, and we had no winter rains to speak of.

Q. When was that period, when, according to the Philadelphia rainfall record there would have been a shortage?

A. 1879 to 1882.

Q. Is that the one shown by the Philadelphia record?

A. The Philadelphia rainfall record and arbitrary formulas make that period 1879 to 1882, and the correction of the arbitrary formula is what is used to make our specifications.

Q. Well, what was the dry period shown by the New York record?

A. New York record, one dry period, and that was 1841 to 1843, and that don't show anything like the Philadelphia, that would only require a raise of two feet in the dam.

Q. Take what is called an ordinary dry year which is mentioned so frequently in the State Geological reports occurring once in seven or ten years, what would the effect of a draft of seventy millions per day be on the present reservoir in an ordinary dry year?

A. Draw it down 28 feet.

Q. I asked you a question the other day which the minutes appear to show you did not directly answer. I will therefore repeat it. Is there any difficulty, from an engineering standpoint, of increasing the dam at Boonton so as to make it nineteen feet two inches higher than it is now?

A. No, sir.

Q. What would be the ordinary ways of doing it?

A. Well, I think the best plan to do it would be to raise the top of the dam nineteen feet and re-enforce it on the down stream side with a slice or buttress running all the way through, eight or ten feet

wide, and carry it right down into the foundation.

Q. Could it be done in other ways?

A. Why you could raise right on top and put enough weight on it to overcome the force of the pressure of the water.

Q. Could it be done by a buttress?

A. It could be, but instead of putting in a continuous buttress, you could put in buttresses along the line.

Q. When you speak of a slice on the down stream side of the dam, is that the method that is indicated on the map offered here the other day?

A. That is about the method indicated on the map.

Q. I show you exhibit D 10, entitled Jersey City Water Supply Company, Boonton, N. J., comparative dam, cross sections, with their improvements, for a seventy mill. gal. class B series No. 168, November 11, 1899. I call your attention to the fact that there are two cross sections of dam shown here one marked Banta dams and the other marked Kingsland dams, do these cross sections indicate that slice method of enlargement that you have spoken of?

A. These cross sections indicate the slice business, and the calculation of the difference in cost in enlarging those dams as put into the communication from Mr. Flynn to the City is based upon this slice in that way.

Q. What communication to the City do you refer to?

A. Communication in which Flynn notifies the City that he has found a site for the new dam, and asked to have the change, and handed to the City by Mr. Ferris.

Q. Was this map D 10 showing the cross sections of the two dams, used at the time you were negotiating with the City for a change of site of dam?

A. No, sir, that blue print was never given to

Jersey City by the Jersey City Water Supply Company officially. It is a sketch showing how the calculation was made, and on which the calculations of the different quanities required in the two dams were based. I believe from what Mr. Ferriss tells me that they secured a copy from the draftsman but it never was official, it was never sent to them.

Q. Who was the draftsman?

A. Godfrey; they used to go there and ask and got a copy of it.

Q. What was his position in the Jersey City Water Supply Company at that time?

A. He was draftsman, designer and computer.

Q. Had he any official position or power to adopt plans?

A. No, not the slightest. Mr. Godfrey signs himself "C. E." He is a civil engineer, but he was not the chief engineer.

Q. Where was he located

A. He was located at Boonton.

Q. Were you present at the interview in the City hall of which Mr. Gardiner has spoken, when the Mayor and Board of Street and Water Commissioners and Board of Finance were present, about March, 1902?

A. Yes, sir.

Q. Was that before or after X and Y were signed?

A. Before.

Q. Did you hear what Mr. Gardiner said to those officials at that time?

A. Yes, sir.

Q. What was it?

A. It was an answer to a claim that certain promises or statements had been made by different people before that—

Mr. Vredenburgh: I object to this statement as not legally binding in any way.

A. (Continuing.) That certain things were to be done in regard to raising the dams and doing other things. Mr. Gardiner took up the contract and said he was, for his people, prepared to carry out that contract as written. He knew nothing of anything else, would have nothing to do with anything else; the proposition must be accepted on the contract as written and signed.

Q. Did you hear the response to it by corporation counsel or anyone else, of the city officials?

A. Yes, the response of corporation counsel was, I remember very distinctly, that of course Mr. Gardiner was right, the City would have to stand on its contract, but there might be questions of accommodations, doing the right thing, and all that, but the contract must govern as written—told the City people there at the time.

Q. Now with respect to the Parsippany back dyke, Mr. Ferris made some suggestions as to changes in the location of the core wall, did he not?

A. No, made no suggestions in regard to change of location of the core wall, the first plan I presented was the ordinary plan of a dyke, the core wall in the center with equal slopes at either side and the proper dyke for holding in the water at an elevation of 305.25.

Q. Could that dyke, as you originally placed it, have been properly raised nineteen feet?

A. Yes, sir, there were many ways in which it could be raised.

Q. How?

A. Why that dam, understand, was an ordinary dam, with a core wall in the center. Now then if you raise it from the land side—we fixed up the dam and studied the question and presented it to Mr. Ferris in different ways—the upper part of that dam was to be raised by putting water proof coating upon the slope, bringing the core wall up.

Q. I observe you have just made a diagram,

show it to the Court and describe it so that it will mean something on the record.

A. From the top of the present core wall taking the earth solid and covering the earth with concrete or it could have been done even with steel plates covered with asphalt, all that was necessary was to get something that would prevent the water going through and back it with earth to hold the weight, that was one way. The other way would have been to ignore the old core wall, build another core wall back, which could have been done at very little cost comparatively in a structure of that kind.

Q. There are different ways in which it can be done?

A. Yes, there are different ways in which it can be done.

Q. How came you to make the change which you did make by shifting the core wall back and adding more earth?

A. Mr. Ferris contended that was not within the spirit of the specifications, that was we should propose an easier way to raise it, and we differed; the company, acting through me, declined to make the change; Mr. Ferris declined to agree to the plans. Things remained like that, considerable correspondence passing between us, which has been read here. At last they notified us that they would attempt to enjoin the work.

Q. Would what?

A. That they would try to enjoin the work.

By Mr. Vredenburgh:

Q. Was that in writing?

A. It was not. Well, it was—I don't think the actual words "enjoin the works" were in writing; Mr. Ferris notified us to stop, that they would take means to stop us.

Q. Notified you in writing didn't he?

A. He notified me—

Q. In writing?

A. In writing.

Further direct.

Q. I asked you how it was you came to make the change.

A. I submitted to him a compromise which I thought would cover the situation and he thought it would.

Q. Were there other things also with respect to the work included in the compromise?

A. There were.

Q. What?

A. There were four or five things which we had not settled on which were still in the air and it was very important for us we thought to have them settled. There was difference in opinion with regard to engineering methods.

A. Yes.

Q. What?

A. Just how much of the back of the big dam should be considered as exposed face and Mr. Ferris' first idea was that there was more exposed face than I believed there was. I prepared a statement showing the different elevations which the water would be at the back of the dam at different periods and we settled on three courses of ashlar there, that is, about ten feet of ashlar instead of thirty-five or forty.

Q. Did your agreement finally embrace all these different matters that were then in dispute?

A. Yes, sir.

Q. And was the work in accordance with your agreed changes?

A. The work was built in accordance with those agreed changes—not changes because there had never been any other submitted, but agreed upon, the methods were settled upon.

Q. Have you examined the situation at the back of the Parsippany dyke since the work was completed?

A. Yes, sir.

Q. Did you observe as to the seepage there or the wetting of the ground?

A. The ground is very wet, I expected it would be.

Q. What do you attribute that to?

A. Why the raise of the ground water surrounding the reservoir. We cut off quite a number of springs which we found running into the reservoir and having their outlets at the bottom of the basin and when we put the water in that basin we raised the hydraulic wash of all those surrounding waters and it must come up back of the dam in the ground there.

Q. Some witnesses have spoken of seeing water coming up or bubbling up at the foot of the big dyke on the land side, where does that come from in your judgment?

A. From the springs there that were cut off; it is very wet there—it is wet, not very wet, wet at different seasons, and the tests made show that water does not come from inside, but there is very good reason and we could reasonably expect and we did expect before we did it, that that place would be wet.

Q. Since the reservoir was first filled in the spring of 1904 has it remained substantially filled ever since?

A. After it raised to full height, it remained substantially at that height.

Q. That is two years ago is it?

A. Yes, sir.

Q. Since it was filled has this wetting at the back of the dyke been uniform or has it varied in quantity?

A. In the test pits dug the flow of water varies according to the rain; the ground storage around there. There has been no indication of any steady elevation. There is no indication whatever of the reservoir having the effect it would have of an equalizer there and in dry seasons there is less

water than I expected there would be there, we cut off some very big springs.

Q. In your opinion does the water appearing there come from the reservoir?

A. No sir.

Q. Where is this big spring that you cut off?

A. The one that I alluded to as one of the largest was about the lowest point, a little west of the lowest point in the valley and it was about fifteen to seventeen feet down; we have the record of that, it was a strata of gravel there.

By the Court:

Q. What do you mean by fifteen or seventeen feet down?

A. From the original surface of the ground; when we were putting the core wall there—

Further direct:

Q. Did your core wall go as deep as that?

A. The core wall went through that spring and cut it off and went into the good ground below.

Q. .On which side of the core wall is the spring?

A. The direction in which the water was flowing was from south to north, into the reservoir, the bottom of the reservoir was very springy there were some very fine springs there.

Q. Is this spring under the reservoir or under the land?

A. Under the land.

Q. Outside?

A. It came out in the bed of the—the springs came out in the bed of the reservoir.

Q. Near what house is that spring?

A. The one I just spoke of.

Q. That big spring, yes?

A. It is not near the Righter house, it is below the Righter house.

By Mr. Edwards:

Q. Is it below the Hennion house?

A. Yes, sir.

Q. The Hennion house that was moved across the street?

A. Yes, sir, near that house that was moved across the street, that old house.

Further direct:

Q. Do you remember where the other springs were that you cut off by the core wall?

A. There were three or four there but that is the only one I particularly noticed, because it was so important the contractor made a protest about going down and we had to make a special examination of it.

Q. Were these springs which appeared upon the surface before your work commenced or springs which you encountered under the surface?

A. Under the surface, they were running into the reservoir, I knew they had to come up after that core wall was done, they had to come to the surface somewhere.

Q. What?

A. They must come to the surface, they cannot lose themselves.

Q. Do you know where they did come to the surface?

A. There is every indication that they came up between the back dyke and the road, all around the road there.

Q. What road?

A. The turnpike road, the Parsippany road.

Q. Before the work was done did those springs come to the surface if you know?

A. They did come to the surface before the work was done because those springs held our work very late, the dyke was nearly finished.

Q. In which direction was the flow from these springs, towards Boonton or otherwise?

A. Towards Boonton to the north.

Q. But it was an underground flow?

A. Yes, sir, through gravel and large boulders, pretty fair sized boulders.

Q. Who had immediate charge on behalf of the company of building the core wall and taking care of these percolating waters?

A. Mr. Cyrus Sproul, he was the assistant in charge of the back dyke.

Q. How deep is the core wall at Parsippany below the old surface of the ground?

A. Varies from six to twenty-eight or thirty feet.

Q. What kind of a soil is there at the bottom of it?

A. Well, the bottom of the core wall is always—

Mr. Vredenburgh: I object.

The Court: Well, this is the engineer, and he saw the conditions there.

By the Court:

Q. You are speaking now from personal observations, of course?

A. I am speaking of personal observations.

Q. You must confine yourself on this subject to personal observations.

A. From all the different points in the district that I saw, as engineer and inspected, the core wall was in a good impervious strata.

By Mr. Corbin:

Q. Of what?

A. Generally a mixture of clay, gravel and sand

combination. I saw the core wall in many places and went through the ditches in many places.

Q. In your judgment was the material on which the bottom of the core wall rests pervious or impervious to water?

A. Well, in my judgement it was impervious. My judgment is that the bottom of the core wall is in a proper place it is down as deep as it should go, and is well founded, good engineering practice and good construction. Every point is very well studied out.

Q. What character of soil is the surface on which the earth part of the dyke rests?

A. The earth part, below the—the original soil was first stripped of some thin loam, down below that is a mixture of clay gravel, and is really and practically an impervious soil; as the water pours on it it won't soak in; a mixture of gray clay and gravel. I went over that before the contracts were let,—went over it with different contractors, and we dug a number of places into that soil to see what it was and whether it would be useful to make it the water side of the dyke. It was a magnificent material for the water side of a dyke.

Q. Where did you get that material

A. Why we stripped it all over the back there and used it to build the water side of the dyke.

Q. Stripped where?

A. From the bed of the reservoir.

Q. With the core wall located as it is, and your knowledge of the soil under the bottom of the reservoir at and near the dyke and beyond the dyke, what is your opinion as to the imperviousness of the reservoir-bottom of the reservoir at Parsippany

A. The upper end of that reservoir for a distance of at least half a mile—from two thousand feet to half a mile down towards the bottom was covered with this particular soil of clay, mixture of gravel, it was so coverd that after a rain it was slippery, and in many parts of it the sour grass and swampy hummocks were growing, which we

had to remove under the direction of Mr. Ferris. Care was taken in taking off that and in using the soil to build the back dyke, not to go through that impervious part, and to the best of my knowledge it wasn't cut through at all. Below that, and in fact all through that country there are pockets of sand and pockets of gravel.

Q. When you say below, which direction do you mean?

A. I mean down—

Q. Towards Boonton?

A. Directly under ground, the formation there that you see was originally, I think, an upland swamp; it is just where you always find just such swamps on the top of a water shed—break of a water shed—at a flat place, and below it, as we get down in that ground, we found pockets here and there—little layers of sand and drift, but in those there seemed to be more pockets.

Q. Now I will repeat the question. In your judgment is the reservoir at that end pervious or impervious to water?

A. It is impervious to water, has every indication that we believe to be impervious, when we put it there we tried to keep it impervious, and it has every indication of being impervious.

By Mr. Vredenburgh:

Q. The core wall or the dyke?

A. The reservoir bottom and the dyke, and all the plant there is impervious to water. I will say that in my opinion that if the big stone dam being in place—if we could draw out the Rockaway river and not let any of it go into the reservoir at all—let it run around on the side somewhere, and then leave the reservoir to be filled by the ground water and springs in it, eliminating the question of evaporation, that the reservoir would fill by these springs to its present height, and that it would keep

on filling, and there would be a natural lake there without the Rockaway river coming into it at all; of course I say eliminating the question of evaporation, as the water would come in slowly, the evaporation at the surface would be great, but what I mean is this, that the hydraulic grade of those springs—the source of the springs—would bring the water from a higher point than the top of the dam. That is the indication all through that country.

Further direct.

Q. Mr. Harrison, do you remember the modification of the Flynn contract, which was made July 8, 1901, in which the Morris Canal & Banking Company was a subject of the agreement?

A. Yes, sir.

Q. Did you have to do with the preparation of the changes then agreed upon?

A. Yes, sir, I spent quite a little time upon that matter.

Q. I call your attention to the fifth paragraph of that contract dated July 8, 1901, and I read: "For the purpose of construing said contract of February 28, 1899, any waters which may be drawn and diverted from the water shed of the Rockaway river above the location as now fixed of the storage and intake reservoir, at old Boonton, by the Morris Canal & Banking Company, for the purpose of navigation, etc." How had the location of the Boonton reservoir been at that time fixed?

By Mr. Vredenburg: I object to that, may it please your Honor; it is an attempt to explain this written contract by Mr. Harrison's testimony.

By the Court: It is precisely the same evidence that I permitted you to give with respect to the

matter of pollution; it is evidence explaining the meaning of those words.

By Mr. Vredenburgh: What dispute is there about it?

By Mr. Corbin: You took the position that you could find no recognition by the city for those changes.

By Mr. Vredenburgh: On the contrary, I read and offered in evidence a resolution of the Board of Public Works with reference to it.

By Mr. Edwards: But you said that was not a recognition by the city, because the Mayor had not joined in it or the other Boards of the city, by a resolution approving the changes in the dam.

Q. (Question read).

A. There was a great deal of excavation, for the dam already made.

Q. At what place had it been made—my question was?

A. At the present place.

Q. What?

A. Where it is now, where it was finished.

Q. That is all I want on that. Now, are you familiar with conduit No. 4, which includes the Watchung tunnel?

A. Yes, sir.

Q. Was it done under your supervision?

A. As Chief Engineer, yes, sir.

Q. Are you familiar with the rock that was encountered in the bottom of the tunnel?

A. Yes, sir.

Q. What was it?

A. About half way through it was triaccic, sandstone, lying with a slight dip towards the west; on the westerly half it is Orange mountain trap, fine grain trap rock unstratified.

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Q. Was the rock that you encountered what is known in the contract as loose rock or solid rock?

A. Solid, absolutely, all the way through it.

Q. Under the conditions found, would it have been feasible to finish the invert in the way suggested by the complainant, with Rosendale cement and a skim of Portland cement on top?

A. No, sir; it would have been impossible to have made a good job of it.

Q. Why?

A. Because about half way through the tunnel we found a large amount of spring water coming in, and as we dug it out and as we built our side walls, it came in down below and came in through the rock fissures at all points along there. If it could have been confined to one particular place, we might have put in Rosendale, but that was not the case, it was impossible to get the Rosendale cement to set there.

By the Court:

Q. The statement made on the other side by the engineers of the complainant is that you ought to put in an underdrain; what do you say about that?

A. We could have put in an underdrain on one side; it might have been possible to do it, but to use an underdrain we would have had to have an absolutely tight conduit.

Further direct examination.

Q. Does the masonry that is called for, for the lining of that tunnel, give a perfectly water-tight conduit?

A. There never was an absolutely water-tight conduit built in the world for a water tunnel.

Q. How thick is the brick called for in that tunnel?

A. It is eight-inch, twelve-inch and sixteen-inch.

Q. Does that constitute a water-tight pipe?

A. Nobody has ever been able to lay it so as to make it water tight yet; there is no such thing as a water-tight conduit; an absolutely water-tight water tunnel has never been made; I have never heard of one.

Q. What did you do with the water which you encountered and which was percolating in?

A. We took it in; it was beautiful water, better than the Rockaway.

Q. Did you have it examined?

A. Yes, sir.

Q. Did you notify the city engineer?

A. Yes, sir; he knew all about it.

Q. What was the proper way to finish that invert in your judgment under the conditions?

A. I think the way we finished it was the best way as a practical proposition; I do not think they would have been able to get as good a job in any other way, as safe a job. What we did was to level off as far as possible by hand work and breaking off the projections and getting it down to a fairly level surface.

Q. How low did you sink that surface?

A. Two and a half or three inches; the highest point is about, I think, two and a half or perhaps three inches—it is shown on the drawing—below the theoretical invert; that is, it gives that much more.

Q. How did you smooth it up?

A. The cups in the rock, the little low points we filled in with clean gravel.

Q. How much gravel was used to fill in those low points?

A. Only enough to fill in those low points. The attempt was to keep that as near as possible like a natural mountain stream, a rock stream.

Q. Were there places in the bottom of the tun-

nel where the stratum of rock offered a level surface?

A. Oh, yes, very many places, very good.

Q. What size did you make the tunnel as compared with the theoretical size required?

A. The roof is one inch higher and the sides are two inches wider. This Mr. Ferris reported in his report to the Board; the roof is but one inch higher and the sides are two inches wider, which is two inches more.

Q. In calculating the carrying capacity of such a main, how do you make allowance for the element of friction, what rules have you to go by?

A. The rule adopted and stipulated by the specifications was to use the Kutter formula.

Q. What is meant by the Kutter formula?

A. That is a formula prepared by a Swiss engineer by the name of Kutter; he was a very great worker on the flow of rivers and streams and did a great deal of experimental work and evolved a formula which is based of course on the older formulas which have been known to experience for very many years in the study of hydraulics, but he evolved a formula in which he took into more account the element of roughness and friction in different streams and made a study of that. That is, he evolved a formula that would be able, using the judgment of the engineer as to the character of the roughness, to fit more cases than the older formulas would, and that formula has an element which is called N, the coefficient of friction and in the case of these contracts all you had to say was to use the Kutter formula with the coefficient of friction of so much.

Q. How much was it in the specifications. .014 was it not?

A. Well, I don't remember.

Q. (Counsel read from specifications to witness). .014 was the formula for brick work?

A. Under the Kutter formula, using .014 the

theoretical lines of that tunnel, with the flow line one foot below the top of the arch, was supposed to carry seventy million. The coefficient for new work is a very conservative one, is a very safe one, it ought to carry more than that in good work. Now if we enlarge as we did, we enlarged the tunnel two inches and raised the roof one inch, we have got all that leeway so that we can have a little more roughness in the bed than in the theoretical bottom and still carry the same amount of water.

Q. What difference in the coefficient do you reckon the additional roughness in the bed to amount to?

A. Very little.

Q. What percentage of increase of cross section is there by reason of this enlarged tunnel?

A. About four per cent.

Q. In your judgment is that four per cent. enough to overcome the additional friction encountered?

A. I think so, it is so. Our tests show it.

Q. Suppose that, with 12 inches from the top free the tunnel will carry a little less than 70,000,000 gallons, would there be any objection to operating the tunnel with only eleven or ten or nine inches space at the top?

A. Not the slighest.

Mr. Vredenburgh: I object to that question.

Witness: And it probably will; it has got to be operated in that way, you cannot make the water flow in 17 miles of pipe just according to what the books say.

Q. You mean it will be operated so?

A. It will; it will be flatter and sometimes the line will not be parallel with the top of the tunnel; it will sometimes be flatter and sometimes a little steeper, depending a great deal on the amount of water being used.

Q. If you should fill it all through so that there was a slight pressure on it, would there be any detriment to the work?

A. Not the slightest; under the directions of Mr. Ferris, we submitted one of the conduits to four or five foot of head.

Q. How long did you keep one full?

A. We planned it so, so that it could be kept there under certain conditions. Of course it won't be working normally that way.

Q. Is there any doubt at all that the conduit can be operated so as to carry seventy million gallons a day every day?

A. Not the slightest?

Q. How much more can it be operated to carry?

A. That could not be determined without figuring it out; I consider those conduits safe for four or five foot of pressure head, and it is only a question of figuring or calculating as to what they will carry; they will carry considerably more than seventy million if put under pressure. Of course I would not design a conduit of that kind to be used habitually under pressure.

Q. You speak of filling the conduits at Mr. Ferris's request, when was that?

A. In the last year—spring of last year.

Q. Spring of 1905?

A. Yes, sir.

Q. How long did you keep them full?

A. Why we kept them full over four months.

Q. You mean under pressure all that time?

A. As full as they could be kept, yes, and some part of the time under pressure, I presume, I don't know just the record I know they were filled all the way up so that they overflowed.

Q. Did that include the Watchung tunnel?

A. Yes, the whole line.

Q. That was kept full for four months, was it?

A. Yes, four months.

Q. Why did you keep it full so long?

A. He requested to have a test, to be able to make a test of the tightness of the conduits, said that he wanted to go along the line and see whether there was any seepage through the banks, that was what they wanted, that was the ostensible reason, but there were other reasons. They wanted to see how high they would get the water at Jersey City, see how far above 210 it could be delivered.

Q. How high could it be?

A. I think it went up somewhere around 222 or 224, I wouldn't want to state that, it was over 220.

Q. Well then the Watchung tunnel actually remained full of water for four months did it?

A. Yes, sir.

Q. Was it being operated daily during that time?

A. Yes, the water has never been cut off since we commenced to deliver.

Q. How came you to empty it finally—draw it down finally?

A. Why, during the discussion of what we had to do, I told Mr. Ferris that I thought that the test had been too long. I thought we weren't called upon to keep that thing full, that it cost some money to do it and some water was wasted and it took the time of the company's employees, and I thought we had made a long enough test and had given them a long enough time and asked that it be let off. He first said to do it, and afterwards notified me— I have the letter here—I requested him by a letter, and he told me that we could shut down, and then afterwards—

Mr. Vredenburgh: I object.

Q. What was the date of your letter to him?

The Court: Well, is this important?

Mr. Vredenburgh: Well, only I object to this witness rambling on about the contents of written instruments. I would like to hear what the written instrument said, but I don't want his judgment or his recollection of it.

Mr. Corbin: Never mind, I will withdraw that.

A. July 19th, 1905, is my letter, and I got a letter back from him July 21st, stating that Mr. Kuichling was away and would be home in two weeks, he would then make a formal answer to my letter. "In the mean time you are not to understand that a representative of Jersey City has taken any position with you in this matter."

Q. Did you keep it on after you got that letter in June?

A. Yes, sir.

Q. How long?

A. Some little time after that.

Q. Did you hear anything more from him?

A. Haven't heard anything more; I don't know exactly the date when we stopped.

Q. Mr. Harrison, are you familiar with the condition at Boonton where you built a drain down the inclined plane.

A. Yes, sir.

Q. Did you design that drain?

A. Yes, sir; went over the ground with Mr. Ferris and Dr. Leal and concluded that was the best way to take care of how Mr. Ferris thought the matter should be taken care of.

Q. Did you inform Mr. Ferris before you built it what you were going to do?

A. Yes, sir.

Q. What did he say?

A. He thought it was a good plan then, and he does now, as far is I know.

Q. What will that drain carry?

A. Somewhere around fifty million gallons of water a day.

Q. In your opinion is it sufficient for the Brook street brook and the other things it carries?

A. In my opinion it is sufficient to carry off any danger of pollution from the Brook street brook.

Q. It is said that there is an overflow of it where it strikes the incline plane, so that when it is full some of its contents might flow over into the Rockaway river?

A. Well, yes, there was an over-flow put there, that is a measure of precaution to save the plane in case of a cloud burst. There might be a case of cloud-burst, and that was done partially to satisfy the Morris Canal authorities that we could not have a cloud burst coming down through that drain tearing out the incline plane.

Q. Suppose a cloud burst should come and the drain would not carry all the water and the rest went over into the Rockaway river—

A. It would go into the Rockaway river, yes.

Q. —— what would be the effect on the water supply at Jersey City.

A. I don't think there would be any effect at all. The washing out of that drain would go in the early stages of that stream; before it got up high enough to over-flow you would find practically clean water,—rain water.

Q. In your opinion is there any menace to the water supply in that situation

A. No, sir, not the slightest. The water as I understand it—the drain was a natural drain and nobody had a right to drain into it. Mr. Ferris thought we ought to have protection against it, some of the people had their wash waters come down in it.

Q. Now are you familiar with the automatic gates that were put into the lower level of the canal at the foot of the plane at Boonton

A. Yes, sir.

Q. What have you to say as to those

A. Why, I think they do just as they were intended to do,—prevent any water backing up and entering the river from the lower level. When I first designed that—we first put that in, I went there at that point several times and tried that water, and I never was able to find—on four or five tests—any back flow into the raceway. I believe that at certain times when certain movements were made in opening the lock or something of that kind, I understand there is a momentary wave coming back, but I have never been there at such time. In order to meet this momentary flow back the gates are put in.

Q. You mean when the boat comes down the plane?

A. When the lock is used below and the water seems to have a reflex acting for a moment—for a few seconds a wave back, which effects and closes back against the plane and necssarily into that drain.

Q. Are you familiar with the Morris Canal below Boonton and thence down to Montville

A. Yes, sir.

Q. What drainage is there in the canal at Montville?

A. Why several mills have the right to draw water—claim to have the right to draw water from the canal for use of their mills—Capsticks.

Q. Are there mills in operation?

A. Yes, sir.

Q. Where is the water drawn from?

A. From the canal.

Q. What is the course of the current in the canal from Boonton to Montville?

A. The current is down towards the east all through from Hopatcong down, a current amounting to—well, it is slow, 24—25 to 35 cubic feet per second.

Q. You are speaking now of between Boonton and Montville.

A. BetweenBoonton and Montville, and it is a pretty nearly uniform current down through the canal, there is a little more water going down from Boonton to Montville than from some other sections.

Q. From Boonton to Montville the canal has to carry not only the water for its own operation, but water to operate the mills at Montville?

A. Yes, sir.

Q. Has the water company taken any steps to take care of the storm waters in the canal, in the lower level towards Montville, in the way of an overflow?

A. Storm water in the canal?

Q. Yes, in the way of an overflow—have you built an overflow at Montville?

A. There is an overflow at Montville, into the Montville brook.

Q. At the time you built the automatic gates at the Boonton plane did you make any overflow or flow provision further down in the canal?

A. There was something of the kind done but I did not do it. The whole matter was taken up at the time; in fact, I saw the drawings of the gate and I saw them after they were put in place.

Q. Did you see them in operation after they were put in?

A. Yes, sir, I saw them in operation once or twice.

Q. How did they operate?

A. They operate all right and with a very slight movement. I saw them in operation the evening of the last day you were here. I did not go up especially to see them. I went to look at the back dyke, but I looked at that gate and with any slight movement in the current you could see the gates move, they seemed to work very well.

Q. Does it prevent the water going into the river?

A. Yes, sir.

Q. Do you consider them successful, Mr. Harrison,—those gates?

A. I think so, I think it is the best device we could put there.

Q. Do you know anything about the steam pump arrangements with the Water Company as installed at the foot of the Boonton plane?

A. I know it is there, I don't know what it costs.

Q. You don't know anything about the details of it?

A. No, sir.

By Mr. Vredenburgh: May I ask a question, Mr. Corbin?

By Mr. Corbin: Yes, sir.

By Mr. Vredenburgh:

Q. You spoke about Capstick mills having some rights to water at Montville; have they any rights in the flow of the river.

By Mr. Edwards: No, not from the river, only from the canal.

By Mr. Vredenburgh: Because if those mills below there have any right, Jersey City ought to know it, and it ought to be cleared up in some way. I never understood before that the mills below there had any right in the flow of the water above our dam.

By Mr. Corbin: When the canal was built in 1830, or earlier, between Boonton and Montville, it intercepted the brook, and instead of carrying the brook underneath the canal—that brook at that

time feeding these mills near Montville—instead of carrying it underneath the canal by an aqueduct, it was taken right into the canal, and the water of the brook was used in the canal, thus cutting off the supply from the mill or mills at Montville, and as compensation to them a contract was then made which is still in force and has been since that time, whereby in lieu of the water of that brook they were authorized to take right from the canal itself an equal amount of water, which is specified in the contract as so many inches I think, and they take that water right from the surface of the canal winter and summer—a flow of water which is estimated to be equal to what we deprive them of.

(Some further discussion followed this statement by Mr. Corbin, which was not reported.)

Q. In the estimates you have given us of the capacity of the Rockaway water shed and its run-off did you deduct anything for the water which may be taken by the Morris Canal out of that water shed?

Q. Why not?

A. Because I found in my study of the actual condition of affairs that the Morris Canal puts in as much from Hopatcong as they take out, that is when properly operated. Of course, I do not mean to say that they operate the canal so that they measure every drop that comes in above and measure every drop that goes out. In ordinary times nobody complains and they draw the water out of the river and out of Hopatcong and there may not be exactly the same amount taken from Hopatcong as they take below. But at a time of a pinch there would be no difficulty in operating the canal, as it was intended to be operated, without any draft on the Rockaway water shed. The water that operates the levels above through the nine miles from Lake Hopatcong down to Dover will take care of a little

less distance from Boonton to the next feeder at Pompton, the Pompton feeder.

Mr. Corbin: In this connection I wish to call the attention of the Court to the fifth section of the agreement of 1901.

(Counsel read same.)

Q. Are you familiar with the situation at Powerville, what has been called the rag mill or the roofing paper manufactory there?

A. I have not been there for perhaps eighteen months or two years, I went and looked it over at that time.

Q. Did you see it after the changes had been made there at the suggestion of the water company?

A. Yes, sir; and I had seen it before, too.

Q. What is its business and of what size is it?

A. How large a plant? Well, it is a small affair; they take rags received from all over and make them into pulp and then into paper boards and heavy paper, heavy rough paper. The rags pass through a series of washers—

The Court: We understand the operation of the thing.

Q. Do you know the amount of output it has per day or week?

A. I don't know just how much they turn out.

Q. After the changes were made was there anything from those mills that flowed into the river at all?

A. No, sir, because from the time the changes were made or just before that new parties were taking hold of the works. When I first saw those works they were run by very old-fashioned ideas and old-fashioned people; new people took hold of it, scientific men, educated men, and they told me that the

changes we had suggested and which they had made resulted in saving them the actual profit in the concern; they were wasting enough pulp in the Rockaway river before to lose their profit.

Q. Do any washings from the mill as changed go into the river?

A. No, sir, they pass into a pit made of cinders and lined with canvas and they are pumped back again, continually; whatever little seepage may go through that canvas and through the cinders will pass down the river but by that time my judgment is it is filtered as well as it possibly could be filtered. They watch that all the time, they don't lose anything. It is a matter of dollars and cents to them to keep that stuff there, their interest demands it shall be kept that they shall not lose it.

Q. Do you know how many hands there are there?

A. No, I do not; it is no very great industrial establishment; there may be over thirty but I do not think there are over fifty.

Q. Are you familiar with the watershed of the Rockaway river generally?

A. Very well.

Q. Have you personally been over it?

A. I think I have been over the whole water shed of the Rockaway. I do not mean to say that I have touched every foot of it, but I have been in all parts of it on all the streams and all the lakes.

Q. What do you say as to the water shed being a proper one for a water supply?

Mr. Vredenburgh: I object to that, there is no dispute as to that, that is not in issue.

A. That is one of the best supply water sheds in the United States.

Q. Are you familiar with the water conditions at Dover and Hibernia?

A. Yes, sir.

Q. What steps did you take when you were preparing to furnish water to prevent pollution.

A. My whole idea was in all that I have done for the company that the law would prevent harmful pollution of that river, putting into any river in the Passaic water shed anything harmful, the act which was passed in 1893 I think, and that by recourse to that act and the law that thing could be prevented and from time to time doing the work we have through Dr. Leal—of course, that matter of sanitization has been in Dr. Leal's hands, he consulted me a good deal on engineering questions—we have from time to time stopped pollution when we found it.

Q. Did you cause the watershed to be inspected for this purpose?

A. The water shed has been inspected all along, a very careful inspection has been made all along there.

Q. And who is in the employ of your company for that purpose?

A. Mr. —— Dr. Leal and Mr. Gibson inspector, and besides that the city had several people going over the water shed, sending in reports which were then taken up by Dr. Leal and Mr. Gibson examined into them.

Q. Did you receive one or two communications from the city with regard to certain specified sources of pollution—have you got those papers here?

A. There was a communication with regard to the closet on the Cooper-Lord estate, yes.

Q. As to examinations of the water what has the company done?

A. From the very beginning, as soon as I took hold as consulting engineer I had the bacteriologist Dr. McLaughlin, take hold of the examination of the water.

Q. When did he begin?

A. He commenced in 1900, I think there was one or two taken in 1899, but 1900 he really commenced, and we have an observation of the river weekly and monthly at different points from that time on.

Q. Down to the present time?

A. Right on, take them every week now from tap water, and every month we take them from the river and the reservoir.

Q. Is that kept up methodically?

A. Yes, sir, very carefully.

Q. Have you kept records of those examinations?

A. Close examination and kept a record of the condition of it for the last four or five years, right from the beginning of that work—as to the condition of the water.

Q. What steps did you cause to be taken to suppress or remove the cause of threatened pollution?

A. Well, we removed the Cooper-Lord nuisance by an injunction. In a number of other cases where there was a change, we notified them that we would apply for an injunction, we would proceed against them, of course, that is a matter—the actual work of that is entirely in Dr. Leal's hands, but from time to time I have looked over that, and I know there have been a great many changes made. I will say that the reservoir is better to-day I think, than it was, a good deal better, as far as that question of little items of pollution or which might produce pollution, than it was in 1899. Of course, it has had a very careful looking over all the time.

Q. Is your inspection still kept up?

A. Still kept up.

Q. Are you familiar with the situation at Hibernia, on the surface?

A. I haven't been up to Hibernia for a few years.

Q. Does your company keep a record of the daily deliveries of water to Jersey City?

A. Yes, sir, that is I know they do keep a record,

but I have had practically nothing to do with that.

Q. Where is the water measured?

A. Measured at delivery at Jersey City, high service, there is a meter there on the end of the pipe.

Mr. Corbin: I offer in evidence blue print schedules, entitled "Daily amount of water delivered to Jersey City." It gives the daily readings from May 23, 1904, to April 30, 1906, and I have appended to them Mr. Vredenburgh, copies of the sworn bills accompanying same, which have been rendered from quarter to quarter to the Mayor and Aldermen of Jersey City for the same amounts.

Marked exhibit D 5.

Mr. Corbin: I also offer a complete schedule deliveries for the year 1904, the deliveries down to May 23d being by the East Jersey Water Company, and the deliveries for the rest of the year being by the Jersey City Water Supply Company, all deliveries being through the present seventy-two-inch main from Montclair down.

Marked exhibit D 6.

Cross examination. By Mr. Vredenburgh:

Q. Mr. Harrison, were you employed by Flynn before his proposal was accepted by Jersey City?

A. No, sir.

Q. Do you recollect that a certiorari was brought to review the letting of this contract, after the contract was signed?

A. I don't quite understand the question.

Q. Do you recollect that certiorari was brought by Mr. McEwan either as prosecutor or attorney to review the legality of the proceedings by which this contract in question was let to Mr. Flynn?

A. I remember there was a certiorari brought.

Q. Were you employed by him after the Supreme Court had decided that question?

A. I was employed before the Supreme Court decided, during the summer. I knew nothing about the certiorari and never saw the papers in it.

Q. Were you a witness in the case?

A. No, sir, I don't remember being and I don't think I was.

Q. Were you employed by Flynn before Mr. Ferriss was employed by the city on this contract?

A. No, Mr. Ferriss was engineer at the time I was employed by Flynn.

Q. Do you recollect that distinctly?

A. Well, that is my impression, I recollect that he had got up specifications under which the bid was made, and my impression is that he was employed by the city, before I went in with Mr. Flynn.

Q. The stenographer has you down that you were employed in 1889 by Mr. Flynn?

A. No, sir.

Q. Is that incorrect?

A. That is incorrect, it was 1899, in the late summer of 1899.

Q. Who employed you on behalf of Mr. Flynn, who personally employed you?

A. Well, Mr. Connelly and Mr. Kennedy; Mr. Conelly I think was Vice President and General Manager and factotum on the work, and Mr. Kennedy was Treasurer.

Q. Connelly was Vice-President of what?

A. Jersey City Water Supply Company.

Q. Do you know Flynn?

A. I had never met Flynn at that time.

Q. Do you know what city he was a resident of?

A. Oh, yes, I knew he was a Brooklyn man, I knew of him.

Q. What was his business?

A. He was a contractor and promoter, and had

been engaged in railroad matters, a speculator.

Q. Had he ever, to your knowledge, been the owner of any water rights in the Passaic water shed?

A. No, sir.

Q. You never heard of it before?

A. I never heard of it.

Q. You stated that you had measured a great many streams and that there was hardly any point in the Rockaway water shed you had not been over. What is the name of the brook that flows from Hibernia to Rockaway?

A. Flows from Hibernia,—I don't remember the name; it is right in my head now but I can't just think of it. One of our suggested reservoirs was situate upon that brook, and I figured out the dam for it.

Q. Is it Beaver brook?

A. Yes, sir, that is it, Beaver brook.

Q. What is the length of that brook, from Hibernia to the Rockaway river?

A. I don't carry the geography and lengths in my head; I have reports of it and I have got maps from which I could soon tell you.

Q. You don't remember now.

A. I don't remember as I have ever measured the length of it.

Q. How much is the amount of flow in that brook ordinarily?

A. I would not want to state without having the square miles of drainage area of that brook, or without referring to the actual position of things.

Q. Do you know at what speed the run-off is from Hibernia—at what rate of speed the run-off is from Hibernia to the Rockaway river?

A. What speed?

Q. Yes.

A. Well, the upper part has quite a fall, and the lower part is quite flat, wide, broad meadows.

Q. What is the rate of speed?

A. That would depend upon the rainfall the night before.

Q. What is the ordinary rate?

A. I don't know as I have ever measured it.

Q. You never measured that?

A. I don't know as I ever measured the ordinary rainfall. We take the flow of the stream and the amount of the area in the Rockaway Valley.

Q. That gives you the quantity but not the velocity?

A. No, it don't give the velocity, but with the velocity and the time you can calculate the quantity.

Q. The area and velocity give you the quantity?

By the Court: Does that come from Split Rock pond?

By Mr. Corbin: No, sir, this is further west. This Beach Glen or Beaver brook comes into the Rockaway river between Boonton and Dover near Rockaway, and runs in from the northwest. The Hibernia brook and the White Meadow brook together form the Beaver brook.

Q. Do you know the ordinary rate of speed of the water of the Rockaway river between Dover and Boonton?

A. No, I don't remember just now.

Q. Have you ever measured it?

A. I don't know as I ever did, but I have measured it at the dam, the dam below and the dam up at Dover. I have often taken the elevation of water flowing over those dams to ascertain the quantity.

Q. Do you know the ordinary rate of speed in the Rockaway river between Dover and Boonton?

A. No, sir, not now, but I can tell very quickly though.

By Mr. Corbin: What do you mean by rate of speed, cubic foot per second or what?

Q. Do you know the time of the flow of the Rockaway river, the ordinary flow, from Dover to Boonton?

A. I can tell you practically what it will be, very closely what it will be, by figuring it out, but my own impression—memory—of it is that when you consider the ordinary flow you take it from Dover to Powerville, not to Boonton and the river is quite flat and I should say it would take about five hours, four to five hours, the ordinary flow of the river flood water to pass from Dover to Powerville. I can tell you by to-morrow morning just what it is, without measuring, from figures which I have.

Q. You have not the figures here?

A. No.

Q. What is the time of flow in times of freshets between the same points?

A. In times of freshets?

Q. Yes.

A. The river in times of freshets spreads out over the meadows and the average flow is a very difficult thing to tell over those broad meadows, my impression would be from the river, that it would take about three hours; the speed would be two and a half to three miles an hour in times of freshets from Dover to Powerville; when you get to Powerville, you go over four miles an hour and from there down you get a very rapid stream, down the rapids, falling in Boonton itself.

Q. What rate would it run from Powerville down to the Boonton reservoir?

A. Five or six feet to the second.

Q. What as to time, not feet per second, but the time?

A. You would have to give me the distance.

Q. You know the distance.

A. I should think the water would come from Powerville down to the head of the dam inside of an hour—down to the head of the reservoir, the still water.

Q. At ordinary times as well as at flood?

A. Well, I have taken now flood speed; it would be somewhat over that in ordinary times, a little longer than that in ordinary times; there would not be such a great difference though there.

Q. Look at your letter book containing your letter to Garwood Ferris of August 1st, 1900?

A. I have it here.

Q. Who is the Mr. Godfrey referred to in that letter?

A. He was a draftsman, computer employed by —I don't know whether he was employed by Mr. Connolly alone or by the company, at Boonton.

Q. What did you mean by a re-calculation of area?

A. Mr. Ferris had doubted some calculations for the area at different elevations of the reservoir and those calculations had been made by Mr. Sprowel in the early part of that summer—not by Sprowel, I do not mean that, by Godfrey; Mr. Ferris demurred to some of the calculations and they were then as I remember re-calculated. I had a talk with Mr. Godfrey as to what he had used—

Q. Who is Mr. Sprowel?

A. He was assistant engineer up there at that time.

Q. Was he your assistant engineer at that time?

A. Assistant engineer of the company.

Q. Was he your assistant engineer?

A. No, sir, not mine; I was consulting engineer of the company.

Q. At that time who was engineer of the company?

A. Mr. Hume was acting as engineer of the company.

Q. Where was his office?

A. At Boonton.

Q. Was he ever there?

A. All the time; he directed what Mr. Godfrey was to do and Mr. Godfrey made the calculations

and got up the plans at Hume's suggestion and they were referred to me to comment on and advise upon.

Q. Was this plan which Mr. Godfrey handed to Mr. Ferris—

A. Mr. Godfrey never handed anything to Mr. Ferris, not that plan.

Q. Please hear my question.

A. I thought you referred to the plan.

Q. Was the plan which Mr. Ferris said Mr. Godfrey handed to him submitted to you as chief engineer?

A. No, sir.

A. Was it submitted to you as consulting engineer?

A. No, sir.

Q. Where was your office then?

A. Where it is to-day, in Jersey City.

Q. Had there up to that time anything been submitted to you?

A. Why, certainly.

Q. What?

A. The whole question of the location of the dam; I had fixed the location of the dam where it is to-day. There would have been no necessity for submitting this; this was a mere sketch on which a man was to make his calculations, not a plan for construction.

Q. When did you first see the plan to which you are now speaking?

A. I saw that plan about the time Mr. Ferris got it; I saw that map, the revision of it.

Q. You testified that the Banta dam was about a mile above the Kingsland dam and that caused the company to have a pipe a mile long?

A. Yes, that, of course, made the conduit pipe and all somewhat longer.

Q. What was the exact distance between those two sites?

A. I don't know as it was ever mentioned exactly, about four thousand feet.

Q. Well, then, the additional length was only four thousand feet?

A. Well, it would be dependent upon just the line; you cannot always run a pipe direct; it is practically direct as we did it.

Q. How much was the surface of the ground at the Banta site above the surface of the ground at the Kingsland site?

The Court: Do you mean at the bottom of the bed of the stream?

Mr. Vredenburg: Yes.

A. Practically about fifteen feet lower—that is, the dams—my idea is that the dams are about the same height above the ground, but the surface of the present water level is about fifteen feet higher than the water level would have been if they were to put it on the Kingsland side.

Q. And the level of the surface of the land was about the same, do you mean?

A. No, about fifteen feet lower.

Q. That is, the surface of the land at the Kingsland site was about fifteen feet lower than the surface of the land at the Banta site?

A. About that on an average; the land of course is very irregular.

Q. Do you refer to the bottom of the stream or the meadow or what?

A. I take it from this sketch which we used for calculation, and that would indicate there, and that is what I understand, as I remember that is about what it was.

Q. Do you refer to the stream of the Rockaway river or bed of that river or to the meadow on each side of the river?

A. Well, I think, taking the two beds of the river

and comparing them, that would be about it, and the meadow is about the same way.

Q. What was the rate of fall of the river back of the present dam?

A. I don't think I ever measured it. It has been put in evidence here; the map shows here, but I never made a survey.

Mr. Corbin: I don't think the witness heard the question.

A. I never measured it. It is about fifteen feet fall in there, as I remember.

Q. (Question read.)

A. Back of the present dam?

Q. Above the present dam?

A. Above the present dam. Well, that depends entirely upon how far up you want to go.

Q. Well, the first hundred feet.

A. I cannot tell. I should judge the river fall there is about two or three feet in a hundred; it is quite a fall there.

Q. Two or three feet in a hundred?

A. Yes, sir.

Q. What was the elevation of the surface of the land where the dam was built—the Banta site?

A. About two hundred, the surface of the land.

Q. How far was the contour line of 260 from the dam—above the dam—in the valley of the river?

A. About 3,400 to 3,500 feet.

Q. Was the rise gradual from the dam to that point?

A. Yes.

Q. What was the elevation of the spillway at the Banta site?

A. That is, the present dam?

Q. Yes.

A. 305.25.

Q. What was the elevation of the spillway out at the Kingsland site?

A. Well, the estimates made are 292.

Q. 292?

A. Yes. Never could tell where that would be, there hadn't been a survey or line or hardly any levels taken at that time.

Q. Why do you say that this reservoir is deeper than the reservoir which would have resulted from the Kingsland dam, if a dam had been built there?

A. Because the same amount of water is impounded in a less area—that hundred acres you tried to find—it would take the same amount of water and less area, the average depth of water has to be greater. The Kingsland site ran up very shallow in the upper end.

Q. Then the greater depth that you speak of is up by the Parsippany dyke?

A. Yes, very much so; fifteen feet deeper there than it would have been at the other.

Q. It is not any deeper at the site of the dam?

A. No, they have over a hundred feet there now. We don't care when we get over fifty feet, it don't make so much difference, but when you get down below fifteen it does, in a reservoir.

Q. Is there any indication on this Exhibit D 3 which you say was sent, as I understand it, about August 1, 1899, to Mr. Ferris, of any pipes or conduits?

A. Yes, on section 2 is shown the masonry aqueduct starting towards Jersey City, practically the way we built it.

Q. And what is the size of that pipe?

A. Why, that is a conduit and I think at that time we had—

Q. No, what is the size shown on the exhibit?

A. That will have to be scaled.

Witness: Eight and a half feet about. Just what we built it; we had practically settled the size of that at that time.

Q. Where was the mile of tunnel that you did not build?

A. Watchung and Hook Mountain.

Q. How much in Watchung?

A. Well, at Watchung we saved about a quarter —a little less than half a mile. The original tunnel through the Watchung Mountain was pretty nearly two miles long, the present tunnel is 7,400 feet.

Q. How much did you save at the Hook Mountain tunnel?

A. That was about eleven hundred feet long, the saving was over half a mile.

Q. What was the distance between the site of these tunnels as fixed by the original proposal and the maps annexed, and the site of them as built?

A. Well, we have got a map here that shows that; I can only tell you my memory of that; I think the original tunnel was about half a mile north at the east end from the other tunnel—original tunnel. But at the west end it was the other way, it was about a quarter of a mile south. I think those two lines crossed; I am only speaking from memory. The original tunnel has never been located on the ground. Now, you asked me about the other, the Hook Mountain tunnel; the new tunnel is about 3,000 feet further south than the first plan showed.

Q. Now, as to the Watchung tunnel, was there any difficulty in locating it where it was actually built if the reservoir had been at the Kingsland site —in other words, had the changing of the reservoir any bearing on the changing of the location of the tunnel under the Watchung mountain?

A. The tunnel that was actually built?

Q. Yes.

A. Why yes, it made a great difference; it would have had to be lower.

Q. Did it necessitate a change of location?

A. Yes, sir.

Q. In what way?

A. Because you always look in building a tunnel

at the grade you have to go through, and where the closer contours are, you don't make a tunnel longer than necessary.

Q. Why did the change of the reservoir from the Kingsland site to the present site necessitate a change in the tunnel so far as its actual location is concerned?

A. It did not make a particle of difference—that is, if you were willing to make a two-mile tunnel where you could get one at 1½ miles.

Q. (Question read to witness.)

A. Well, I say that need not have made any difference in the alignment if you were willing to build the tunnel longer.

Q. Now, Mr. Harrison, how much did it cost per running foot to build the tunnel and the conduit inside; I mean the lining of the Watchung tunnel per foot?

A. About $36 a foot.

Q. How much?

A. About $36 a foot.

By Mr. Corbin: I desire to object to this as incompetent, not pertinent or material to the issues.

By the Court: I overruled Mr. Corbin's questions as to the total cost. It did not seem to me that that was material; now you are going into the same matter, are you not?

By Mr. Vredenburgh: I don't think so.

By the Court: What is your offer?

By Mr. Vredenburgh: I have insisted, before your Honor, that if there was a saving here in the way that this tunnel was built, other than the specifications provided, it seemed to me that Jersey City was entitled to the benefit of it, and I thought I ought to bring it before the Court. I don't want

to spend very much time, but I want the facts before your Honor, if this Court should conclude that the saving that was made should be for the benefit of Jersey City.

(Counsel followed his offer up with illustrations and argument.)

By Mr. Corbin: My reply is that the contract does not call for the building of a conduit upon any definite tract or definite location. The specification and the contract calls for nothing at all about that. The proposal says that from the intake at old Boonton, the water would be conveyed along the route shown generally upon map No. 1, and the hydraulic gradient of the tunnel and conduit are shown on profile No. 10 annexed. But the location is allowed to be changed and was by concurrent action, all of which of necessity affects the location and gradient of the pipe line. They were to seek a location so that the water could be effectively carried by the works in accordance with formulas laid out with or without a tunnel. The specifications and contract provide that they are to get a conduit to carry a certain amount of water, and if the contractor would give them a straighter and better line and consequently could save money, that was no affair of the city's, it would be entirely within his province to do so. This work was not paid for by cubic feet but by one payment of a fixed sum of money, which must be paid whether the works cost little or much; the contractor takes all the risk, and it is not a variable contract. Of course, if the contractor is to take all the risks, he should be permitted to take advantage of such economies as he makes.

By the Court: I will admit the evidence subject to the objection.

Q. When was this map of August 1st—that was

sent by you to the City on August 1st, 1900, made?

A. When was it made?

Q. Yes.

A. My memory of that is that it was sent to them very soon after it was finished. We had been working on it for some little time.

Q. It was made about May 1st, 1900?

A. It was sent about May 1st, 1900, but it was made previous to that.

Q. No, it was sent August first?

A. Yes, but it was made about May first?

Q. It has a date upon it.

A. The date is about right.

Q. When did you understand the City voted to accept the proposal of Mr. Flynn's?

A. I forget exactly the date, that spring, I think.

Q. The spring of 1900?

A. Yes.

Q. Did you tell Mr. Ferris that at the price that iron was when you started to build those concrete conduits, that you could build concrete conduits cheaper than you could lay the pipe per foot?

A. No, sir. The original estimate of the concrete conduit was $15.00 a foot. The price of pipe, as shown by our contract for the same location is about ten and a half to eleven.

Q. You didn't tell Mr. Ferris that you could build that conduit cheaper than you could buy the iron pipe at the time you were building the conduit?

A. No, sir, Mr. Ferris knew the cost of those conduits, and also knew the cost of the pipe; there was no use telling him something he knew all about.

Q. Where did you get the gravel with which you surfaced the Watchung tunnel?

A. I don't know where the contractor got it.

Q. How many loads did you use?

A. I don't know.

Q. About how many?

A. It would be a mere guess.

Mr. Edwards: I object to a guess.

A. (Continuing.) It would be a mere guess, I can have that, we can get it, but I don't know just how much was used.

Q. Well, give it now, won't you?

A. I cannot give it to you now.

Q. Why not?

A. I will have to have the man who has had charge of the work.

Q. Well, you cannot give us within what limits the number of loads were that you put in that tunnel, is that so?

A. I can give you an estimate of it. I went through afterwards and went through before. I can give you an estimate of it.

Q. Well, give us your judgment of how many loads of gravel you put in that tunnel to surface it up?

A. About eight hundred to a thousand cubic yards, I think.

Q. You don't know where it came from?

A. No, I don't.

Q. What was it worth a yard, delivered there?

A. Well, I don't know just how far it was brought and where it came from, so I can hardly tell.

Mr. Edwards: Wait a moment, I object.

The Court: Is it worth while to go into that, Mr. Vredenburgh?

Mr. Vredenburgh: All right, your Honor.

Q. How was the invert in the Hook Mountain tunnel constructed?

A. Laid in concrete.

Q. Rosendale cement?

A. Laid in—no, laid in Portland cement.

Q. To what thickness?

A. Two to four inches.

Q. From two to four inches?

A. Yes, sir.

Q. Was there any water in that tunnel?

A. Practically none; it was quite a dry tunnel.

Q. Where was the water that you met with in the Watchung tunnel, through the trap rock or through the red sandstone?

A. Well, the greater portion came from about almost two thousand feet, from the east end and extended for about two thousand feet into the tunnel in sandstone and at the junction with the trap; there was water, though, coming through the trap and also water in the eastern end. Until we get in a thousand feet neither end of that tunnel is very wet.

Q. Well, there was one place that was especially wet, a fissure of some kind, was there not?

A. Well, some places were a little wetter than others—there was a little more in some places than in others, and it was all pretty wet.

Q. There was no place in the tunnel where there was any large volume of water coming in the tunnel?

A. There were several places where there was quite a large volume.

Q. Is that in the trap rock or sandstone?

A. Sandstone.

Q. You said the sandstone was stratified?

A. The sandstone was stratified.

Q. Was there any reason for not building a drain to drain this tunnel other than the expense?

A. Yes, in the first place the tunnel only has a fall of six inches in the mile—that is, it had a fall of about nine inches in the whole length. There are about two millons of gallons of water a day thrown into it, and in order to carry away that two million gallons of water and do anything, we would have had to have had a drain, I won't say as

large as the tunnel, but we would have had to have a drain that would be abnormal in size and that drain would have to be closed up afterwards in some way; you might take the chance of losing some of the water for Jersey City; it could have been sealed at the end, perhaps.

Q. Could not the water have been pumped out in sections as you built the tunnel?

A. From the drain? Yes, I believe it could, it might have been; we did use drains there, you know.

Q. It would have been more expensive to have built it that way?

A. It would have taken a great deal of time and there did not seem to be any necessity for it.

Q. The size of the Boonton main dam is what at the bottom and what at the top?

A. Well, it depends upon the section, the whole of the top is 17 feet wide and at the bottom of the deepest section it is about 70.

Q. Does that include the earth as well as the masonry, does that include any earth or is that all masonry?

A. That is all masonry, concrete.

Q. It is 70 feet at the bottom at the heaviest place and 17 feet at the top?

A. Seventeen feet at the top and about that at the bottom; it depends upon what you say is quite the heaviest.

Q. Mr. Gardner, you say, suggested that there should be an increased width upon the dam as originally shown on D 3?

A. An increased width at the top, and after consultation we decided to put it there.

Q. That increased width ran down how far from the top towards the bottom?

A. It started at the top and I think it just about struck the line of surface at the bottom.

Q. The surface of the land?

A. The surface of the original valley, in the deep points.

Q. And there it ran out?

A. It ran right on down, yes sir, into the ground.

Q. Was it regular all the way to the top?

A. Yes; .56 in one, I think.

Q. Originally the top was but 12 feet?

A. The original top was 12 and we made it 17.

Q. The dam was built with stone on each face and the center filled with concrete and broken stone?

A. No. The front face was laid up with ashlar stone in regular courses; the back of the dam up to within three courses of the top is laid in rubble and Portland cement pointed; the interior of the dam, the heart of the dam, is what we call, in the sense that it has been adopted by many engineers, Cyclopian masonry, which was just as large masses of stone as we could get out of the quarry, imbedded in a matrix of concrete.

Q. What was the width of that part?

A. What was the width?

Q. Yes.

A. The width of that heart?

Q. Yes, at the bottom and at the top.

A. At the top, the faces all the way down would be about, on the back face, I think, an average of three feet; that would cover the rubble and cement and 4 feet would cover the ashlar faces; that took 7 feet, those 2 classes; that left the remainder of the width in the heart of Cyclopian masonry.

Q. If you had increased the width as shown on Exhibit D3 so as to impound 70,000,000 gallons, what would the width of the bottom have been then?

Mr. Edwards: I object to that as not cross-examination.

The Court: What is the object of it?

Mr. Vredenburg: It is to show, may it please

your honor, that this thing if it was built at the time could have been built a great deal more cheaply.

The Court: I cannot go into the details of that; if I come to the conclusion, on a fair construction of this contract they were bound to build on a 70,000,000-gallon basis, then I will allow you to go into this.

Mr. Vredenburg: I thought it was proper cross-examination, but in the view which your Honor expresses I do not care to go into it.

Q. Now as to the Parsippany dyke, Mr. Harrison; the Parsippany dyke is shown on the map annexed to the proposal of Mr. Flynn, and is shown on the exact divide between the Troy brook and the Rockaway water-shed, is it not?

A. No, it shows it adjoining the Parsippany road. The question of an exact divide is a question of a very few feet one way or another, and on that map you cannot tell whether it was the exact divide or two or three hundred feet away.

Q. You could not tell from the map whether you were on the exact divide or not, is that what you say?

A. No, sir. The State geological map is a very good map; that is, within certain limits it is very good, but you could not tell the dividing line from that.

Q. Do you mean the divide did not slope away in both directions, slope down perceptibly in both directions, south or north?

A. Yes, sir, it is about on the divide.

Q. Well, you call it a divide; a divide is a theoretical ridge of land which the water flows down one side of, and another portion of water flows down another side into another valley. Now that divide or ridge was appreciable to the eye?

A. No, it was a little south of the dam, about on the road—the road is nearer to it.

By Mr. Edwards: The point is that the State map which we use in a general way wasn't made accurately enough to define the divide with any certainty within a couple of hundred feet.

By the Witness: The State map only shows contours every 10 feet apart.

By Mr. Edwards: That is it, and that might be three or four hundred feet between contours—exactly where it lies between them we cannot tell. In other words, we didn't have a survey made before we put the bid in.

By Mr. Vredenburgh: Mr. Ruggles' map shows that it falls from the dyke.

Q. Was a fall from the dyke towards the big dam on the surface of the land?

A. Yes, sir, on the general surface of the land there was a fall.

Q. You say that you dug out a portion of the reservoir site near the Parsippany dyke; wasn't that dug out for the purpose of increasing the amount of capacity?

A. No, not principally; it was to get good material for the dam. We owned that land, and the proper place and usual practice was to take it from the interior of the reservoir to make the dykes with. You save three things by doing that; we got the earth, we took away the vegetation and the surface, and we increased to a very small extent the quantity or the capacity of the reservoir.

Q. Is not that the meaning of your letter to Mr. Ferris in regard to the re-calculation by Mr. Godfrey?

A. That is one. It meant the taking in of all

these angles, and all that we would take out would mean a very small amount, perhaps 30 to 40 million gallons, which we required in order to fill with.

Q. Where was it inside the reservoir that the springs boiled up before you built your dyke?

A. I can show you on the map.

Q. No, don't show us on the map; tell us where it was?

A. There were one or two springs 1,000 to 1,500 feet north of the dyke, and on the west side of the reservoir; on the east side of the reservoir there was some very large good springs, about half way down, they were very fine springs.

Q. Half way down where?

A. Half way down the reservoir to the north down towards the river, very fine streams, and the result of those springs was a very fine little stream running on down through the reservoir, adjoining the Rockaway river, just about opposite the dam. That stream was big enough to run a mill.

By Mr. Edwards:

Q. What was the name of the mill; was it Cahart's?

A. I don't recollect the name of the man, but we had to buy it.

Further Cross:

Q. I didn't ask you about the stream, I asked you about the springs?

A. That was the head of the stream.

Q. I asked you about springs; you said there was one spring about 1,000 feet to the south of the dam?

A. Yes, sir.

Q. Was that the nearest spring to the dam that you saw?

A. I won't be sure about that; I can show you on the map. I have got them all on the map. I don't remember now whether that was just the nearest or not.

Q. You don't remember whether there were any springs nearer the south dam than 1,000 feet?

A. I don't remember whether there was one nearer than that or not, that is, I don't remember whether there was nearer than 1,000 feet.

Q. Now that which was as near as 1,000 feet from the dyke south, where was it, in some one's backyard?

A. No, sir; it was in the fields.

Q. How did it spring out of the ground?

A. I have got a map here which will show it; this guessing from memory without a map is not satisfactory.

Q. Please answer my question. Did you see this spring yourself that you speak of?

A. Yes, sir. I drank from it.

Q. How did it come out of the ground; was it a round spring?

A. It came out of the ground and ran away in a rill.

Q. Was it a boiling spring?

A. I don't know what you call a boiling spring; it is rather a poor term to use; it rose up out of the ground in the side of the bank, and ran away in a stream, as all of them do; all of the springs did in the reservoir.

Q. Did not Mr. Ferris write to you that these core walls were not going down through the gravel?

A. He wrote me a letter that he wasn't quite satisfied in his mind about that. I have got it here now.

Q. Now, did you show him the test pits or had you shown him the results of the tests?

A. No, sir.

Q. Why not?

A. Because there were no test pits on the line of the dam.

Q. Is that the only reason?

A. That was one; and the other thing was that when we had the ditch dug for the full length it would show much better than test pits. We thought it was better to use them.

Q. What did you do with the result of the tests from the test pits?

A. I don't know.

By the Court: Does it appear yet how far before the surface of the ground the bottom of the core wall was made?

By Mr. Vredenburgh: No, sir. He said it was 6.6 to 20 feet, I think.

By Mr. Edwards: Twenty-four feet in some places.

Q. Now you did have pits dug somewhere in the neighborhood of the dyke to ascertain what the soil was beneath the surface, didn't you?

A. Yes, sir.

Q. Did you serve those tests upon Mr. Ferris?

A. No.

Q. Why not?

A. Well, I tried to get them to him several times, and we never used them ourselves, and I don't know why he didn't get them.

Q. Now when you came to actually dig for the core wall you determined that it was of no use to have test pits dug along that line?

A. No, because we immediately took—we already had the old pits, and we now dug a ditch or trench, and we thought we thoroughly understood the situation and went on and built.

Q. How deep did you build the core wall below the surface of the ground?

A. As I say, it ran from six to thirty feet, different elevations at different points. You will have to look at the profile to tell exactly how it was.

Q. Why was it made thirty feet in some places and six in the other?

W. We always go down until we get a good bottom, and when we get a good bottom we stop.

Q. At what point in the wall was it that Mr. Ferris objected, that your wall was not going through the ground?

A. I don't know as he objected in that way. I have his letter, perhaps you better have his letter. He objected—

By the Court:

Q. Well, the foundation of the core wall then was not built on a horizontal plane, but varied in depth as the soil itself—character of the soil itself varied, is that what I am to understand?

A. So that when we went down to a good bottom, in the judgment of the engineers, we knew we got a good bottom. Do you want me to read the letter?

By Mr. Vredenburgh:

Q. What letter are you reading?

A. The letter to Mr. Ferris and my answer.

Q. I think it is in evidence, but perhaps it would be well to read it just now, if the Court would like to hear it. Just read those two letters.

A. (Witness read Mr. Ferris' letter.)

By Mr. Edwards:

Q. What is the date of Mr. Ferris' letter?

A. April 24, 1903.

Q. Now, your answer.

A. April 29, 1903. (Winess read same.) That matter was considered by Mr. Smith and Mr. Fuller and myself—went over there and looked into it very carefully before that letter was written.

By Mr. Vredenburgh:

Q. Your wall, then, at that point was built of sand?

A. Built in sand below the clay.

Q. And do you know how deep that sand was?

A. No.

Q. It was a glacial sand I understand you to say?

A. Yes, glacial drift.

Q. You thought it was a pocket?

A. Yes, and I think so now.

Q. How many feet long was that pocket?

A. The profile would have to show that.

Q. Do you know how many feet long it was—the pocket?

A. Along the——

Q. At right angles to the dam?

A. No.

Q. Don't know anything about it, do you?

A. No.

Q. You don't know whether it went down to Troy brook or not, do you?

A. No, sir.

Q. You don't know whether it went a thousand feet in the reservoir or not, do you?

A. Well, only from what we could see of the same class of pockets opened up at different places on the hills there.

Q. Could you tell from that trench of the dip the pocket had or the sand had?

A. Well, yes, the dip was towards the reservoir, that is all, just how much or just what, it was a very narrow trench, but the dip was towards the reservoir whatever there is there.

Q. I am talking about this particular bed of sand in which you put this——

A. Whatever dip it had was down towards the reservoir, but we considered it a pocket and believed it to be a pocket and believe it is a pocket to-day.

Q. You don't know how wide it was, do you—how wide was it along the wall?

A. We only had—well, I cannot remember now, but our profile shows that the width in the trench is about five feet.

Q. In the building of this dam did Mr. Ferris agree with you as to what was the proper thing for the different portions of the reservoir?

A. Why, Mr. Ferris and I have agreed very well all through this work, we have had differences of opinion on engineering subjects, difference of opinion as to how the thing should be carried out, but in general I think we have tried to agree; in all non-essentials we have been very liberal.

Q. You have heard counsel say that Mr. Ferris would not agree to anything?

A. I did not hear that, if he did, he was wrong.

Q. He was wrong about that, was he?

A. There are very few points of difference now.

Q. When you say there was a compromise with Mr. Ferris, what do you mean?

A. On the back dyke?

Q. Yes.

A. Now, I want to be understood exactly that I think that thing was settled in a splendid business-like manner and on good engineering principles, it was, there was a compromise between the original plan which Mr. Ferris wanted me to adopt and the plan which we had submitted. The original plan that he wanted was a very radical one.

Q. Did he make any plan at all?

A. No.

Q. You made all the plans, didn't you?

A. He brought a sketch plan and said he

thought that was about what it ought to have and what they wanted. The compromise was this: The city outside of Mr. Ferris—somebody had taken hold of the thing and proposed to exploit it and litigate it; Mr. Ferris and the Street and Water Board said, "We want you to go ahead and hurry this work through; we don't want to fight it out in the Court, we want it finished and can't you and Ferris agree?" At that time I said we had made our ultimatum and he had made his—(interrupted).

Q. Do you mean to say the Board of Works said anything more than they said in their resolution?

A. Yes, sir.

Q. They passed a resolution on this subject?

A. They passed a resolution and this was a committee meeting; they told me that they wished we would be able to agree, in committee meeting, and I then was moved by that to see if there was any possible way by which I could come to an agreement so that Mr. Ferris' idea that he could build up that core wall in the future if he wanted to, could be carried out, and the result of that was that plan which I submitted, and the way it has been built. That plan involved an expenditure of about $15,000 more for the whole length of the dam, which was not a very heavy sum on the whole amount, but I had to submit it to the president of the company and I told Mr. Ferris if we could agree on that he was not to go into court then; some of you people were going into court then and take everything up, that he was not to go into court then as there were three or four questions we had been debating about and I thought it a good idea to settle the whole thing at once, which was done.

Q. Why didn't you say that in your letter when you wrote it?

A. I wrote to—(interrupted).

Q. You wrote a letter to Mr. Ferris?

Mr. Edwards: I object. I thing Mr. Harrison should be allowed to finish his answer; he has not finished his talk.

Witness: The reason there was no need in that letter——

Mr. Edwards: One minute; let us have the Court's decision.

The Court: Mr. Vredenburgh was simply inquiring with regard to this core wall, as I understood him, and the witness was going on to state other matters of dispute and differences and I do not understand that Mr. Vredenburgh has inquired with regard to them.

Q. Did you write a letter in answer to the letter from Mr. Ferris?

A. Yes, sir.

Q. Do you remember the date of that letter?

A. I have got it here probably, but if you have it let me have the date, it was away on late in the fall sometime, about October sometime, I think.

Q. October of what year, 1903?

A. I think so, yes.

Q. Will you just read that letter?

A. Will you give me the date of that letter, you have it in evidence and I have not got it in the index.

Q. I would if I could, but I cannot remember.

A. It is in the minutes of the Water Board, I know that.

Q. Well, Mr. Harrison, was the letter that was offered in evidence in Mr. Ferris' testimony the one?

A. Yes, you got the whole testimony in—the whole correspondence—Mr. Ferris submitted it, between me and him in 1902, it was in the fall of 1902.

Q. And it is in evidence?

A. It is in evidence, yes, sir.

Q. Now, Mr. Harrison, you spoke about the dry season and the run-off of the Passaic Valley during those dry seasons, and you told us on the day on which you were examined that those records were taken from the run-off in Philadelphia?

A. No.

Q. From the fall of water in Philadelphia in 1805?

A. Well, I said commencing as I thought in 1805, but it commenced about 1825.

Q. Was there any dry year in 1805 that you know of?

A. No, sir; but early in those records there were dry years and that was 1825—a dry year, but not a dry period.

Q. Was 1825 a dry year?

A. 1825 was quite a low rainfall in Philadelphia.

Q. Was that the dryest year in Philadelphia?

A. No, sir; the dryest of that series of dryest period, but there were many dry years and the dryest period of the series is from the fall of 1879 to the fall of 1882.

Q. Now you said you made a record or that you had the data taken correctly in 1896?

A. 1896? I have the ten years flow of the Pequannock river.

Q. From what source did you get it?

A. From 1890 to 1900 it was taken by the East Jersey Water Company from the Macopin.

Q. Have you had access to those records?

A. I was employed by the company in the suit in Newark and had been there and I have had access to them since.

Q. From those records you ascertained that the driest year was 1896?

A. One moment until I look. 1895, the record from 1890 to 1900 shows the dryest year was 1895.

Q. Then when you said 1896 you were mistaken in the year?

A. Did I say that; I have it right here on the paper 1895.

Q. And that was the dryest year of those ten?

A. Yes, sir.

Q. How much was the rainfall?

A. 35.84 inches.

Q. And what was the run-off?

A. 19.07 inches.

Q. Now you made a careful calculation having the run-off of 19.07, and from that calculation you arrived at this result; that in the Rockaway valley in that year, if they were using the seventy millions of gallons a day the reservoir would have gone down about 28 feet, is that right?

A. No, sir; the reservoir would have been drawn down to about five hundred million gallons on that year's basis.

Q. What level would that be?

A. The reservoir would have gone down 28 feet in an average dry year of the New Jersey State Geological reports on the Rockaway valley.

Q. How much would it have been drawn down that year?

A. On that year it would have been drawn down to about five hundred million gallons. I can give you about what that would be in feet, roughly.

Q. Well?

A. That would be an elevation of 268, about eight feet above the outlet pipes.

Q. About 268?

Q. About 268.

Q. Now that is upon the supposition that there was nineteen inches of run-off?

A. No, sir. There was a good part of that run-off went over the dam and down the Pequannock and that was in the year which was the dryest and worst year of the series, and yet even at that time with that water there was a wastage in the last

week of 7,732 million gallons, as much as would fill that whole reservoir was wasted. The rain came at the wrong time, as it generally does with the water companies.

Q. If you had the arrangement of holding that water you would make an improvement on nature?

A. Well, I suppose we could improve on nature at Dover.

Q. You could?

A. Yes, if we could only regulate your place for the rainfall it would be all right.

Q. Now you have been quoting figures, I take it, from what you have said, from the State Geological reports?

A. No, those figures I have given you—(interrupted).

Q. Well, with the exception of the one figure from the East Jersey Water Company?

A. Yes, sir.

Q. Your other figures were taken from some report or another—from the geological report?

A. Yes, sir.

Q. What report is that?

A. That was volume 3, 1893, of the water supply report.

Q. Well, now you have got it there, I guess?

A. It is Mr. Vermule's report.

Q. I have got it here, this is the one.

A. Volume 3, 1894, geological survey, New Jersey.

The Court: That was written by Mr. Vermule?

Mr. Edwards: Yes, sir.

Q. What have you to say as to this, Mr. Harrison, "We may expect——"(interrupted).

Mr. Edwards: What page is that?

Mr. Vredenburgh: Page 101.

Q. What have you to say as to this: "We may expect a minimum of 11-inch flow upon the Sudbury at Croton?"

A. Let me look at that page and see how it applies.

A. I don't believe you may expect, as we haven't had it in the Passaic, eleven inches flow since 1877 certainly, up to date, and there is nothing—take the New York record of rainfall and the Philadelphia records, there is nothing to indicate away back to 1825.

Q. You don't agree with Mr. Vermule as to that?

A. I don't agree with him as to very many things, only Mr. Vermule was the engineer who drew the specifications under which we are working. That would be enough though to give you over fifty millions, you only draw nine and a half inches from the water shed for fifty millions, and only about thirteen inches from the water shed for seventy millions, you wouldn't be so bad off with eleven, and that is a guess; it may never happen.

Q. Mr. Harrison, I understood you to say that your calculations were based entirely on the whole flow of the 121 square miles of drainage area?

A. On the whole flow of the—yes, 121 and a half or 122 square miles.

Q. Now there are water-works at Dover?

A. Yes, sir.

Q. That is within this water-shed, is it not?

A. Yes, and another one at Boonton.

Q. Well now, wait—at Dover?

A. Yes, sir.

Q. How much—did you make any calculation as to the amount of water that was taken out of the water-shed at Dover?

A. No.

Q. There are also water-works at Rockaway?

A. I don't know of the works at Rockaway.

Q. You don't know of them?

A. No, sir.

Q. You have been in the water-shed a great deal?

A. Boonton there is a works.

Q. You don't know of any water works at Rockaway?

A. Not public water works, I don't know; they may be there, I don't know.

Q. Now at Boonton there are water works?

A. Yes, sir.

Q. How much water do they take out of the water-shed?

A. They only supply a very small part of the town; I don't know.

Q. Do you know the capacity of their reservoir?

A. I forget—I have heard it.

Q. They supply the engines of the Lackawanna Railroad, don't they?

A. I don't know, I am very doubtful if they do; I think the Lackawanna have a well and pump.

Q. You think so, do you?

A. I don't know, I didn't take it into account.

Q. Well, now, the amount of drainage which runs down the lower level of the canal, you said amounted to twenty or twenty-five cubic feet per second; is that taken out of the water-shed?

A. No, but taking the whole year around that is an equal amount they put in at Lake Hopatcong, and there is no trouble if the canal was operated properly, about bringing in water from Hopatcong to bring it up——

Q. I didn't ask you that. I asked you whether that amount was taken out of the water-shed?

A. No.

Q. Why not?

A. It was taken from the flow of Hopatcong.

Q. Well, it is taken out of the water-shed?

A. It is taken out of the water-shed after being put in.

Q. Did you ever measure the amount that is put in at Lake Hopatcong?

A. Well—how much they took out at Lake Hopatcong?

Q. Yes, did you ever measure it?

A. Yes, I measured the amount coming out of Lake Hopatcong—about 1886, at the time of making the investigation of the Morris canal, and more was going out of Lake Hopatcong than there was going east.

Q. Going east from where?

A. Going east from Boonton.

Q. How much was going east from Boonton at that time?

A. I have got those figures; that is twenty years ago. There was about thirty-eight cubic feet per second going east of Boonton, and about forty-three cubic feet per second coming down from Lake Hopatcong; now that is not normal, that is a large amount; I don't think it has that much usually, I think what I told you is a true or average amount going through—would about equal it up. There is another source of water——

Q. There is thirty-eight going out of the water-shed at the lower level?

A. And about forty-three coming in.

Q. Thirty-eight what?

A. Going down towards——

Q. What?

A. Cubic feet per second.

Q. How many gallons is that a day?

A. Well, about twenty-six millions.

Adjourned until Friday, June 1, 1906, at 9.45 A. M., at the Chancery Chambers, Newark, N. J.

Simon J. Loewenthal sworn, for Defendant.

Direct Examination by Mr. Edwards.

Q. Where do you live?
A. Rockaway, New Jersey.
Q. In what business are you engaged?
A. In the bleaching, dyeing, printing and finishing of cotton goods.
Q. How are you connected with that establishment.
A. I am secretary of the corporation and general manager of the business.
Q. What is the name of the business?
A. The Liondale Bleaching, Dyeing and Printing Works.
Q. How long have you been engaged with that company?
A. Ever since they started in the fall of 1896.
Q. Did your company discharge matter into the raceway which entered the Rockaway river at one time?
A. Yes, sir.
Q. What did you discharge into that?
A. The refuse of the mill.
Q. The water closets?
A. Yes, sir.
Q. And urinals?
A. Yes, sir.
Q. Do you do it now?
A. No, sir.
Q. When did you cease doing it?
A. Well, there were various times; we ceased at different times.
Q. At whose request or demand did you cease?
A. I think it was Dr. Leal who first came to see us.
Q. When did he come to see you first, and tell us what you did?

A. I can tell better by referring to some notes that I have.

Q. All right, you may refer to anything you have got.

By Mr. Vredenburgh:

Q. Were those notes made by you?

A. Yes, sir.

Q. Made, I suppose, for this examination?

A. Yes, sir.

Q. Now proceed?

A. I should judge it was some time in the latter part of 1899.

Q. What did you do at that time?

A. We put in filter beds and screens, and also put in perforated pipe with a solution of sulphate of aluminum.

Q. Had you any engineers to supervise it?

A. No, sir, but we got our instructions from Dr. Leal as to what to do.

Q. What did that purification plant take care of?

A. The filter bed took care of all the solids or anything else that might come down there, and the sulphate of aluminum precipitated the coloring matter in the water.

Q. Was there any difference in the outflow of the water before and after you put in those things?

A. Yes, sir.

Q. Describe it.

A. Well, the water as it comes to us is of the usual water color, as a general rule; sometimes it is a little discolored, at least the water after it left us was discolored with dyestuffs.

Q. After entering into the purification plant, how does it leave it?

A. Well, they go through a filter bed, and after going through the filter bed, it is very much clearer, and by the time it gets down to the end of our prop-

erty or probably a few feet further on, you would not know any difference between that and the water above us.

Q. Does any fecal matter go into the filter beds?

A. I don't understand what you mean?

Q. Any human excrement?

A. No, sir.

Q. Of any kind?

A. No, sir

Q. What did it cost you to do all this?

A. Between fourteen and fifteen thousand dollars.

Objected to.

Objection overruled.

Q. Well?

A. I can't give you all the figures from my books, but estimating the balance, I figure up to date it cost something like $14,000 or $15,000.

Q. What else have you done there to take care of the possible pollution?

A. The fall of 1904 we dug a very large cesspool, and had all the closets connected with that cesspool.

Q. How is that cesspool lined?

A. It is lined with chestnut boards.

Q. And made water tight?

A. Not at all.

Q. What did you connect with it?

A. All the closets are connected with the cesspool.

Q. How are they connected?

A. By tile and sewer pipe.

Q. How is the matter removed from the cesspool?

A. There has been no occasion to remove it so far, but if it should be removed, it would be pumped

out or taken out in some way or removed to some field away from the river.

Q. Do you burn any of your wastes there?

A. Yes, sir, we are burning it all the time, we have practically a fire going all the time. Our coloring matters for printing are carried by starch, wheat starch; in other words, we pile up our starch and the coloring matter is added to the starch, and that is printed on the cloth, and then the starch is washed away, the color remaining in the cloth, and that excess of starch is emptied into a barrel in the building, and carried to this place and burned, and of course there are scraps left in the tubs which cannot be taken off; it is impossible to take it out, and a hose has to be put on that, and the coloring matter is washed out, and that is probably the only matter that goes through to the tail race.

Q. Does it go through the purification works?

A. Yes, sir.

Q. Then very little of your rubbish does reach the purification works?

A. Yes, sir, only just what I have said.

Q. Now what do you put from your factory now into the river, if anything?

A. Only the washings out of the tubs.

Q. What does that consist of, aniline dyes?

A. Mostly aniline dyes, probably 90 per cent. aniline dyes.

Q. Any chloride of lime?

A. No, sir, the proportions of chloride of lime are gone after they get through our mill.

Q. Is there anything deleterious which goes into the water?

A. Not that I know of.

Q. Has Dr. Leal visited you very frequently up there?

A. Yes, sir, quite often.

Q. And kept a close outlook on the works?

A. Yes, sir, I should say so.

Q. Who else has been there as inspectors for the Jersey City Water Supply Company?

A. At different times there were different people there, but only one that I remember the name of, and that was Mr. Gibson.

Q. Is there anything now connected with the river from your works at the present time, the drain water or the material, either to the river or any tributary thereof, except through the purification works?

A. No, sir.

Cross-examined by Mr. Vredenburgh.

Q. How many men have you in your employ?

A. Well, that is according to the amount of business we do, say from 200 to 260.

Q. Were proceedings commenced against you in the courts for polluting the stream?

A. In the Justice's Court, yes, sir.

Q. Who were the prosecutors?

A. I think it was the Board of Health.

Q. The Fish Warden, wasn't it?

A. Yes, sir, that's right.

Q. Were you convicted and fined?

A. We were fined before the Justice, but we obtained a certiorari on that.

Q. What were you fined?

A. I believe it was $100.

By Mr. Edwards: I object to that as immaterial.

By the Court: It does not seem to make much difference.

Q. When was that?

A. I can tell from the records, I have a newspaper print of it here.

Q. Well?

A. It was in the Rockaway Record of July 20, 1899; that was not the day of the trial; this was printed probably the succeeding Thursday to that trial, because the paper was issued on Thursdays.

Q. You say you have expended altogether some $14,000; will you please give us the items which make up the $14,000?

By Mr. Edwards: Can you tell us just exactly where your works are located?

A. Right in the borough of Rockaway.

Q. Above or below where Beaver brook empties into the river?

A. Above.

Q. About how far above the Beaver brook?

A. I think it enters right back of our works.

Q. Within a quarter of a mile?

A. Yes, sir, nearer than that.

By the Court:

Q. On which bank of the river are you situated, north or south?

A. We are on the south bank.

Further Cross:

Q. On the south bank of the Rockaway river, did you say?

A. Yes, sir.

Q. Is there any stream or brook running through your place?

A. No, sir.

Q. How far are you from the Rockaway river?

A. Right on its bank.

Q. Will you tell me the cost of the items making up the $15,000.

A. The first item is for constant attention, cleaning and renewing filter beds; I have averaged

one man per day, although we have had as many as twelve a day at one time, and some days none; I have averaged one man per day for seven years or 308 days a year, amounting to $2,675. The next item is excavating, filter, broken stone from time to time and making filters, about $250. Sulphate of aluminum at 32 tons of 2,000 pounds to the ton, the amount we used being two grains to the gallon, about 671,200 gallons, 10 hours a day, makes it 240 pounds per day for the same number of days, amounting to $7,096. One man constantly to burn starch, refuse, etc., nine years, 308 working days, $1.25 per day, amounts to $3,465; the total there is $13,506.

Q. Now we come to the second item of expense, which was later on, when we changed the sewerage, closet sewerage, over to the cesspool connecting with that, cutting through walls, 2 men, 6 days —we had to make three connections through a 24-inch stone, $18. Loss on old pipe which we could not take up from the ground, and which was laid to the original place of emptying——

Q. Do you mean the pipe which led from these water closets to the river?

A. It did not go to the river, it went to the tail race, and it would have cost us more to take that up than to leave it where it was—loss on pipe broken and discarded, in walls and underground, about $50. Excavating for pipe, 2 men 10 days at $1.25 a day, $25. Excavating for cesspool, carting dirt away, replacing dirt on top, 6 men two weeks at $1.25 a day, $90. Iron and earthen pipe, fitting, etc., $133.85. Lumber for cesspool, that is for sides and top, $96.25; plumber and two assistants about ten days, $42.50; lead, cement, waste by pipe broken, etc., cleaning pipes and rags, attention to pipe, cleaning cesspool, etc., $100. That makes $555.60, which added to the other amount makes $14,061.60, and I have possibly omitted quite some

other details, so I call it in round figures about $14,600 up to date.

Q. The sulphate of aluminum I think you said you added?

A. Yes, sir.

Q. What did you add that to?

A. We mixed that with the water.

Q. What water?

A. The water we pumped from the river.

Q. Do you pump the water from the river, and then before you use it, add to it this sulphate of aluminum?

A. That part which goes to the tail race—I can explain it better by saying that all our water is pumped up into tanks, and this particular pipe which goes from the tank is to feed another tank in which we mix the sulphate of lime in a certain proportion, and from this vat it goes through a perforated pipe which extends across the tail race, and the sulphate of aluminum is used in that water.

Q. What is the purpose of your sulphate of aluminum?

A. To precipitate the color from these dyes.

By Mr. Edwards:

Q. Not for the purpose of printing at all?

A. No, sir.

Further Cross:

Q. What coloring matter do you precipitate?

A. All the colors, no particular color.

Q. What is the chemical color which is precipitated?

A. Most of it—90 per cent. of it is aniline colors.

Q. What does the sulphate of aluminum do?

A. Precipitates the coloring matter.

Q. What do you mean by that?

A. Drops it down to the bottom as a sediment.

Q. What does it form, what is the result of this sulphate of aluminum with the dyes, what does it form?

A. It forms a sediment.

Q. Does it form a solid?

A. It forms a flakey substance, which settles at the bottom of our septic tanks; our tail race is a septic tank.

Q. Now describe the septic tank?

A. It is formed with the tail race, and we have used it with the sewer, everything going into that one tail race, and from there everything went directly and unobstructedly into the river. Now we have dammed this tail race up by means of a filter bed.

Q. Just describe the filter beds?

A. Well, shall I leave the other subject alone?

Q. Yes, do you mean heaps of stone?

A. Stone and clinkers.

Q. Then you call the filter beds these heaps of stone?

A. Yes, sir.

Q. And those stones are the size of that ink stand up there to the size of your head?

A. Yes, sir, but the water cannot go through the stone, it has to go through the crevices.

Q. Exactly; that is what you call the filter bed, is it?

A. Yes, sir.

By the Court:

Q. This tail race you speak of, does it receive all the water that goes through your establishment, or does it receive the water you pump up from the river?

A. Both. In our bleachery we use a great deal of water for washing white goods, probably two or three million gallons a day, and it comes directly

by gravity from the river above, or from the pond, and also the other matters which you spoke of go through the same place. I have stated the number of gallons per day, 691,200 gallons per day, I think.

Q. Water flowing through your works?

A. Yes, sir, everything; it is practically all the water.

Further Cross:

Q. Do you use any other water than the water that comes from the river?

A. Yes, sir.

Q. Where do you get that water from?

A. From our own private springs; we have a pond in front of the place with a reservoir run up to take care of it, and we pump from there to get spring water for delicate work.

Q. How much waste water discharges from your mill altogether, per day?

A. On the average about 690,000 gallons.

Q. Taking part from the river and part from those springs?

A. Yes, sir.

Q. Now as to your flush tanks, how many of them have you connected with the privies?

A. Well, I am not quite sure, but I think they are flushed every hour; I am not quite sure about that.

Q. How many privies have you?

A. About five or six in use.

Q. And the same number of urinals?

A. No, we have no urinals.

Q. They are used also as urinals?

A. Yes, sir.

Q. Now this trough that you speak of, the water to that comes from the flush tanks?

A. Yes, sir.

Q. How many flush tanks are there?

A. Five or six, just the same number of privies.

Q. And how many gallons do they discharge?

A. I don't think I am competent to answer that question; I don't know.

Q. Can you give us the size of them?

A. I can give you about the size of the box which encloses the tank.

Q. Yes?

A. I should say it was about eighteen inches by fourteen by twenty-four, and that is a rough estimate.

Q. I suppose when they are flushed, they are full before they are flushed, and after they are flushed all the water passes out?

A. I don't know that.

Q. How much alum do you use per day?

A. Two hundred and forty pounds.

Q. Per day?

A. Ten hours.

Q. You didn't tell us how deep——

By Mr. Edwards:

Q. That is the same thing as sulphate of aluminum?

A. Yes, they are both the same, sulphate of alum and sulphate of aluminum—used the same.

Further Cross:

Q. These flush tanks, did you say how often they were discharged?

A. I said I didn't think, I think about an hour, maybe less.

Q. You didn't tell us the depth of the cesspool?

A. It is about forty feet long——

Q. The depth?

A. Well, I wanted to give you the whole dimensions—well, all right, the depth is anywheres from ten to twelve feet, ten on one side and twelve on the other.

Q. The surface of the ground at that point is

how far above the level of that ordinary flow of the river?

A. I should judge about fourteen or fifteen feet.

Q. The surface of the ground above the ordinary flow of the river?

A. I should judge about fourteen or fifteen feet.

Q. About how far from the river bank is it?

A. I haven't taken any measurements, I don't know—I don't really know, sir.

By Mr. Edwards:

Q. Can you give us a guess?

A. I should say about twenty-five or thirty feet, maybe more.

Further Cross:

Q. Is it between the canal, the discharge canal or sewer as you call it, and the river?

A. It is between two tail races.

Q. Both those tail races discharge into the river?

A. Yes, sir.

Q. And how far from these cesspools along the canal is the river?

A. Well, the tail race runs between the cesspools and the river.

Q. One tail race does?

A. Yes, sir.

Q. And the other tail race runs on the other side of it?

A. On the other side.

Q. Does it run directly to the river, those twenty-five feet you speak of?

A. No, that runs to the tail race which is between the river——

Q. How far is it to the river at the tail race, at the place where this cesspool is?

A. Well, the tail race is about fifteen or twenty

feet from the river, but the tail race is between the cesspool and the river.

By the Court:

Q. Then the cesspool, do I understand, is only ten or twelve feet from the tail race?

A. Oh, no, it is more than that; it is about twenty-five or possibly more.

Q. You said, as I understand you, that the cesspool was about twenty-five or thirty feet from the river, and that this tail race was between the river and the cesspool?

A. Well, I took it in this way—that you meant anything that led to the river—stream which led to the river.

Q. Cannot you make a little diagram of it?

A. Yes, sir, I can.

Q. Just a diagram showing the cesspool and the river and the two tail races?

A. Yes, sir. (Witness does so.) I have indicated on diagram.

Said diagram offered in evidence and marked Exhibit C 102.

Further Cross:

Q. When did you say the cesspool was dug?

A. In the fall of 1904.

Q. I understood you to say that there were two hundred and forty pounds of alum used per day?

A. Either alum or aluminum.

Q. Where did you get your figures from for that?

A. From books.

Q. Well, now haven't you fallen into some error with regard to that. You don't use two hundred and forty pounds a day, do you?

A. According to the bills and the amount of water that goes through there, I suppose we do.

Q. You reckon that you put in a certain amount in each gallon?

A. Yes, sir.

Q. And you compute the number of gallons that go through?

A. Yes, sir.

Q. From that you determine how much you use per day?

A. That and my bills.

Q. How many gallons—just give us how many gallons do you say goes through?

A. This is a day of ten hours, we always reckon it on a day of ten hours, we reckon that there is 691,200 gallons go through in ten working hours; of course we don't filter when we are not working.

By the Court:

Q. Is all that water used in the process of dyeing?

A. No, washing, just to wash the cloth; eighty-five per cent. of it at least is used for washing.

Q. Washing what?

A. Only the cloth, that is all.

Q. What is the washing for?

A. That is washing out—after the goods are boiled you wash out whatever foreign matters might be in the cloth.

Q. Before you dye it?

A. Yes, sir, before we dye cloth—it is all white cloth.

Further Cross:

Q. Where do you put this alum?

A. Where do we put it?

Q. Yes, where do you use that—on what water do you use that?

A. On the sewer, this tail race that we have been speaking about.

Q. Then you use it for the whole 690,000 gallons, you say?

A. Yes, sir, because we cannot separate the coloring matter alone from the water we use in the bleacher.

Q. How much do you use in each gallon.

A. Two grains.

Q. Well, as we have calculated it that only makes one hundred pounds?

A. I thought there was 5,760 grains to the pound.

Q. Yes. How then do you get it—what is your next figure?

A. I have only got the net results here, I haven't the figuring down on a sheet of paper.

Q. Well, is not there 7,000 grains in a pound?

A. 7,000 grains in a pound?

Q. Yes?

A. Well, I got my figures from the books, I don't know, but they ought to know, in the regular tables in the book.

Q. Well, if there was 7,000 grains in a pound there would be just one hundred pounds?

Mr. Edwards: No, two hundred.

Mr. Vredenburgh: Well, we make it one hundred.

A. I took the figures from the printed books that had these tables in, and I suppose they are right.

Q. How much do you use a day—how many pounds?

A. 240 according to my figures.

Q. According to your figures, and those figures some one else has calculated?

A. No, sir, I calculated them myself.

Q. Well, I understood you to say that after fixing the number of grains in a pound at 5,000 grains

—I ask you how you made 240 pounds out of that; how do you?

A. Well, there is 691,200 gallons, two grains of that would be double that, then divided by 5760 and you will have the number of pounds used. That is the way I did.

Q. Which did you use, the Troy pound or the avoirdupois?

A. Sixteen ounces to the pound, avoirdupois.

Q. How many tons of starch do you use per year?

A. Well, of the various kinds I should judge a car load a month.

Q. How many pounds is that?

A. Well, there is 225 bags in a car, or maybe 235 bags of different starches, I think each bag weighs two hundred pounds to two hundred and twenty five. That starch, if I might say, does not go into the tail race, it goes into the goods, there is very little starch goes into the coloring matter.

Q. How much chloride of lime is used?

A. One and a quarter per cent.

Q. One and a quarter per cent of what?

A. A mixture of one and a quarter per cent.

Q. Of what?

A. Specific gravity one and a quarter per cent.

Q. In weight?

A. No, you use a twaddle, and at one and a quarter it holds the twaddle up at the level of the water, this chloride of lime is mixed with water so that there is only a specific gravity of the twaddle at one and one quarter.

Q. How much chloride of lime do you use in a year—how much do you buy?

A. I cannot tell without my books, I have other things to attend to besides that, and a good many things to remember too.

Q. Undoubtedly, but I thought that was the way you would most likely remember?

A. I would if I had my books here to refer to.

Q. You seem to recall about the starch, now how about the chloride of lime?

A. Well, the starch is a factor, and chloride of lime is not, in our business it is a very small factor.

Q. So you cannot tell us how much chloride of lime you use in a year?

A. No, sir.

Q. What other chemicals do you use?

A. Sulphuric acid.

Q. What else?

A. That is about the only thing of any consequence.

Q. How many pounds of alkaline dyes per year?

A. It takes about what you could get on the point of a pen or the point of a knife to make a whole tub full of color. One pound may last a year of a certain color, it is not a question of pounds with us.

Q. So you cannot tell us that, now?

A. No, sir, you are asking me about the entire business, I cannot give you that without my books.

Q. You are secretary?

A. Yes, sir.

By Mr. Edwards:

Q. And manager too?

A. Yes, sir, general manager.

Further Cross.

Q. Did you say that the properties of chloride of lime are lost at the time the liquid is discharged into the canal?

A. I should judge so, yes, sir.

Q. What do you mean by septic?

A. That is a term that I have taken from Dr. Leal; he called it a septic tank, I know what he means by that, but I don't know where he got the word from.

Q. I will show you a photograph of it. Do you recognize that photograph?

A. No; I generally saw it from the other way, if you mean ours.

Q. I means yours. I mean the septic bed and the filter you spoke of?

A. That is not the septic bed.

Q. Well, the filter?

A. That is not the filter, that is the barrier.

Q. What is that?

A. The over-flow from the over-flow from the filters. I see my mill there, and that is how I know it is there.

Q. You see the mill in the photograph?

A. Yes, sir.

Q. Now the canal is covered, you say, on one side of that barrier by a scum? What is that?

A. Well, you say it is a scum. I don't say it is a scum.

Q. Don't you say it is a scum?

A. No, I don't.

Q. What is it?

A. I don't know what it is. I suppose it is the bare ground. I don't know, I cannot tell by that photograph what it is. I never saw the filter from that direction or the tail race from that direction; I don't recognize the picture at all.

Q. Do you mean to say you haven't been down there lately?

A. I have, but always looked at the other side of this?

Q. You haven't looked from the under side?

A. I mean from the rear side. I always looked at the side that does the filtering. What goes out I don't care about, and what is represented there in the foreground is not a filter—it is only a barrier.

Q. In what respect does that barrier differ from the filter?

A. Well, there is more of it and heavier and wider filters and all that.

Q. Bigger stone?

A. No, the width of the barrier or dam or filters is wider than that.

Q. How much wider?

A. I don't know how wide that is.

Q. Then how can you say it is any wider?

A. Apparently, that is all.

Q. Only apparently?

A. Judging from the surrounding trees, etc., I take it that way.

Mr. Vredenburgh: I offer this photograph in evidence.

Marked Exhibit C, 103.

Q. Is there any ventilators to that cesspool?

A. Ventilators? Oh, yes, vent.

Q. Describe them?

A. The cesspool is covered over with a plank, and that in turn is covered over with ashes, and on top of the planking is a four-inch vent box, a wooden box that extends from the highest part down to the lower part and then goes out past the wagon road and then up in the air about five and a half or six feet; that is merely for vent, that is all.

Q. Did you ever see the septic tank cleaned?

A. It is cleaned every day; there is a man there all the time cleaning it.

Q. Did you ever see it cleaned?

A. Yes, sir.

Q. Where does he put the materials, right on the bank, that he gets from the tank?

A. Yes, and then it is covered over with ashes.

By the Court:

Q. What is done with it then?

A. Well, that is rather misleading I am afraid. He doesn't clean the bottom of this, the part which

goes on is merely surplus, like bubbles or froth at the top of the water, the top of the surface of the water; the bottom of the tank is not cleaned in that way. It is simply a weak starch.

Further Cross.

Q. Do you use the alum that you purchase for the works for any other purpose than these colors?

A. Yes, we use it in processes.

Q. And what processes?

A. I don't know myself, I am not the chemist. We use very little of it for the works, I know.

Q. How do you determine how much you use for the works and how much you use for the other place?

A. We use such a small amount I don't know. I don't suppose we would use fifty pounds in a year for the works; it is only to correct some mistake probably that we use it.

Q. Well, has those septic tanks been cleaned since the cesspool was dug or put in?

A. No, sir.

A. They have never been cleaned?

A. No, sir; the bottom is raised, I might say about a foot to a foot and a half.

Redirect.

Q. Who made you use this sulphate of alum or aluminum?

A. Doctor Leal recommended me to do so.

Q. Now, you say you used 85 per cent. of this water for washing? Does any coloring get into that 85 per cent?

A. No, sir, nothing at all, except washing cloth. There is nothing in the cloth to do any harm to anybody.

Q. That is before it is printed?

A. Before it is printed or dyed, yes, sir.

Q. Is it white cloth?

A. White cloth, or the way it comes from the bales.

Q. Do you have anything but cotton goods there?

A. Well, no; we may have a bale or two in a couple of yards of silk or linen, but our business is cotton goods.

Q. No wool?

A. No, sir.

Recross.

Q. You say Dr. Leal recommended it. Did he make these figures for you?

A. No, sir; I made the figures myself, I stated.

Q. Well, you say that he came there in 1899. How do you fix that date?

A. I stated it that way because there is an article here I have cut—a clipping of the local papers relative to our mill, and I have got the dates of it here, and I know that right after this suit of the Fish and Game Warden Doctor Leal came to see us, and he told us what to do in order to filter the water, and I got my date from that clipping.

Redirect Examination.

Q. Since 1899 have you had any complaint from the Fish Wardens?

A. No, sir.

Q. That is all.

MR. LYNN Sworn.

Direct Examination by Mr. Edwards.

Q. Where do you reside?

A. Dover, New Jersey.

Q. What is your occupation?

A. I am secretary and superintendent of Richardson & Boynton Company.

Q. Are you in charge of the works at Dover?

A. Yes, sir.

Q. How long have you been located there?

A. We have been in operation in Dover since January 7, 1897, previous to that in Brooklyn.

Q. But you have been superintendent since the inception of the works in Dover?

A. Oh, yes.

Q. Have you during the period that you have been in Dover received any visits from any person representing the various water supplies in connection with the alleged pollution of the river?

A. Yes, sir.

Q. Who have you met?

A. Well, I don't remember the first man that came there. I don't remember his name, but I can describe him by saying that he continually wore a glove on one hand, because of some bad accident he had previous to that; I don't know the man's name.

Q. When was that?

A. In 1899 or 1900. I won't be sure about that.

Q. What did you do in consequence of his visit?

A. I put him out.

Mr. Vredenburgh: And he only had one arm.

Witness: No, he had two, but if he had six I would have put him out.

Q. Who was the next one?

A. The next man was Mr. Gibson.

Q. Was he Doctor Leal's assistant?

A. Well, I presume so; I saw Mr. Gibson many times before I saw Doctor Leal.

Q. When did you begin to receive visits from Mr. Gibson?

A. Well, that is a little difficult. He has been there so often that I cannot tell just when he started.

Q. What did you do as the result of the visits of Mr. Gibson and Doctor Leal?

A. Well, the first thing we had was after the visit of the man with the injured hand. Previous to that time we had a dry stone sewer running through the grounds that took the water that came from the overflow from what is known as Gooddale Pond, which ran under our store house and in between No. 2 and 3 buildings, to the river. We put up a dry stone wall and sewered all of our foul matter into that sewer and into the river, and after the visit of this gentleman we put in a crematory, a cast-iron affair, with a method of drying this out, and ran it for about eighteen months. The odor from it was so bad that the people living on the higher portions of the town objected, and after consulting in the office and out with the various officials we decided to abandon that; it was abandoned, I think, in the fall of 1900. I have no way of fixing the date.

Q. Had you upon putting that in abandoned the dry stone sewer?

A. No.

Q. I mean for the carrying away of the excrement?

A. There was no excrement went into the dry stone sewer except from two water closets back of the main office, after we put in the crematory they continued to go into that old dry stone sewer.

Q. It was only used for the office?

A. That was only used for the office force.

Q. A small number?

A. Five or six people.

Q. What did you do next?

A. After that they commenced to make it warm for us, and it was a matter of sewage here and sewage there, one side had inspectors there and the

other side had inspectors there, and we were in hot water all the time, and we finally decided to do away entirely—oh, no, I am agraid of my story a little. Previous to that we put in wagons there in No. 9 building that was formerly the crematory, and all the droppings went into those wagons.

Q. And where were they taken?

A. Lord only knows. We paid so much a load to take them away, and we didn't care where they took them.

Q. They weren't taken to the river?

A. I don't know. I didn't care. We just as leave they put them in the river as anywhere else. We were having all the trouble we wanted between this stuff—about this fight you people were making. After this was removed we concluded that it would be necessary to build something to keep the foul matter out, and we started to build a cement sewer, taking the line of the old sewer from what was known as the No. 9, and by No. 9 I mean our crematory building, taking that line to the river, and above that making a straight line up to what is known as our No. 4 building, and discontinue using that sewer for any foul matter at all. Since that time that sewer has not been used for any foul matter to our knowledge, but a test made a short time ago showed that some of the liquid matter did leak through the ground and go into that cement sewer. We corrected that just as soon as it was demonstrated.

Q. When was it demonstrated?

A. Let me see. About ten days ago, I should imagine.

Q. What did you do then?

A. Had to send a man down the sewer to find out where it was, and he found that in the construction of the sewer, by taking off the forms too quick—the wooden forms—there was a crack in the sewer, and this liquid matter had run down along side of the outside wall of the sewer until it reached

this crack, and then had gotten into the sewer, and to get from No. 9 building, which is about eight hundred feet, I think, I have got that data here, to the river it took thirty-two minutes on that.

Q. What did you do?

A. I fixed up the crack in the wall, and that wasn't enough. Then Mr. Leal and Mr. Gibson and two or three other gentlemen came up there and made me shut up the pipe altogether.

Q. What pipe do you mean by that?

A. There was a pipe from the No. 9 building that ran down to within—wait a minute now until I get it right—there was a pipe from the No. 9 building, the original pipe that carried the matter down into the old stone sewer.

Q. What was that pipe designed for?

A. To carry the matter—before we put in the crematory—carry all the matter into that old stone sewer; there is a pipe there, ten or twelve inch pipe fifty feet long; it runs to within about seven feet of the new sewer, and it then runs down parallel with the sewer, running away from the sewer two hundred and fifty feet into the swamp, where we now have a brick building. It is under that building.

Q. What did you do with that pipe recently?

A. Why, we shut off the hole in the pipe recently, or inlet into the pipe.

Q. Then nothing can go into the sewer from that pipe now?

A. No, sir; absolutely nothing.

Q. Just describe exactly what you did in the last ten days?

A. Well, the first thing that we did in connection with the sewer was to cement up this crack that was found.

By Mr. Vredenburgh:

Q. When?

A. Well——
Q. This week?
A. No.

Mr. Edwards: You can find that out by and by.

Witness: I will recall that all right, if you give me a chance. No, I cannot recall it. It was the day that the gentlemen were up there and made the inspection that afternoon, I think about ten days ago.

Q. Which gentlemen?
A. That gentleman right behind this old man here was one of them. He had a camera there.
Q. Mr. Griffen?
A. Yes, sir.
Q. Mr. Griffen, stand up?
A. Oh, I can see him; he is big enough. On that afternoon, if he can tell you the date, I cannot give you the date, but that afternoon I cemented up the crack in the sewer, and later on, last Sunday morning, in the main inlet into this pipe we put in a bag of sand and about fourteen inches of cement and closed up the inlet into the sewer entirely.
Q. Who requested you to do that?
A. Doctor Leal. There was no request about it. He said we had to do it, that is all there was to it. That is the trouble with us, we haven't had any option to do anything—had to do for somebody else all the time.
Q. And you generally followed the directions of Doctor Leal?
A. Couldn't get out of it very well. It is either that or injunction, I suppose.
Q. Have you now—have your works any connection whatever with the river?
A. Yes, sir.
Q. From closets?
A. No, sir.

Q. Or from urinals?

A. No, sir.

Q. Are any of the closets or urinals connected now directly or indirectly by drains or otherwise with the river?

A. No, sir.

Q. What do you connect with the river for?

A. In our line of business we make castings that have to stand a high water test—high pressure—and we test these castings by filling them full of water and then putting a pump on that will handle probably 150 pounds, and after the casting is tested the water is discharged into a trough, and that trough in turns dicharges into the drain, and there is about 90 gallons used a day that way.

Q. Any chemicals used?

A. Not in that department. We used some few chemicals in our nickel room, but very little.

Q. Mr. Jenkinson has testified in this case that your office closets were connected with the drain leading into the river, or at least had been. Is that so, now?

A. No. The office pipe did connect with the old dry stone drain, but the new drain does not run at the same point, and the office pipe is connected with the cesspool for that particular department.

Q. And when was that change made, about?

A. Well, that change has been made three times. We have had recently to provide for a new building at that end, an extension 140 x 40 feet, and that was changed very recently, and it was changed more than a year ago; we wanted to get it outside to put up the new building which the contracts are out for now, and that changed the cesspool.

Q. When was the first change made, however, for the old drain, how many years ago?

A. From the office ?

Q. Yes.

A. On the day that the Maine was blown up, I think it was February 14, 1898. I was in Buffalo

myself at the time, and when I came back the change had been made.

Q. How many closets and urinals have you now which are not served with the wagon that you told us about?

Q. With what?

Q. Taken away with the wagon?

A. We have two closets back of the main office, one back of the mounting shop office and one in the foundry office; they are closets. We have one urinal between the No. 6 and No. 7 building, it is merely a box on the surface.

Q. And with what are these closets and urinals connected?

A. Nothing—the cesspool.

Q. The cesspool?

A. Just plain cesspool, the urinal is not—the urinal is right on the surface.

Q. How near to the river is the urinal?

A. Well, now, you have got me. There is a building fifty feet wide. There is then fifty feet of our property, seventy-five feet of the D., L. & W. property, six hundred feet that we transferred to the Dover Water Company, and then there is a long stretch between that and the river, I should say there was fifteen hundred feet, and that is an estimate.

Q. Are there any streams near there running into the river?

A. No.

Q. Does any of the closets or urinals of your building in any wise now pollute the waters of the Rockaway river?

A. I cannot say that, and I will tell you why. When the water is very high there, the low parts of our land get all the water from the Rockaway river that we can hold, and when the water is very low I suppose it goes back into the Rockaway river.

Q. What?

A. All the water—everything that accumulates

in there—I don't see why it would not go back just the same as it comes in out of it.

Q. But there is no direct contamination?

A. No, sir.

Q. If any it must be then through percolation?

A. Yes, I presume so.

Cross Examined by Mr. Vredenburgh:

Q. How many men, Mr. Lynn, have you ordinarily employed in your works, about?

A. Well, I would like to be excused from answering that question, because I came down here with the distinct understanding that that question would not be asked me. Of course, if I must, I will, but in my line of business we don't care to tell the amount of work we are doing, and I would like to be excused from answering it.

Q. Well, perhaps, I can get at it some other way; you have a large number of men at work there?

A. Yes, sir.

Q. And you are about to add to your buildings?

A. Yes, sir.

Q. You have a large building?

A. No, sir, not a large building, an extension to our present building.

Q. Now the original drain or sewer that you built, was it built across your property so as to take in the brook that came from the pond above?

A. Yes, sir.

Q. I don't remember the name of the pond?

A. Goodale's pond. By the way, let me explain. Mr. Goodale always claimed that we did not get any water from that pond, now the Jersey Central's tracks are between our property and Goodale's pond, and there is about 900 feet of land between the track and Goodale's pond, and there is no other water course between that and the iron works property from which we could take the

water, if we don't get the water from that pond; I don't think we get it from anywhere else, I don't know where we get it from, it had always run down there before we bought the property.

Q. So far as you know it still comes down?

A. Oh, it comes down all right.

Q. Is that drain you formerly built still in existence?

A. Yes, sir.

Q. And in addition to that you have built another sewer?

A. Yes, sir.

Q. I did not understand from your description from what point in your property that sewer commences?

A. Do you mean the new one?

Q. Yes.

A. Well, I can show you better than I can explain. My powers of explanation are limited. Now this (referring to a map) is the old stone drain coming down here.

Q. That used to take the water?

A. All the water from up here came under our storehouse and it ran down here (indicating) and at that time we had a connection in it here, for the office. This water closet was connected with the old stone drain right here. Now we built a new cement drain not interfering with the old drain, a drain which ran down direct to this point here (indicating)—when we constructed the sewer again, we made that of concrete and it ran down here under the D., L. & W. to the Rockaway river.

Q. Well, is that sewer now opened, and is the water passing through it?

A. No, sir, we filled it up from the refuse from our cleaning shop, which was not burned up, because as soon as we opened the new sewer, we filled this one up.

Q. The old stone drain you filled up?

A. Yes, sir.

Q. And the water that did pass through the old stone drain now passes through the new cement drain?

A. Yes, sir.

Q. Or the new concrete drain?

A. Yes, sir.

Q. Passing on to the river, under the D., L. & W.?

A. Yes, sir.

Q. Now you have on this map a red line over which you have marked water closets; what does that represent?

A. The building that we have got the wagon under.

Q. What does the red line represent?

A. It represents the tiling that went into the old drain. We changed it and ran it into here, open swamp.

Q. That open swamp is how near to the new cement drain you spoke of?

A. The nearest point is about 10 feet, and the furthest point is about 62 feet.

Q. Sixty-two feet?

A. Yes, sir.

Q. And the point where it ends is meadow?

A. No, sir, there is a building on it now, but when we put it there it was a swamp. We connected this end of it with large boulders and built right over it, and it just runs into it now, there is no drainage from there.

Q. Where does the drainage go?

A. Runs right into the land.

Q. How far is that from the river?

A. About 165 feet.

By the Court:

Q. I should think it would be disagreeable to have it empty out of that building?

A. No, sir, it is natural water; we never had

any stench from that when it was wide open, not a particle.

Further Cross:

Q. Not when you had the matter from the water closet going through, you had no stench?

A. The matter from the water closet never went there, it went through here (indicating) to the river.

Q. Now, there is a red line connecting a pipe from this water closet with the new cement sewer; what is that line?

A. That is about one foot underground, what we call a bosch in the foundry that the men get water from to wet down their sand with.

Q. Is it marked bosch?

A. Yes, sir.

Q. And there is a red line running from that red parallel marked bosch, to another parallel marked bosch; what is that?

A. They are tanks 2 feet wide, 8 feet long, which the moulders get water from in pails so as to wet down the sand at night and temper the sand to work on the next day.

Q. Has it any entrance into this pipe which runs underneath there?

A. No, sir; this pipe is 2 feet underground, and this (indicating) is about 15 feet underground, and there is 14 feet of fall right there before we get over to this building. This is in a swamp.

By Mr. Edwards:

Q. And there is no connection between the water closet drain and this bosch?

A. Absolutely none.

Further Cross:

Q. Was the red line runing from what is called wash room to the new cement drain?

A. The wash room is a room with a cement floor and an overflow from washing, where the men are washing up, the water runs out onto the floor, and runs down into this drain.

Q. They go there to wash themselves, do they?

A. The hands go there to wash, and they have lockers in the room, and hang their clothing in there, and it is nothing but clean water running into a depression in the floor, and then it runs away, it is all clean water.

Q. Is the property of the Dover Water Company shown on that map?

A. No, sir, but I can show it to you very easily; I can show it to you probably exactly; I will put a cross right there; it is about like that in relation to our property (indicating).

By the Court:

Q. Mark it W.

A. Yes, sir.

Further Cross:

Q. The point at which this new cement drain discharges is in a brook that was there before you came?

A. Yes, sir.

Q. And passed under the railroad at the time you came there at the same place where it does now?

A. I think it was there, but I am not sure whether there was a culvert under the railroad before we went there or not; I think there was. I know when we started operations there was a culvert there.

Q. This Goodale pond here, are there residences around it?

A. Yes, sir.

Q. And buildings?

A. Yes, sir, they cut ice there in the winter; that is about all it is, an ice pond.

Q. How far is that from your property along the line of this drain?

A. I should say it was, it was, from 1,500 to 1,600 feet away, I don't know, I never measured it.

Q. Does it cross any streets?

A. Yes, sir, I think they call it West Clinton street, either West Clinton street or the Union turnpike, I don't know which.

Q. Where it crosses the street, does it cross through a culvert?

A. I don't think so, I have never seen a culvert there, I don't know how it crosses the road.

By the Court:

Q. Does it cross on the surface?

A. No, sir, because there is a nice macadam road there; there may be a pipe there, but I have never paid much attention to it. I know we get our water under the Jersey Central track.

Further cross:

Q. In times of freshet is your land covered with water?

A. One freshet we had about two years ago we had 3 feet of water where No. 3 building stands; No. 2 building had 2 feet of water, and No. 1 building had 1 foot. There is just a foot's difference in the grade of the buildings.

Q. In an ordinary freshet is there any water on your land?

A. No, sir.

Q. It don't rise quite to the surface?

A. Well, it rises up in the depressed spot where No. 9 building is; it always rises there when we have a heavy storm and the river is high; it always comes back through in that culvert which is on

that property of the Dover Land Company, coming across under the track where the switch comes in of the D., L. & W.; it covers that low ground. It does that regularly in a heavy storm.

Q. Is No. 9 where the wagon is used?

A. Yes, sir.

By the Court:

Q. Where is No. 9; point it out?

A. This is it.

Q. You appear to have a large tract of land there; how many acres?

A. I think on both sides of the D., L. & W. we have 42 acres.

Q. All high ground except this one spot?

A. All on the grade of the Delaware & Lackawanna except one spot which is very low. It is higher on the west side than on the east side, except probably this piece (indicating) on the east side.

Further Cross:

Q. And about how much lower than the D., L. & W. is this spot which you speak of?

A. Fourteen feet.

Q. And with reference to the ordinary level of the river, is that spot or the elevation of it above or below the ordinary flow of the water?

A. Above at ordinary times—just a little above.

Q. Two or three feet?

A. Yes, sir, there is not much difference. It does not take much to cause water to come over there.

Q. You say you own property on both sides of the D., L. & W.?

A. Yes, sir.

Q. The property shown on that map is only on one side?

A. Yes, sir, that only shows you just what property we are operating in connection with this sewer, that is all.

Q. What do you use the property on the other side of the river for?

A. We don't use it at all.

Q. Is it vacant?

A. Vacant, except that portion we have added to the Dover Water Company.

By Mr. Edwards: I desire to offer this map in evidence. The same was marked Exhibit D 7.

By the Court:

Q. How does the Dover Water Works procure its water?

A. By driven wells on it from which they obtain water for the supply of the city of Dover.

Q. Is that where the water supply of Dover comes from?

A. Yes, sir.

Further Cross:

Q. I call your attention to D 7, to this lead pipe line running from building No. 9 (interrupted)

By the Court:

Q. First of all, let me ask you this, are they artesian wells or surface wells?

A. Driven wells, but I don't know much about them, sir. I don't know what other people are doing about us; I have a whole lot there to attend to myself.

Q. Are they very deep wells?

A. Well, now, there are men in this room who can tell you how deep they are, I don't just know how deep they are.

Further Cross:

Q. Is there or was there any connection with this drain which runs into the swamp with building No. 9?

A. How is that?

Q. (Question repeated.)

A. Yes, sir, that is the main connection now, right down from No. 9 building to the swamp.

Q. I understand that takes all the liquid?

A. It don't take it now because they made me shut up that pipe.

By the Court:

Q. Well, as I understand this matter, as it is now, went down this pipe into this swamp, but it did not connect with the sewer leading into the river?

A. That is right.

Q. Now is that right?

A. Yes, sir, but here these people made me shut off this opening.

Q. When did you shut this opening off?

A. Last Saturday.

Q. Mark it with the letter N?

A. (Witness did so.)

(At this point, Court, counsel and witness went over the map, and the stenographer was directed not to take down what was said.)

Q. Will you please show us where you cemented up the drain?

A. Yes, sir, where I have marked the letter N.

Q. Where was the break in the cement drain?

A. Where I have now marked the work "break."

Q. And the break has been repaired, has it not?

A. Yes, sir.

Further Direct:

Q. Is there any way now by which drainage from building No. 9 or the surrounding land can get into the drain which ends under the foundry building 14 feet underground?

A. I don't know. There may be cracks in the pipe or breaks in that pipe, I don't know anything about; the only way to find out that is by taking them up.

Q. But there is no direct connection?

A. No, sir.

Re-Cross:

Q. Your judgment, Mr. Lynd, is that the discharge from the water closet—liquid discharge—finds its way down to this drain about 70 feet away?

A. Seventy-one paces.

Q. Seventy-one paces before it gets into the drain?

A. Yes, sir.

Q. Is there anything down there to prevent that same liquid from running down these 321 paces?

A. You are getting mixed up in your figures.

Q. I said 71 paces; I mean 71 paces?

A. Yes, when we cemented up the crevices we found that drain.

Q. Did you do anything to prevent liquid getting in those crevices?

A. No, I could not go outside of that because that is all underground.

Q. So far as you know, then, the liquid matter still runs down the crevices?

A. Sure.

By the Court:

Q. I cannot understand what Dr. Leal's idea is. The witness states his theory of this matter, that this liquid matter did not run to the loosely made up drain at all, but did run outside of this drain to this point where it got through these cracks; if that is so, then the shutting up of that drain would not have any effect at all, would it?

A. Well, Dr. Leal says he is quite sure it runs through the pipes, and that is his reason for stating what he did.

Further Cross:

Q. I understood that the improvement which Dr. Leal insisted upon your making was to put a urinal where before that time it ran down along the pipe, underground—put a urinal on the back of the ground where there is a flood of water when the river rises?

A. Yes, sir.

Q. Is that the improvement he insisted upon?

A. I don't know that he insisted upon it in that way, but that would be the result.

By the Court:

Q. Then I understand it, in all freshets you have more water that comes up from below, the more the better you like it, because it cleanses that particular spot?

A. That particular spot is all filled in with water, we call that—sand, which is refuse from our factory, which would absorb water perhaps forever; I don't believe it ever stops absorbing water, and I think it would hold it there.

Q. How do you account for it getting into the tile drain, then?

A. I don't try to account for it at all; it got there all right.

Further Direct:

Q. Will you tell us about where the river is on that map?

A. At this point where it says Rockaway river.

Q. At that point?

A. Yes, sir.

By the Witness: May I state one thing?

By the Court: Yes.

By the Witness: I would cheerfully welcome a committee of you gentlemen to come up to the works and walk through them and see these connections and drains, and everything else, and if any changes can be suggested, I will do the work all over again, although it has cost me over $4,000 to build it now. Any of you gentlemen, like this gentleman over here (indicating Mr. Vredenburgh) could walk right through that drain if he wanted to.

Q. Are you now having the closets enclosed in concrete?

A. Yes, sir, all around two of the walls are done, and the other wall will go up the first holiday we have.

EUSTACE RUDINE sworn for Defendants.

Direct Examination by Mr. Corbin:

Q. Where do you live?

A. Dover, New Jersey.

Q. What is your occupation?

A. Manager of the Hart Union Lumber Company.

Q. Are you connected with any official board of Dover?

A. I am president of the Board of Health.

Q. Were you present at the tests attempted to be made at the Swedish Church at Dover, by Mr. Griffin?

A. I don't know who is Mr. Griffin.

Q. Stand up, Mr. Griffin.

A. Yes, sir, he was one of the gentlemen around there that day.

Q. Do you recall the date when the tests were made?

A. I could not tell exactly, but it was very early in the spring.

Q. What brought you there?

A. Curiosity; my office is right across from there, 50 to 75 feet away, and I walked over to see what was going on.

Q. Were you there during the whole test?

A. No, sir; they had put the powder in before I got there. I understood that it was in before I got there, but I stood there while they were pouring the water in.

Q. Did you see them put the powder in?

A. No, sir; it was already in.

Q. Did you remain there as long as they did?

A. Yes, sir; I was there when they left.

Q. Where did you stand?

A. Near the bridge—about 15 feet from there or maybe 20.

Q. Did you watch the water?

A. Yes, sir.

Q. Did any coloring come out there?

A. No, sir.

Q. Could it come out without your seeing it?

A. No, sir; not while I was there, and I was there after they left, and no coloring came out.

Q. Were you there when they went out to the river?

A. No, sir; but I saw them from the office, down on the river wall, and that is what made me go over there to see what they were doing.

Q. Did you go at once?

A. Yes, sir; but they had the powder in before I got there.

Q. And you are certain that no coloring appeared in the river?

A. I am certain there was not while I was there.

Q. Do you know how the Swedish Church is sewered, I mean this privy?

Q. Just a hole in the ground.

Q. A cesspool?

A. It is just a hole right in the ground there, just 10 or 12 feet from the river, and during the freshet a few years ago it kind of washed out the back part of it there, and there is an opening there now which allows you to look in.

Q. That is all.

Cross examination by Mr. Vredenburgh.

Q. Where did you have your office?

A. 118 East Blackwell street, right across from this church.

Q. What is your office?

A. A frame building.

Q. What business?

A. The Hart Union Lumber Company.

Q. What do you deal in?

A. Lumber, coal, wood, mason's material, tile and all such things.

Q. You say you are also president of the Board of Health of Dover?

A. Since the 1st of January.

Q. Of this year?

A. Yes, sir.

Q. What are your statistics as to typhoid fever there since the 1st of January?

A. We haven't had any.

Q. Will you please tell us what day it was you saw these gentlemen there?

A. I could not say. I did not charge my mind

with it; I just went over out of curiosity to see what was going on.

Q. This year?

A. This year.

Q. How do you know it was this year?

A. I remember it was this year.

Q. Was it in January?

A. No, sir; later than that.

Q. Was it March?

A. Somewhere around the first of March, I should judge; I can't say positively what date it was.

Q. Did you see the dam more than once?

A. No, sir; only that particular time when these two men went down there. They had a color with them.

Q. What color did you expect to see come out?

A. Well, I did not look for any particular color, but I know the water was clear and stayed clear as long as I was there, and I stayed there until after they had left.

Q. Did you look in the hole to see what color it was in there?

A. Yes, sir.

Q. Did you see any color in there?

A. Yes, sir.

Q. What color did you see?

A. I should judge it was a salmon color. I am not positive about that, but it was a peculiar color.

Q. Did you look in there before they left, or after they left?

A. Well, they were pouring in the water; it was right there in the open.

Q. When did you look in the hole in the ground?

A. While they were there. I could see in from where I stood and after they left, too.

Q. How high was the river that day?

A. Oh, just normal. I should judge about 12 inches of water in the river bed, but I am not positive about that.

Q. What?

A. I say I am not positive about that. I should judge there was about 12 inches of water in the river bed.

Q. Was the water about as it is ordinarily?

A. Just ordinary.

Q. The ordinary heighth at that time of the year?

A. Yes, sir.

Q. How long did you stay there watching?

A. Well, I did not keep any time of it. I was there when they left. They asked a few questions and walked off. I don't know where they went.

Q. How long did you remain after that?

A. I could not say.

Q. About?

A. I should judge five minutes after they left.

Q. And then you went where?

A. Back to the office.

Q. How long were you there altogether? Would you judge?

A. Perhaps ten minutes. Well, I stayed there about that long. I could not say exactly to a minute.

Q. Do you keep a record of deaths from disease as the Board of Health?

A. Yes, sir.

Q. Are they in your charge or in charge of your clerk?

A. The clerk

Q. What is his name?

A. J. H. C. Hunter.

Redirect.

Q. Did you hear these young gentlemen claim to have got any results?

A. No, sir; only from the testimony Mr. Gibson had up since then.

Q. What?

A. Only from Mr. Gibson.

Q. I mean when they were on the ground?

A. Oh, no; nothing at all.

Q. Did they say anything at all about the results of the test?

A. No, sir.

By the Court.

Q. What were they doing?

A. At the time I was there they had a hoe and a pail on the hoe; there were some masons working down near there, and I suppose they borrowed that hoe and pail from them, and they were dipping the water out of the river with a pail on the end of the hoe and dumping it into this hole.

Q. Did they do that while you were standing there?

A. Yes, sir, and then I looked into the river, and there was no coloring matter coming out of there as long as I was there, and I saw it after they left.

Q. Who is Mr. Gibson, who brought that testimony up to you? When did he do that?

A. I don't remember that. We have had lots of talks with Mr. Gibson.

Q. Well, what did he produce to you, some testimony?

A. Well, I don't know how I came to speak about this—about the Jersey City people coming up, but he asked me what was done, and I don't know whether it was him or not. I could not positively say whether I told it to him or not.

Q. Well, you testified he came and read some testimony to you. What do you mean by that?

A. It was a typewritten copy of testimony written by these young men of the result of their test back of that church.

Q. Did he read it to you?

A. I read it myself.

Q. When was that?

A. That was later. I forgot to say what date that was. It must have been a few days ago—must have been a month ago.

Q. A month ago?

A. Perhaps.

Q. Why do you say perhaps?

A. Well, it may have been a month and a half ago. It may have been less than a month. I could not say positively, I did not charge my mind with it. I did not think I would ever get into it, and I did not make any record of it.

Q. Where were you when he read this testimony to you?

A. I think he showed me a copy of it in front of the office. I don't know how they came to talk about it, and then they showed me this typewritten copy.

Q. Did they ask you to come down here?

A. They did not.

Q. How do you happen to be here?

A. I did not know anything about it until I think it was a day before yesterday, and then he told me that he would subpoena me down here.

Q. He told you he would?

A. Yes, sir; that was the first I knew about it.

Q. Did he subpoena you?

A. He did.

Q. What did he promise you?

A. He did not promise me anything. Only I am sorry I am down, because it is the first of the month and there is lots of work on hand.

Q. That is all.

Redirect.

Q. Mr. Gibson is around Dover quite frequently, is he not?

A. Yes, sir.

Q. What is he doing?

A. I don't keep track of him, I have business of my own to attend to. I see him occasionally go by, that is all.

Q. Did he call to see you?

A. Not particularly. He might have called in if he was going by to pass the time of day, that is all.

J. HILLYER C. HUNTER sworn for Defendant.

Direct examination by Mr. Corbin.

Q. Where do you live?

A. 50 Hudson street, Dover, New Jersey.

Q. How long have you lived there?

A. Ten years the 20th of July.

Q. What is your occupation?

A. Dentist.

Q. Do you hold any official position at Dover?

A. Yes, sir; I am secretary and treasurer of the Board of Health, and also recorder of vital statistics.

Q. How long have you held that position?

A. About six years.

Q. Who were you appointed by?

A. The Common Council.

Q. Who are the other members of the Board?

A. Mr. ————————, myself, Dr. D. V. Johnson and Mr. Edward Jenkins, and we had a Mr. Buchanan there, but he is out now, and the vacancy has been filled by another man, who up to this time, as far as I know, has not qualified, at least they say he has been appointed. I don't know whether he has or not.

Q. Where is your office in Dover?

A. 11 East Blackwell street.

Q. Is there a water closet connected with that building?

A. Yes, sir.

Q. Now, it is claimed, Doctor, in this case that that water closet is connected with a drain in Morris street. Is that so?

A. No, sir; absolutely not.

Q. How do you know that?

A. I tested it on several different occasions myself. I also tested it in connection with Dr. Leal and Mr. Gibson, and the inspectors of the Board of Health.

Q. How did you make the test?

A. Why, it was done with soluble blueing. I put fifty cents worth of soluble blueing in there in the morning and got no results. The inspectors and I washed it down from upstairs by tipping the trap somewhere in the neighborhood of six or seven times and then washing it down with twelve pails of water.

A. Where did you look for the result?

A. In the cistern, on the back of Mr. Pulaski's. He has the first floor, and I am on the second floor. I put a bottle down into the cesspool and brought it up, and it was as blue as grass.

Q. Did you watch to see if you got results in the river?

A. Yes, sir; I was over 20 minutes at the river —half an hour. I stayed there with Dr. Leal and our inspector, and I got no results.

Q. But you did get results from the cesspool?

A. Yes, sir.

Q. But none in the river?

A. No, sir; after I had been to the river I said I am going to see if that will not show in the cesspool, and I got a bottle thoroughly cleansed and washed in the office, tied a string around the neck of the bottle and dipped it down in the cesspool, and it came up as blue as could be, and the result was quite plain.

Q. Is the cesspool of your closet connected with the river in any way?

A. No, sir; I saw the pipes disconnected myself.

Q. Did you see the cesspool built?

A. Yes, sir.

Q. Had there been at that time any connection with the sewer?

A. Oh, yes; it was connected one time with the sewer—that is, my closet was.

Q. When was that disconnected?

A. Well, now, you have got me, but it is over a year.

Q. Did you see it disconnected?

A. I did.

Q. Was the pipe itself taken away?

A. You mean the pipe leading to the river?

Q. Yes.

A. I saw about 6 feet of it taken away from there.

Q. There was a break made in it?

A. Yes, sir.

Q. Did you see any connection made in that cesspool?

A. I did, sir; it was all done there in three or four days. They had to put cement in there and let it dry, and they told me not to use the water closet at all while it was being connected up.

Q. Did you pay for this work or your landlord?

A. My landlord.

Q. Has there been any overflow from that cesspool?

A. No, sir; no overflow, not from the time the stone was put on it.

Cross examination by Mr. Vredenburgh.

Q. Do you own this property?

A. No, sir; I am only a tenant.

Q. Who owns it?

A. Mr. Mays.

Q. You rent which floor?

A. The second floor, sir.

Q. Is there a bathroom or water closet on each floor?

A. No bathroom; there is a water closet.

Q. How many floors are there there?

A. Three floors.

Q. Who rents the floor on top?

A. A man named Houston.

Q. What does he occupy it for?

A. He lives there.

Q. Is it a dwelling?

A. Yes, sir.

Q. He and his family?

A. Him and his wife.

Q. They have a bathroom?

A. No, sir.

Q. They have a water closet?

A. The same one that I had. There is only one water closet there, and that is on the second floor; the third floor has no water closet.

Q. The first floor is occupied by whom?

A. Mr. Pulaski.

Q. Is there a water closet there?

A. No, sir.

Q. Bathroom?

A. No, sir.

Q. When was it that you and Dr. Leal and Mr. Gibson made this test?

A. March 7th.

Q. Of this year?

A. Yes, sir.

Q. How did you get down in the cesspool?

A. Why, we went downstairs to the back of the house. All you got to do is just to take the top off.

Q. Did you take the whole of the top of the cesspool off?

A. There is a 6-inch pipe coming out of the ground, running up 18 inches to 2 feet on the top.

Q. What is that, a vent?

A. A vent.

Q. What is there on the top of this vent?

A. There is a cover on top of it which is put there in case it gets full, when they cover up the hole and take it away.

Q. Have you ever seen them pump it out?

A. No, sir; I have not.

Q. When was that cesspool built?

A. Well, I could not recall exactly what the date of it was, but I remember it being built well enough.

Q. Was it built before you went there?

A. No, sir; I have been there four years.

Q. The cesspool was built since you have been there?

A. Yes, sir.

Q. There was no cesspool there when you went there?

A. No, sir.

Q. Was there a water closet there when you went there?

A. Yes, sir.

Q. But you can't tell us now when the cesspool was built except that it was built since you went there?

A. It was built over a year ago, it is safe to say.

Q. It has not been built for over two years?

A. Well, I could not positively swear to that at all; I know it was springtime and it was over a year ago—a year ago last spring or two years ago the last spring, I could not say which; but it is within three years and over a year.

Q. Within three years?

A. Yes, sir.

Q. Now the change that was made into the sewer was made when?

A. When the cesspool was built, and before the top was put onto it.

Q. I think you spoke of taking up some portion of the sewer or drain?

A. I did not take up any, sir.

Q. Did you say you saw somebody take it up?

A. Yes, sir; I saw somebody do it.

Q. When was that?

A. Before the cesspool was completed, sir. They made a connection from the water closet into the cesspool before the water closet was completed or the top stone was put on it.

Q. Was that the time the sewer or drain leading from the Morris street sewer was taken away?

A. At the time the connection was made from the closet to the cesspool the connection was broken from the Morris street drain at that time and connected with the cesspool.

Q. How was the connection broken?

A. The tile pipe——

Q. What?

A. With tile pipe.

Q. How was it broken?

A. It was disconnected, and they took out about six feet of it.

Q. Do you mean the tile pipe was taken up?

A. Yes, sir; about 6 feet of it.

Q. At that time?

A. Yes, sir.

Q. Have you a record of typhoid fever in Dover?

A. Yes, sir; I have got that.

Q. When was the last case?

A. I don't know, sir; I don't pretend to carry that in my head; my records will show it.

Q. You have no recollection outside of the record?

A. No, sir; I would not want to swear to anything outside of the record.

Q. That is all.

Redirect.

Q. Are all three of those buildings connected with the cesspool?

A. Yes, sir.

Q. And on the same line of pipe that you spoke of?

A. Yes, sir; all on one line.

Q. Doctor, have you heard that charges have been made that your village drains into the river?

A. No, sir.

Q. Are those charges true?

A. No, sir, they are not true. About a year ago Mr. Gibson brought a gentleman up there and introduced him to me, and I am sorry to say that I cannot remember names, and these gentlemen asked for the privilege of testing that closet. I told him I would grant him the privilege of testing it, and he and Mr. Gibson tested the closet, and I went down with them to the river, and we stayed there somewhere in the neighborhood of fifteen minutes, or at least I did, and they stayed there about three-quarters of an hour, and when they came up no results came out, and none came out when I was there. This was a year ago or over, and I asked the gentlemen when they came back if they got any results, and they said no, everything was all right.

Q. Was Mr. Bouton the name of the gentleman?

A. Well, now, that seems to me that was the name. I cannot be positive. I could not positively tell, but I could tell the man if I saw him.

Q. Was he a Jersey City man?

A. Yes, sir.

Q. Acting for Jersey City?

A. I understood he was acting for Jersey City.

Re-cross.

Q. Who told you about the testimony of this man?

A. Mr. Gibson.

Q. When did he tell you?

A. That was in March somewheres, or around the first of March, or last February somewheres or

thereabouts. It was between the 17th of March and the 25th of February.

Q. When did you see Mr. Gibson last?

A. I see him every day or pretty nearly every day.

Q. Did you see him this morning?

A. Yes, sir.

Q. Did you talk with him in his room this morning?

A. Yes, sir; I spoke to him in this room.

Q. Did you talk about this case?

A. No, sir; he never said a word to me about this case. All I told him was I wanted to get on as soon as I could and get away.

Q. Did he read to you the testimony that was taken?

A. No, sir.

Q. Have you ever asked for it?

A. No, sir.

Q. Has he ever showed you that testimony?

A. No, sir; not the scratch of a pen has he shown me; he never showed me anything.

Redirect.

Q. By the way, Mr. Hunter, within the last few years has much work been done in Dover in order to prevent this objectionable matter getting through into the river?

A. Yes, sir; decidedly there has.

Q. By whom?

A. Well, there has been several times.

Q. Has your Health Board taken a hand in it?

A. Yes, sir; they have.

By Mr. Vredenburgh. I object to any statement of this witness of the records of the Health Board; he could not tell me anything about the records; his memory seems to be better now.

Q. Who has been calling the attention on behalf of the Jersey City Water Supply Company to the changes that were necessary?

A. What?

Q. What officer or person has been calling attention to the changes required from time to time?

A. Mr. Gibson.

Q. And Dr. Leal?

A. Yes, sir.

Q. That is all.

JAMES C. REYNAR sworn for Defendant.

Direct examination by Mr. Edwards.

Q. Where do you live?

A. Boonton, N. J.

Q. How old are you?

A. Twenty-six years.

Q. What is your occupation?

A. Manager for the Pelgram & Meyer mill.

Q. Is that a silk mill?

A. Yes, sir.

Q. How long have you been there?

A. Twenty-six years with the exception of a few months.

Q. What position do you hold?

A. Manager.

Q. How long have you been such manager.

A. Twenty-six years.

Q. Now in that mill what arrangements have you for disposing of the human excrement of the hands?

A. Well, the closets are connected with pipes. Four-inch pipes are laid outside to catch basins or cesspools directly next to closets, and from there there are overflow pipes that lead to a filter bed, and these filter beds are ashes on natural ground.

Q. How far are the filter beds from the river?

A. Sixty feet.

Q. What is done? Is there any connection between the solids and the cesspool with the river?

A. No, sir.

Q. It has been testified in this case that you are in the habit of burning the solid matter. Is that true?

A. What do you mean, solid matter?

Q. Fecal matter?

A. No, sir, we never see any fecal matter.

Q. What?

A. No, sir; we burn silk waste, cotton waste, paper that may be deposited in these catch basins.

Q. Does any solid matter go into the cesspools into the filter beds?

A. Not that I am aware of. It is apparently broken up and dissolved before it goes into the filter bed. We never see any of it.

Q. And it is only liquid that runs off?

A. Yes, sir.

Q. Where do you get the stuff that you burn?

A. From our cesspools.

Q. Is it taken from the top of the cesspools?

A. From the bottom or top, either one.

Q. Is there any of that fecal matter?

A. No, sir; very little. Sometimes some may adhere to the cotton waste or paper.

Q. In your judgment, Mr. Reynar, is it possible for any pollution to get from your factory into the Rockaway river?

A. No, sir.

Q. Now, it has been said that fecal matter oozes out of the bank along the side of the Rockaway river. Is that true?

A. That is not so.

Q. Have you been there to look and see?

A. Yes, sir.

By the Court.

Q. How high from the surface of the water—ordinary surface is the filter bed?

A. Well, I suppose above the water it is about 21 or 22 feet—that is, to the bottom of the filter. The surface of the ground at that point is 24 or 25 feet high, I should judge.

Further direct.

Q. The river never flows up to that?

A. No, sir.

Q. At flood or any other time?

A. No, sir.

Q. And at whose suggestion were the changes made at your factory as to the disposal of fecal matter?

A. Mr. Gibson and Mr. Leal.

Q. When did you install the present system?

A. Oh, I don't know; probably five years ago.

Q. Has any complaint been made of it since then?

A. No, sir.

Cross-examination.

Q. How many operatives do you employ?

A. Oh, we have about 150.

Q. Has that been your average for several years?

A. Yes, sir.

Q. How many closets are there?

A. About 10, I think—10 or 11 in use.

Q. Are the urinals separate from the fecal matter?

A. There are no urinals; they use the closets.

Q. What business do you carry on?

A. Silk spining, silk throwing, manufacturing silk yarns.

Q. How many pounds of olive oil soap do you use there a day?

A. Possibly I should think about 35 or 40 pounds per day.

Q. Does liquid waste from that mill go into the river?

A. From what?

Q. From the operation of the mill?

A. No, sir; there is no waste whatever—no, sir, except from this soap, where we use the olive oil soap.

Q. That is what I refer to. Does the waste from that go into the river?

A. Yes, sir.

Q. How far is that from the river?

A. Directly on the river.

Q. How far is the room from the river?

A. 12 to 14 feet.

Q. Is it connected into the river by a pipe?

A. No, sir; the olive oil waste liquid is discharged onto the floor and flows through the soil into the river.

Q. Now the waste from the closets. How far is the closet from the river bank?

A. Something over 100 feet.

Q. And the river bank is about twenty feet above the river?

A. Yes, twenty-one or twenty-two.

Q. Now, the discharge from this closet. Is the water washed by waste water?

A. No, it is by direct pressure—direct pipes supplied by the United Water Supply Company. It is under pressure of a hundred and odd pounds —105 or 110 pounds.

Q. Then the water that you use comes from public water works of Boonton?

A. For that purpose.

Q. And the closets are flushed with that water?

A. Yes, sir.

Q. Do you know how much water is used in that way?

A. No, the water is flowing continuously. They

are not flush tanks, they are open pipes, you know; the water goes in there continuously.

Q. Flowing through there continuously?

A. Yes, sir.

Q. A small stream, I suppose?

A. Yes, sir.

Q. It flows from those closets down through a pipe to what you call a filter bed?

A. First to a cesspool or catch basin.

Q. Now that basin is how large?

A. Probably four feet square.

Q. And its sides are what?

A. Stone.

Q. Cemented?

A. No.

By the Court.

Q. What depth?

A. The depth is about four feet, I should think; three or four feet.

Further cross.

Q. What is upon the stone—these ash cinders?

A. Yes. Well, at that point there is natural earth around the cesspool.

Q. There is an outlet pipe from this cesspool to the filter bed?

A. Yes, sir.

Q. What kind of pipe is that?

A. It is a tile pipe.

Q. Six-inch tile pipe?

A. Yes, sir.

Q. And runs to this filter bed?

A. Yes, sir.

Q. What is the size of the filter bed?

A. I don't know. It has an opening in the ground; it is open possibly 12 feet square.

Q. Is it or not cinders?

A. Yes, sir.
Q. And 12 feet square and how deep?
A. I don't know—eight or nine feet.
Q. And the top of that is how near?

The Court: What do you mean by how deep?

Mr. Vredenburgh: I mean how far from the surface of the bed it is to the bottom.

The Court: The filter bed consists then of a bed of ashes nine feet thick. Is that what you mean to say?

Witness: Yes, sir.

Q. Nine feet thick?
A. Yes, sir.
Q. How deep?
A. Eight or nine feet deep. The depth is a hundred feet or more—sixty feet or more.

Mr. Edwards:

Q. The length?
A. To the river? Yes, there is ashes between the filter and the river.

Mr. Vredenburgh:

Q. Is it ashes to the river?
A. Yes, sir.

The Court:

Q. How deep are those ashes?
A. Well, they are twenty odd feet at the base of the filtering bed.
Q. Then, as I understand, if I am not right you may correct me, but as I understand this waste

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water would pass through a bed of ashes for a distance of sixty feet?

A. Yes, sir.

Q. The bed of ashes extends from the edge of the filter bed continuously down to the river?

A. Yes, sir.

Q. A depth of how many feet?

A. Well, it is a side hill, you know, which starts from nothing to possibly twenty odd feet.

Further Cross.

Q. The top of the pipe where it enters this cinder bed is how high?

A. How high from what?

Q. Above the river?

A. Possibly, I don't know, seventeen or eighteen feet; something like that.

Q. Now from the end of that to the river is how far?

A. About seventy feet, I should think.

Q. And that distance on the line of the pipe is cinders?

A. Yes, sir.

The Court:

Q. Does this form a pool, or as soon as the water is received does it flow off?

A. Always water in there—a foot and a half of fluid in there.

Mr. Vredenburgh:

Q. That level keeps about the same?

A. Yes, sir.

Q. The pipes running all the time?

A. Yes, sir.

Q. And the level of that water keeps about the same in the cinder bed?

A. Yes, sir.

The Court:

Q. That basin, you say, is about 12 feet square?
A. This filter bed.
Q. That is the basin in which this water runs?
A. Yes, sir.
Q. That is about 12 feet square?
A. Yes, sir.

Mr. Edwards:

Q. And then there are ashes from that to the river?
A. Yes, sir.

Mr. Vredenburgh:

Q. Twelve feet square, or is it circular?
A. At times it is square, you know; ashes continually drop down. It has got to be repaired once in a while.
Q. Is that the place that you say you took out the waste and burned it?
A. No, sir.
Q. You didn't take the waste out from there?
A. No, sir.
Q. You do take it out of what you call the cesspools?
A. Yes, sir.
Q. And that waste consists of water closet paper, does it not?
A. Yes, and ocasionally silk waste.
Q. How does the silk waste get in it?
A. Well, I would like to know; that is what it is there for.
Q. That is what?
A. Those cesspools were put there for that purpose. Our employees often times will destroy silk

and throw it down the closet, and the idea was to catch it and keep tabs upon the people working on the silk.

Q. So as not to be detected in destroying it?

A. That is their idea.

Q. You spoke of there being a foot or a foot and a half of water. I understood you to say that this was in this filter bed. Did you mean that or did you mean in the cesspool?

A. There is water in the cesspool, also in the filtering bed.

Q. You did refer to the filtering bed when you spoke of that?

A. Yes, sir.

Q. There is a hole that you see from the bridge. Is that the filter bed you refer to?

A. I presume that is what you mean.

Q. Well, why do you say it is sixty feet from the river?

A. Well, because I know that it is.

Q. Is it horizontal measurement, or what?

A. You can take it either way.

Q. Whether you measure horizontally, or ——.

A. Yes, sir.

Q. And what part of the river did you refer to when you say it is sixty feet?

A. The edge of the river.

Q. Edge of the water?

A. Yes, sir.

Q. How far is it from the edge of the bank, or, I suppose, this is the bank?

A. This is the bank.

Redirect examination.

Q. Is there any visible outlet or water flowing visibly from the filter bed to the river?

A. No, sir.

Q. How is the solid matter taken from the cesspools?

A. Why a man takes it once a week, you know; takes it up with a rake, has a rake for that purpose and takes it all up and carries it away and burns it.

Q. Is that the public scavenger?

A. That is one of our own men.

Q. Where do they take it to burn it?

A. Right on the bank.

Q. What about the rest of the matter in the cesspool?

A. We never saw any.

Q. The excreta?

A. Never saw any; it is broken up and dissolved.

Q. Well, now are you constantly adding ashes to this filter?

A. Yes, sir.

The Court:

Q. Well, just the ordinary coal ashes?

A. That is all.

Q. Fine and coarse together?

A. Yes, just as it is taken from under the boilers.

Q. Is it principally fine ashes?

A. Well, there is quite some slag in it.

Q. Slag and fine ashes together?

By Mr. Edwards:

Q. Now this olive oil soap that you use. What is the quality of that soap?

A. It is a very good quality; of course it is not table oil, but it is a very good quality of olive oil.

Q. Does it contain any deleterious ingredients?

A. No, sir; it does not.

Q. Now does all of that escape into the river?

A. Practionally all; all except that which is retained by the silk, you know.

Q. Some little is retained by the silk?

A. Yes, sir.

Further Cross.

Q. Well, it washes off some of the silk gum that goes with it into the river?

A. Well, there is very little gum.

Q. You were asked about pollution getting into the river. What do you understand by pollution in that sense in which it was used?

A. I presume that they mean matter escaping from the closets.

Q. Solid matter?

A. Solid matter.

Q. That is all.

HUGH M'CORMICK sworn.

Direct examination. By Mr. Edwards.

Q. Where do you live?

A. Powerville.

Q. How long have you resided there?

A. About sixteen years or seventeen years.

Q. What is your occupation?

A. Paper maker.

Q. Where are you employed?

A. At Powerville.

Q. In what is known as the paper mill?

A. Yes, sir.

Q. Or the rag mill?

A. Yes, sir.

Q. What is your position there?

A. Foreman.

Q. Are you the head of it?

A. Yes, sir; I am superintendent; I have charge of the place.

Q. You have charge of the work?

A. Yes, sir.

Q. How long have you been such superintendent?

A. Sixteen years.

Q. During the time that you have been there and since the year 1898 has there been any change in the disposal of refuse matter and fecal matter from that rag mill?

A. Yes, sir.

Q. Will you please tell us what you have done to prevent pollution of the river from those matters?

Mr. Vredenburgh: I desire to object to this, may it please Your Honor. The evidence as we claim it—and that is the reason I object—the evidence as we claim it is that it was agreed that this should be taken away—this rag mill; now any evidence as to what they have done there since don't seem to bear on that question.

The Court: Well, that involves a question which of course will have to be argued at the proper time.

A. Well, I put in filter beds, tank and a steam pump.

Q. When were those filter beds put in?

A. Well, I cannot give you the exact date, but I think they were in there about five or six years, probably more.

Q. Why did you do this?

A. To keep this pollution out of the river.

Q. Who asked you to do it?

A. Well, I believe Mr. Gibson, or Doctor Leal first and Mr. Gibson.

Q. Well, now, where did you build your filter bed?

A. Right on the back part of the mill, between the mill and the river.

Q. How far from the river?

A. Oh, I should say about seventy or eighty feet.

Q. And how was it built?

A. Built with ashes.

Q. How deep?

A. Well, it is built circular, and I should say about three feet in the center and about twenty feet across, 18 or 20 feet across.

Q. How deep?

A. About three feet in the center; there are two of those.

Q. And how is it covered?

A. No cover whatever.

Q. Do you spread anything on it?

A. No, sir.

Q. How about burlap?

A. Well, we haven't spread any of that on in the last couple of years.

Q. What runs into this filter bed?

A. It is the black water from the rags.

Q. And what becomes of that water?

A. We pump it back and use it over again.

Q. From the filter bed?

A. Yes, sir. No, when it goes to the filter bed then it filters through the ashes all out.

Q. And where does it run?

A. I don't know. Never saw any of it after it went out of the bed.

Q. What is it you pump back?

A. There is a tank, and before it goes to those filter beds we pump from that tank back into there again. This is an excess of water that goes into those filter beds.

Q. Is there very much of the water flows into the filter beds?

A. No, sir.

Q. When did you begin to make use a second time of this refuse?

A. I guess about the same time, five or six or seven years probably—well, I have no dates.

Q. Is that a profitable thing for you to maintain?

A. Well, yes; it helps us some.

Q. How much does it cost you to make this change?

A. That I cannot tell. I never asked that question.

Q. Well, now what becomes of this refuse when it is pumped back?

A. Why, we work it right back over into this paper again.

Q. Goes into paper?

A. Yes, whatever there is in it goes right in the paper again.

Q. What did you use to do with that stuff?

A. Let it go in the river.

Q. And now you save it?

A. Yes, sir.

Q. Do you at the present time discharge into the river any of the refuse or black water, as you call it, in the making of paper?

A. Not that I am aware of.

Q. Now does your factory in any wise pollute the waters?

A. Not that I know of. It might, and still I don't know that it does.

Q. You were endeavoring to prevent it in every way?

A. In every way, shape and manner, both day and night.

Q. Are you frequently visited by the inspectors of the Jersey City Water Supply Company?

A. Well, not lately, but last summer we were.

Q. Who visited you?

A. Lately, do you mean?

Q. Yes.

A. Doctor Leal.

Q. And Mr. Gibson?

A. Mr. Gibson and the other gentlemen, too. I believe there was a couple more.

Q. How do you dispose of the human excreta?

A. Why, we have it taken away—carted off the

place altogether—a man comes there and takes it away.

Q. Where does he take it?

A. That I cannot tell you.

Q. And how do you take care of it before it is carted away?

A. We have a concrete cellar.

Q. Have it concreted?

A. Yes, sir; the cellar.

Q. Waterproof?

A. Yes, sir, as much as cement and sand will make it.

Q. And who carts away the stuff?

A. The scavenger in Town—the Town of Boonton.

Q. And is it taken to the river?

A. I cannot say. They say it is taken down some where towards the Boonton reservoir, but that I cannot say. I don't know. I never paid any attention or asked them any questions.

Q. It doesn't pollute when it leaves your place?

A. Not that I am aware of; no, sir.

Q. How often has Dr. Leal been calling upon you those last five or six years?

A. I cannot tell you how often, quite frequently.

Q. Does he keep a close watch on it?

A. Apparently. Always went all around to see that everything was all right.

Cross examination. Mr. Vredenburgh.

Q. When was Doctor Leal last there?

A. Well, I guess two or three weeks ago, or probably more. I have no recollection of dates. I am kept pretty busy.

Q. When was he there before two or three weeks ago?

A. Probably two or three weeks before that again.

Q. You have no recollection as to that?

A. No, sir, not exactly; I didn't pay much attention to it.

Q. Have you orders to let no one in there?

A. Yes, sir.

Q. And you don't permit anybody to go in?

A. No, sir.

Q. Why is that?

A. Orders from headquarters. I cannot tell you why.

Q. Well, who are you employed by?

A. Firm of Field & Wyck.

Q. How long have you been employed by Field & Wyck?

A. Sixteen years. No, pardon me. First I think it was about nine or ten years with Field & Wyck, but before that with the Powerville Ribbon Company in the same place.

Q. Now the works are situated between the canal and the river.

A. Yes, sir.

Q. And how far is the canal from the river at that point where the works are?

A. How far is the canal from the river?

Q. Yes.

A. Oh, I don't know how far.

Q. Three hundred feet?

A. Well, it is not any more; it is not any more, I should say, than that.

Q. And how high is the fall? What fall have you there?

A. Well, they claim ten feet, but I never could find it.

Q. Is that about the height that the canal is—the surface of the canal above the surface of the river where your works are?

A. Oh, no. Yes, that is in the pond. The canal takes the water out of the pond there.

Q. At the point where you say it is 300 feet from the canal to the river. Is the canal about ten feet above the river?

A. No, sir; I don't think it is as much as that.

Q. How much do you think?

A. Well, I would say six or seven feet. I don't believe it is any more than that. I never measured it.

Q. How far is it down the river before the canal and the river come side to side again?

A. Oh, I would say a couple of hundred yards, maybe more—three or four hundred yards.

Q. How does the canal go down to the level of the river, by a lock?

A. Yes, sir.

Q. Now how many men have you employed there?

A. About thirty or thirty-five.

Q. And this filter bed that you speak of consists, I understood you to say, of two holes?

A. Yes, sir.

Q. And these holes are in cinders?

A. Yes, sir.

Q. And about what size are the holes?

A. Well, I should say they were about three feet deep and about, circular, eighteen or twenty feet across—maybe more, I never measured them.

Q. In diameter?

A. Yes, sir.

Q. Why do you have two of them?

A. Well, filter from one to the other in case there would be an excess of this water.

Q. That is, sometimes you have water in one and sometimes in the other?

A. Sometimes in both a little.

Q. How high does the water stand in them?

A. Oh, not over two feet at any time; probably not that.

Q. Any connection between the two beds?

A. Yes, sir; I had a trough in there, but I cut it away.

Q. What connection is there now?

A. Only just the ashes. I built the two of them together.

Q. Does the water rise in one to the same height that it does in the other?

A. Just about; yes, sir.

Q. Right through the cinders?

A. Yes, sir.

Q. How far away do they appear?

A. Oh, a couple of feet.

Q. What are those cinders—coal cinders or ——

A. Yes, sir.

The Court:

Q. Coal cinders from your furnace?

A. Yes, sir, from the boilers.

Further Cross.

Q. Now the surface of the cinders at the place where these houses are—is that above or below the surface of the water of the canal?

A. Well, now I rather think it is below. I rather think it is below the water in the canal—that is, when the level is up, when they are boating—and I don't know as it is, either; but there isn't much difference.

Q. Do you know how deep the cinders are at the place where this hole is to the ground beneath?

A. Oh, they run anywheres from eight inches to fourteen, to sixteen, to eighteen inches.

Q. What is the ground beneath—stone?

A. No, earth.

Q. The ground underneath is?

A. Underneath the cinders?

Q. Yes.

A. Earth.

Q. Well, I thought that was the stone there.

A. No, sir; no stone there. Well, there may be some, just the same as you would find in any lot, but there is no stone there.

The Court:

Q. It is not a rocky stone?
A. No, sir; it is more of a quick sand.

Redirect examination.

Q. How much water and refuse go in a year into these filter beds? Very much?
A. No, I cannot tell you. Sometimes I have to fill them, because I pump from one tank into another; the one tank sets on the outside of the building and gets water dry, and I have to pump that so as to keep it tight; if I didn't have to do that I would not have to put so much water out of these filter beds.
Q. Is there very much water that flows?
A. No, it would go through a two-inch pipe or two and a half inch pipe.
Q. Have you ever known of water from these filter beds to overflow into the river?
A. Never, sir; never, not to my knowledge.
Q. Would, in your judgment, that be possible?
A. I have seen pretty high water there, and it never went over the top of them, as small as they are.
Q. Do you ever leave your bales of rags out in the open so that they can be affected by rain?
A. Yes, sir; I leave them right outside the building. Why, we are using them all the time. Some days it is cleared up, but other days there is a pile of them there.
Q. Do you put them on the banks of the river?
A. No, sir.
Q. How far out are they from the river?
A. Not very far, some of them.
Q. How far?
A. I would say forty or fifty feet. At one time we used to, some years ago, on high water fix a lot

up in place there to keep the water from taking out our raceway.

Q. Did the high water in the river ever reach these bales?

A. Not now, not where we have them now.

Q. Where do you keep most of your rags?

A. In a rag house. We have a building there.

Q. How far is that from the river?

A. A hundred feet or more.

Q. How are your employees there? Are they a healthy lot?

A. I never saw any of them sick, and never had to call a doctor for one yet.

Q. No disease comes from handling the rags?

A. Never. I worked at it twenty-three years.

Recross.

Q. How many rags do you use?

A. Ten or eleven tons a day.

Q. Ten or eleven tons of rags a day?

A. Yes, sir.

Q. What do you get the rags from?

A. From across the water and domestic.

Q. Get them from St. Louis?

A. No, sir; not that I know of.

Q. What do you mean by domestic?

A. Well, the city of New York and Scranton and around those places.

Q. What do you mean by foreign?

A. France, Germany.

Q. Egypt?

A. No, sir; I don't know as we get them from there. They are too expensive a rag for us.

Q. Well, I understand you to say that your whole factory was between the canal and the river?

A. Which house is that?

Q. All the houses of your factory where you store your rags?

A. Yes, sir.

Q. Everything?

A. Yes, sir.

Q. Then you said that the canal was only 300 feet from the river. Certainly not more than that, you said?

A. That is right.

Q. How do you get any building then four hundred feet from the river?

A. Haven't any building four hundred feet from the river; I said one hundred feet.

Q. I misunderstod you, sir; I beg your pardon. Now I will show you a photograph and ask you if you recognize that photograph?

A. Well, yes; part of it.

Q. Which part of it don't you recognize?

A. Well, this here (indicating)—yes, I recognize those buildings here, yes, sir, and that one there (indicating).

Q. You recognize the heaps of rags?

A. Yes, sir. Them on the bank is right there now. We move most all of them as we can, and now there is only a little bit left—just a few bales right close to that building.

Q. Those bales are close on the bank of the river?

A. Yes, and them has all been disinfected, every bit of them; all foreign rags have been disinfected.

Q. You think those are all foreign.?

A. Yes, sir. Do you mean all that (indicating)?

Q. What makes you think so?

A. I know where I had them placed.

By the Court:

Q. How do you disinfect them?

A. I cannot say. That is done over in the old country. I don't know what they use for that.

Q. Well, they are disinfected before they are put on the steamer?

A. Yes, sir.

Q. You spoke of the overflow of the cinder beds. Do you say that the water that comes into the cinder beds never overflow?

A. No, sir; never have overflowed yet.

Q. Now where do you get your water from that you use?

A. Out of the raceway.

Q. And how do you get it up to the tanks?

A. Pump it up. That is, you mean our fresh water, our clean river water?

Q. Yes.

A. Pump it up.

Q. Do you have any other water there besides that?

A. No, sir.

Q. What do you mean by saying clean water?

A. Well, we mean the river water. We have a pipe there, and one is clean water and the other black water; we have a pipe there from our meters.

Q. And the black water is what goes into those filtering beds?

A. Yes, sir; the surplus.

Q. Are there pipes to both of those beds?

A. Why, no.

Q. How does the water get to those beds?

A. Well, from the tank outside to the first bed, and then filters through the ashes to the second bed.

Q. Well, from the tank to the first bed, how is that?

A. With a trough.

Q. Runs down this trough and into the filter bed, and from that filter bed it passes into the second through these ashes?

A. Yes, sir.

Q. Is that a continuous flow or not?

A. Well, sometimes we don't see any going in for a week or ten days, and then maybe some will go in a couple of times a day, as I say, and this

tank we have to keep plenty of water in it because the air dries it out and it would leak.

Q. What is the size of that tank?

A. I think it is about 12x14; something about that.

Q. What is in it before you pump it out?

A. This black water, this dark water.

Q. What is that dark water?

A. Why, it is water that comes from the rags in manufacturing the rags.

Q. Washing the rags?

A. No, sir; we don't wash no rags.

Q. Don't wash no rags?

A. No, sir.

Q. Well, there is refuse that is taken down on the river and burned?

A. Well, we built a furnace for burning that; there is no more taken down there.

Q. You stopped that?

A. Yes, sir; everything is burned now.

Redirect examination.

Q. And what proportion of the black water goes to these filter beds?

A. Oh, I cannot say; 10 per cent., maybe a little more, 10 or 15 per cent., there isn't much.

Q. The rest of it goes back through?

A. Yes, sir; there is about 66 per cent. of that is evaporated out on the steam dryers.

Q. What is your finished product there?

A. Paper.

Q. Heavy paper?

A. Yes, sir.

Recross.

Q. Do you know at all how much water you use a day?

A. I cannot say, no, sir.

Q. With the exception of these filter beds has there been anything else done in the way of changing the method of manufacture there?

A. No, sir.

Q. It has been the same ever since you have been there?

A. Yes, sir; the same ever since I have been there.

Redirect examination.

Q. Well, the tanks and the pump are all new?

A. Yes, sir; that is, from five to six or seven years ago they were put in there.

Q. You used to waste all this black water, and now you use it?

A. Yes, sir; we use it all; yes, sir, and more if we could get it.

Q. It is economy to do that?

A. Yes, sir, I guess so.

Q. That is all.

THOMAS HEATON sworn.

Direct examination. By Mr. Edwards:

Q. Where do you reside?

A. Boonton, N. J.

Q. What is your occupation?

A. Supervisor on the canal.

Q. On the Morris Canal?

A. Morris Canal.

Q. How long have you held that position?

A. About 15 years.

Q. Are you under Mr. Powers?

A. Under Mr. Powers? Yes, sir.

Q. Are you constantly on and about the canal?

A. Yes, sir.

Q. Do you know the gates leading from the lower level into the raceway?

A. I do.

Q. The Cooper-Lord?

A. Yes, sir.

Q. Do you have charge of those gates?

A. Yes, sir; I do.

Q. And the opening and closing of them?

A. Yes, sir.

Q. I show you a map of the dam at the foot of the plane on the Morris Canal and ask you if you recognize that as the gates and the movable gates?

A. Yes, sir; I do.

Q. Are the flap gates shown on the top?

A. Yes, sir; not all of them, but enough to show.

Q. And they move automatically?

A. Yes, sir.

Q. Now then have these lower gates been open at any time in the past two years?

A. They were closed the first of May, in 1905; they haven't been open since.

Q. That is the twenty-four inch gates?

A. Yes, sir; twenty-inch gates.

Q. Twenty-inch gates?

A. Yes, sir.

Q. Now then what effect has the pivot gates on the top?

A. Well, when the water is flowing in they open, and when the race above is lower than the canal they close.

Q. Can any water with those gates get into the raceway from the lower level of the canal?

A. Not when they are closed.

Q. But they close automatically?

A. Yes, sir.

Q. In other words, the water that would escape closes them?

A. Yes, sir.

Map offered in evidence.

Marked Exhibit D7.

Q. How often are you in the vicinity of these gates?

A. I pass there every day, sometimes twice.

Q. Have you ever seen any back water going from the lower level into the raceway?

A. No, sir.

Q. And you have seen these top gates. Have you ever seen these top gates closed?

A. Have I seen them closed?

Q. Yes.

A. Yes, sir, I have seen them closed.

Q. Working automatically?

A. Yes, sir.

Cross examination. Mr. Vredenburgh.

Q. When did you see them close, Mr. Heaton?

A. Well, I cannot give you dates, but when the water is higher in the level than it is in the race they close.

Q. When was that?

A. I can't give you that date.

Q. Why not.

A. Because I didn't keep it.

Q. Cannot you tell about how long it was ago?

A. I cannot say that. I haven't seen them closed this year. We just started up, and the water in the lower level has been lower than in the raceway, and we are having but very few boats. When we are having boats why then the level fills up more rapidly and the gates close as it lowers in the race above, but during last season it was a common occurrence every day.

Q. Every day you saw them closed?

A. Yes, sir.

Q. Then if it weren't for the gates every day the

water would run from the lower level down into the Rockaway river?

A. Yes, sir; that is, the water would run back if the gates didn't hold it from the level.

Q. Did you make this map?

A. No, sir.

Q. Do you know whether it is accurate or not?

A. Yes, sir; I should say it was.

Q. Do you know who did make it?

A. No, sir; I do not.

Q. What is the size of the gate—the lower gate?

A. Twenty-inch pipe.

Q. Twenty-inch pipe?

A. Yes, sir.

Q. Well, this says 24-inch gate?

A. Well, I think it is twenty-inch pipe to the best of my knowledge.

Q. Does it take a gate 24 inches to close a 20-inch pipe?

A. Well, the gate is larger than the pipe; it has a valve, and it comes down into it; there is a slot on each side. I should say that that gate is two inches wider where it screws down in than the pipe.

Q. Do you say that that opening that is said to be 24 inches is 20 inches or 24 inches, according to this map?

A. Well, it says 24 inches there.

Q. But your recollection is that it is twenty inches?

A. The pipe is twenty inches; the gate I should say was twenty-four. It has got to be larger than the pipe in order to stop it.

Q. Is the gate shown on this map?

A. Where the gate passes up it is shown there, but you cannot see the gate there when you screw that up.

Q. The gate is not shown on that?

A. No, sir; the gate comes down in there and closes the pipe up in the center of it.

Q. Does the dotted line show the gate on each side of that circular hole?

A. Yes, sir, it does. I see it now; here is the dotted line (indicating).

Q. Well, now you say that the gate has been shut so as to close that pipe ever since some time in 1905, do you?

A. Yes, sir; the first of May.

Q. 1905?

A. Yes, sir.

Q. Who has the control of that gate?

A. I do.

Q. Do you raise it and close it?

A. Yes, sir.

Q. Anybody else?

A. No, sir.

Q. You are the only man to do that?

A. I am the only man that has charge of it.

Q. What is the purpose of that gate?

A. Why if we should have to draw the lower levels—that is, we have about seven miles to fill between that point and Milton Park, seven-mile level, and if we had to fill those levels rapidly it would be necessary to open those gates to do it, but we haven't had any occasion to do that.

Q. Did you make these gates?

A. No, sir.

Q. Did you put them on?

A. No, sir; I helped put in the head; was there at the time they were put in. They were put in there under an engineer by the name of Mr. Merrian.

Q. Well, now, these flap gates, did you make those?

A. No, sir.

Q. Did you put them in?

A. No, sir.

Q. Do you know whether they are accurately shown on this?

A. I think they are, as near as I can tell.

Q. What is the size of them?

A. The size of those gates?

Q. Yes.

A. I never measured the length.

Q. You don't know?

A. No, I don't know the length of them, I never measured it.

Q. You don't know whether they are shown correctly on the plan or not?

A. I didn't notice the measurements there; I didn't look at it to see that.

Q. Well, you wouldn't know if you did see the measurements, would you?

A. By that?

Q. You wouldn't know if you saw the measurements here whether that was correct or not?

A. Not until I measured the others.

Q. In the raceway leading from this gate to the mill there is also a gate to control the supply to the mills below, is there not?

A. There is what we call a stop gate right above this dam, across the stream.

Q. And that is used to regulate the flow of the water to the mills below?

A. No, sir; that was used in order to keep the water out of the canal, before this dam was put in.

Q. Well, I now refer to the gates in the raceway leading to the mills below?

A. Well, that is the flume you are speaking of; they have a flume which extends out.

Q. You call that a flume leading to the mills below?

A. Yes, sir.

Q. And that flume has a gate in it?

A. Yes, sir.

Q. And that regulates the amount of water that goes down to the mill?

A. Yes, sir.

Q. Now, if the drainage on the mill exceeds a

certain amount then the water from the canal runs into that flume?

A. It would if those gates were not closed; the gates prevent it.

Q. As it was before these gates were there it would?

A. Yes, sir.

Q. But these gates would close automatically and in that way prevent it?

A. Yes, sir.

Q. I will ask you whether these flap gates appear to lap over the post by this drawing. Can you notice that?

A. Not by the drawing, but they do lap over.

Q. The drawing don't show that they lap over, but you say they do?

A. They do, yes, sir; they lap over against the post and close it tight.

Q. Then the drawing is incorrect in that respect?

MR. EDWARDS: He don't say that.

A. They do lap.

Mr. Edwards:

Q. They are perfectly tight there?

A. Certainly they are perfectly tight; they lap over the post, I should say, three or four inches.

Recross.

Q. How wide is the post?

A. Well, now I cannot tell you that.

Q. Well, about?

A. Well, I should think the posts were eight inches, although I am not positive.

Q. Those gates lap three or four inches on each side?

A. Yes, sir; I should think to the best of my knowledge, as near as I can remember.

Q. The old Brook street sewer, where did it go before?

Mr. Edwards: I object; we haven't asked him anything about that.

Mr. Vredenburgh: Well, he said he knew all about the canal.

The Court: That is not cross-examination.

Mr. Edwards: If you want to make him your witness I do not object.

Mr. Vredenburgh: I will make him my witness for one question.

Q. Where did the Brook street sewer empty before this drain was built down the incline?

A. It emptied into the raceway that came down that plane where the water supply comes.

Q. Did it empty down along the incline or did it run across the incline?

A. It crossed the incline and emptied in the race where the Boonton company backed their water.

Q. Well, what was the bed of that stream across the incline, was it cement or what?

A. It was a stone drain as near as I can recollect across there. I don't think there was any cement in it. I think it was stone bottom and stone sides as near as I remember.

Q. And the rails were on top of it?

A. Do you mean for the plane?

Q. Yes.

A. Why there was a coping stone laid over it and a track over that.

Q. That's all.

DEWITT P. HUMMER sworn.

Direct Examination by Mr. Edwards:

Q. Where do you reside?
A. 47 East Blackwell street, Dover, N. J.
Q. What is your occupation?
A. I am in the insurance business and executor for estate of George Richards.
Q. And who is your co-executor?
A. Mahlon Pitney.
Q. How long have you lived in Boonton?
A. Never.
Q. I mean in Dover?
A. Sixteen years about.
Q. How long have you had charge of the estate of George Richards?
A. Ever since his death.
Q. When was that?
A. April 3, 1900.
Q. Well, now does that estate own many buildings—houses in Dover.
A. They own a number, yes, sir; they have one large store property at 1, 3 and 5 West Blackwell street, and another, what we call No. 5. I believe the street number is different; we recognize it as No. 5 and No. 6 brick block, we call it; and we have a small dwelling on Essex street and another dwelling and a barn at 47 East Blackwell street, and another double tenement house on Bergen street and one on Union street. I think it is a stock house.
Q. Well, now, when you took charge of these houses in 1900, where did they sewer?
A. In the Rockaway river, all excepting one where I lived, and that sewered into a cesspool.
Q. Which was your number?
A. 47 East Blackwell.
Q. How did the drainage reach the river?
A. Well, at No. 1, 3 and 5 it went direct from

the building into a large iron pipe that went out Sussex street and down River street into the Rockaway river below the falls, so what we know as Nos. 5 and 6 brick block, that went into the rear into a tile pipe and then down Morris street into the Rockaway river, and that the Bergen street went into an iron pipe and went out through a right of way that we purchased when we built that dwelling to Hudson street, into the raceway that flows through and carries the water from the Dover Electric Light Company's station.

Q. Well, now, since 1900, was your attention called to this method of drainage?

A. Yes, sir.

Q. And if so, by whom?

A. By Mr. Gibson.

Q. Also by Dr. Leal?

A. Doctor Leal, less than a month ago he was up there—that is the first time I saw him.

Q. When Mr. Gibson called your attention to those matters what did you do, and when?

A. In 1903, why I gave orders to the plumbers to disconnect the sewage from our property—that is, at 1, 3 and 5 West Blackwell and 5 and 6 East Blackwell, and put it direct into the sewers that had been constructed.

Q. What did they do?

A. They did it.

Q. How did they do it. Just tell us what they did?

A. Well, I wasn't working on the ground. I don't know how they did it, but the sewer pipe went in. They disconnected the sewer pipe from the drain pipe and put in all the water from closets and urinals direct into the cesspool by iron pipe.

Q. What did all that work cost you, do you remember, for the various numbers?

A. I cannot give you the exact figure, but approximately I should think, and, by the way, Mr. Richards had the cesspools at 1, 3 and 5 West

Blackwell and 5 and 6 East Blackwell constructed before his death, I should think in the neighborhood of $1,000, the whole business would cost.

Q. Does any drainage from any of these houses now reach the Rockaway river?

A. Not to my knowledge.

Q. Have you endeavored in every way to prevent it?

A. We have, yes, sir.

Q. It is charged that No. 16 East Blackwell street is connected with the Morris street drain, is that true at the present time?

A. No, sir.

Q. It is charged that No. 14 East Blackwell street is connected with the same drain. Is that true?

A. No, sir.

Q. At the present time?

A. No, sir.

Q. Do you still own the Mansion house?

A. Mansion House? No, sir.

Q. It is charged that 34 and 36 Bergen street, which you have mentioned connected with the iron pipe of the Electric Light Brook, is that true?

A. Not to my knowledge.

Q. Well, how is it connected?

A. I don't know that it is connected.

Q. I mean how is the drainage taken care of?

A. Why directly into a cesspool.

Q. And have you consulted your plumber who did this work?

A. Yes, sir.

Q. Who was that plumber?

A. Why, Mr. Woodhull, but Mr. J. T. Kerr is the plumber whom I consulted; he has different plumbers working for him, under him.

Q. Do you know of any property controlled by you for the Richards estate or otherwise in the Town of Dover that now connects with the Rockaway river?

A. No, sir.

Q. And have you endeavored in good faith to prevent all such connection?

A. I have, yes, sir.

Q. Now, has very much work of the class that you have spoken of been done in Dover in the last few years?

A. Well, occasionally I have seen here this one building cesspools and changing his plumbing, and that one, but I cannot recall any particular one.

Q. Dover has been a good town for the plumbers this last couple of years?

A. Certainly has been.

Cross-examination by Mr. Vredenburgh:

Q. Does this house, No. 14 Blackwell street, have a closet in it?

A. That is 14 East Blackwell street?

Q. Yes.

A. Yes, two closets and one bath.

Q. And where does the water come from?

A. Why to supply the closets and the bath?

Q. Yes.

A. From the water south of the Town of Dover.

Q. Public water supply?

A. Public water supply of the Town of Dover.

Q. And you say there is a cesspool to that house?

A. Yes, sir.

Q. When was that cesspool built?

A. It was built some time before Mr. Richard's death, I think in 1899.

Q. Have you ever noticed where the water from that cesspool goes?

A. It don't go anywheres, it stays there.

Q. Do you know whether or not there is a pipe from that cesspool?

A. There is no overflow pipe or pipe of any kind that I know of.

Q. Have you ever looked?

A. Yes, sir.

Q. In what way did you look at 14 Blackwell street?

A. Well, along about the 10th or 12th of May there was some discussion whether No. 14—that is what we call No. 5—I don't know the street number of them, there seemed to be some doubt as to whether all of the sewage from that building went in the cesspool or whether some of it didn't go into the Rockaway river. To satisfy ourselves on that point why we had the cesspool partially pumped out and dug up the pipe and tunneled in under to a one-story brick building in the rear, and we discovered that part of it did go into the Rockaway river, and we had it changed, so that I know now that absolutely all the water from 5 and 6 Brick block goes into the cesspool.

Q. When did you have that cesspool cleaned last?

A. That was the first time that we have had anything done to that cesspool.

Q. And the last time?

A. And the last time, yes, sir.

Q. How did that show that there was no pipe—overflow pipe from the cesspool to the river?

A. How did the cesspool show it?

Q. Now, how did that work that you have done, how did that show that?

A. Well, when the plumber in digging the pipes in the rear of No. 5 were laid before this one-story addition was built on, and when we built this one-story brick addition on we put no cellar in under that, and these pipes from the sink and from the cesspools were in under that. When we gave orders to the plumber to connect it he had to dig down along side of the building and tunnel in under it, and he came to the pipe that he supposed was the only drain pipe that came from the building, and he connected that and filled up the hole again, and when we had to open it later we found another

pipe that ran a little deeper and a little beyond that pipe that came from the closet that was not connected, so we had that connected.

Q. Well, the cesspool was in the yard somewhere?

A. Well, it is built out in an alley way partly in the yard and partly in the alley way.

Q. In the rear of the house or in the front of the house?

A. In the rear of the house.

Q. Well, now from the cesspool, do you know of your own knowledge that there is no pipe leading to the drain that leads to the river?

A. Well, I know in a general way. I was there on the ground off and on when it was being conducted, and I don't see how any overflow pipe could be got out of it to go into the river; I never saw any.

Q. Now is that substantially the same with respect to No. 16?

A. Yes, sir, that is the end one.

The Court:

Q. After you got through didn't you make any test to find out?

A. When we had it open in May we made a thorough test then.

Q. I mean did you make any test to see whether there was any possible connection?

A. We did in May, yes.

Q. What did the test show?

A. It showed that it all went right directly into the cesspool.

Mr. Vredenburgh:

Q. But did it show at all where it went to after it got into the cesspool?

A. Well, I can't tell you where it went to after it got into the cesspool. I suppose that is what a

cesspool is for, but it is supposed to soak away in the ground.

The Court:

Q. Well, did you look at the mouth of the drain in the river to see whether anything came through there?

A. Well, I didn't go down there myself. I believe the plumber did and Dr. Leal was there. We did it under his instructions.

Mr. Vredenburgh:

Q. Do you know Thomas Fanning?

A. Yes, sir.

Q. Is he in your employ?

A. No, sir.

Q. Did you send him at any time later to 34 and 36 Bergen street?

A. No, sir.

Q. To notify the tenants?

A. No, not that I know of; no, sir.

Q. You don't remember of sending him?

A. No, I never sent him there.

Recess.

After Recess.

Further cross-examination by Mr. Vredenburgh.

Q. You spoke of 34 and 36 Bergen street as houses belonging to the Richards estate?

A. Yes, sir; they did drain the water closet into the Rockaway river some time ago. It went into a brook which takes the water from the Dover Electric Light Company and which empties into the Rockaway river down near the drill works.

Q. Was there at the same time cesspools in these lots?

A. We built a cesspool in the rear of this property in 1903.

Q. And at the time you built those cesspools, did you disconnect the water closet from the drain?

A. The water from the roofs goes into the old drain yet and goes into this brook, but my orders to the men was to lay a new soil pipe from the house to the cesspool, leaving the water from the roof to go into this drain.

Q. Where did you find it had been disconected —the water closet from the drain—the second drain?

A. Well, I never found out that it is not yet.

Q. I thought you testified that you made some investigation and found that it had not yet been done?

A. That was on No. 5 East Blackwell street.

Q. Do you know of your own knowledge what he did?

A. I know I gave the orders, and I was on the ground from time to time, and I saw the drainage back there and the soil pipe and the soil making the connection. I don't remember I was there when he actually made the connection.

Q. You say that in one of these houses you yourself lived, which one was that?

A. 47 East Blackwell street.

Q. How is the waste from the water closet there taken care of from that house?

A. There is an open sewer over which the outhouse stands with a passage under it. That sewer was built and connected up while I was in Europe in 1899.

Q. Where does that sewer lead to?

A. That sewer must run down into the ground.

Q. Does it connect with any drain?

A. Not to my knowledge.

Q. What is at the end of the sewer?

A. The cesspool. That discharges from my house right into the cesspool.

Q. That was made while you were abroad, you say?

A. Yes, sir, in 1899, when I was abroad.

Q. Is there any overflow from that cesspool?

A. There is no overflow to it.

Q. How near is that to the river?

A. Between 15 and 20 feet, I should judge. I have never measured it.

Q. Is there a pipe leading from that to the river?

A. No, sir.

Q. Is there any pipe there leading from your property to the river?

A. Yes, sir, on the upper end of the property there is, which takes the water from the back end of the house down to the river, but not from the cesspool.

Q. Now that back end of the house you speak of, is that connected with the water closet in either of the houses?

A. There is only one house there.

Q. Well, that one house then?

A. Well, that is the house where I lived.

Q. Well, was that pipe connected with the water closet, or with the dish water?

A. Not to my knowledge.

Q. Now about the stables. You have stables to your property?

A. Yes, sir; there are stables in the rear of the house, I suppose about 15 feet from the rear of the house.

Q. How near is that to the river?

A. Well, one edge of it runs right along the river bank.

Q. Does that drain into the river?

A. It drains out in the yard, into the barnyard, the same as other stables in Dover drain out to the barnyards.

Q. And the barnyard is on the river?

A. Part of it, but there is a back stone wall that maintains it, you know.

By the Court.

Q. Is the stable occupied?
A. Yes, sir.

Further Direct.

Q. How many horses occupy it?
A. Well, I believe at the present time they have eight horses. Sometimes they have nine and sometimes ten.
Q. Who has them?
A. The George Richards Company.
Q. What is the business of the George Richards Company?
A. Well, they have a department store.
Q. Is there an extension to this stable also?
A. Yes, sir.
Q. What is that occupied by?
A. Well, all the stable property is occupied by the George Richards Company.
Q. I think you said they had about 12 horses?
A. Yes, 8 at present; sometimes as high as 10. I believe they have 9 horses; one of them died.
Q. Does the matter from this stable go into the river?
A. I never saw that any of it did.
Q. How does the land slope?
A. It is practically level there. I will make you a diagram of it.

Witness drew a diagram of the premises and explained it to Court and counsel. Thereupon the Complainant offered the diagram in evidence.

Marked Exhibit C104.

Q. The stone wall there running along adjoining the river, how high is it?

A. About 10 feet high.

Q. Higher than the land there?

A. No, sir. I imagine it is the same height. I don't think it rises any above.

Q. The same height as the land?

A. Yes, sir, about the same.

Q. The place you marked W. C. is used for your servants?

A. Yes, sir.

Q. And the sewer that you have said was built while you were in Europe runs to that same plot?

A. Yes, sir.

By the Court:

Q. And the closet, as I understand, is concrete?

A. No, it is just what we would call open masonry work.

Mr. Vredenburgh:

Q. Open what?

A. Most of the sewers built around there were laid up dry, you know, with dry stone.

Q. This stone wall along the river is of what character?

A. That is a dry wall.

Q. From the river bed?

A. Dry wall from the river bed until it gets near the top or else crosses the two; I think at the top is a regular sand line wall.

Q. Well, the stone was the rubble stone from the river?

A. No, regular quarry blocks that was gotten out.

Q. Do you own the house, or does the Richards estate own the house next to you—next to this house where you are speaking of?

A. No, sir; that belongs—next to me is the Methodist parsonage on the east side, and on the west side belongs to the estate of N. B. B. Searing.

Q. Mr. Hummer, do you know whether on May 17th you were in that house next door?

A. Yes, I was coming down from the office.

Q. Well, do you know whether the drain in that house carries sewage to the river?

Mr. Edwards: I object; we didn't examine at all as to that.

The Court: Well, I suppose that objection is good. This witness was not asked with reference to the general situation.

Mr. Vredenburgh: I think he was asked with regard to the general situation.

Q. Were you asked with regard to the general situation there by Mr. Edwards?

A. No, sir.

Q. You don't recall that?—

Objected to.

Admitted.

Q. You spoke, Mr. Hummer, of a drain which ran to the adjoining property from your property?

A. No, it didn't run on the adjoining property; it goes out into the street, and there follows the contour of the curb line down to the river.

Q. Well, now, does the house that is next door to you sewer into that drain?

A. Not to my knowledge, I wouldn't think so, because if they wanted to sewer in the river they would be closer by going direct in the rear of the house than to cross in our property.

Q. Is that the house you were in on May 17th of this year?

A. I don't remember the date. I was coming from the office to lunch one noon, and Mrs. Richardson, that is my next door neighbor, she said there was some gentlemen up in the bathroom and had been there for some time, and she was afraid, and she asked me if I would not kindly go up and ask them if they would not go out.

Q. Were they there for the purpose of testing to see whether that drain?——

Objected to.

A. Oh, I don't know what their purpose was; when I went in the bathroom they were drawing water from the different faucets there.

Q. Mr. Hummer, you said that the stable yard adjoining this wall was about the same height as the wall?

A. The wall probably may rise—the stone wall may rise, maybe a few inches above the mark. I never looked at it particularly, and on the top of the stone wall or inside of the stone wall there is a broad fence built around it.

Q. Well that land that now forms a stable yard, is it made land?

A. Oh, yes, it is all upon made land.

Q. All filled?

A. Yes, sir.

Redirect Examination.

Q. Mr. Hummer, at whose request did you make the investigation at No. 5 Brick Block, this spring?

A. Why, at the request of Mr. Gibson and Doctor Leal. He came there and asked to have it done.

Q. Were you subpoenaed in this case by Jersey City?

A. Yes, sir.

Q. Did you come to the Court?
A. I did.
Q. Were you called?
A. No, sir.
Q. That is all.

EUGENE WOODHULL sworn.

Direct examination by Mr. Edwards:

Q. Where do you reside?
A. In Dover.
Q. How long have you resided there?
A. Since 1888.
Q. How old are you?
A. Forty.
Q. And what is your business?
A. Plumber.
Q. How long have you carried on that business or have you followed that business?
A. Twenty-two years.
Q. Are you in business for yourself or are you employed by some one?
A. Employed by Mr. Kerr.
Q. Do you remember the time that the numbers 14 and 16 Blackwell street or Brick Block were cut off from the Morris street drain?
A. Yes, sir.
Q. Did you do the work?
A. Yes, sir.
Q. When was that?
A. I think it was in 1903.
Q. It has been testified that at the present time the house drainage from No. 16 enters into the Morris street drain, is that true?
A. No, sir.
Q. What fixtures are in that house, No. 16?
A. There is two water closets and a bath.
Q. Where do they drain to?

A. Into the cesspool.
Q. Where is the cesspool?
A. Right in the rear. The cesspool is about on the line I imagine. Part of it is in the alley way and part in the yard.
Q. Does that cesspool have an overflow?
A. No, sir.
Q. Has it any connection with the river?
A. No, sir.
Q. How do you know that?
A. I have been down in it.
Q. At whose request?
A. I think Mr. Hummer, if I remember right, or Mr. Kerr.
Q. Now, then, when in the cesspool, when the fixtures were flushed, could you hear water coming down into the cesspool?
A. Yes, sir.
Q. And see it?
A. Yes, sir.
Q. When was that?
A. Well, it was somewhere about the middle of May. I don't remember the exact date.

Mr. Vredenburgh:

Q. What year?
A. This year.

Mr. Edwards:

Q. Now then when you did this work on No. 16, can you tell us how the No. 16 formerly drained?
A. By drain into the tile sewer.
Q. Into what?
A. Into a tile sewer or tile drain.
Q. Into what other sewer?
A. A tile drain.
Q. Where did that empty?
A. Into the river, I suppose.

Q. Now, was that disconnected?
A. Yes, sir.
Q. Who disconnected it?
A. I did.
Q. At this time is it possible to use?
A. No, sir.
Q. Cannot use it?
A. No, sir.
Q. Is this disconnection exposed now, can you see it?
A. No, sir.
Q. Was it exposed during this month when you went into the cesspool?
A. Yes, it was exposed about the middle of May.
Q. Now is No. 14 connected with the Morris street drain?
A. No, sir.
Q. What fixtures are in that house?
A. Just the same as in the other—two closets and a bath.
Q. Where do those fixtures drain?
A. Into the cesspool.
Q. The same cesspool?
A. Yes, sir.
Q. Can you hear water coming in from the fixtures in the cesspool?
A. Yes, sir.
Q. Did you see whether the pipes from 14 were or does connect to the Morris street sewer?
A. No, you cannot see it now.
Q. I say, did you?
A. I did, yes.
Q. When.
A. Well, it was about the same time, somewhere in the middle of May. I don't remember the exact date.
Q. Who was with you at the time?
A. Well, there were two laborers there.
Q. Anybody from the Water company?
A. I think Doctor Leal was there.

Q. Now do you remember 12 East Blackwell street?

A. Yes.

Q. Does that belong to the Richards estate?

A. No, sir.

Q. To whom does that belong?

A. It belongs to Mr. Simpson.

Q. Does the house drainage from that house go into the river?

A. No, sir.

Q. How do you know it does not?

A. It is connected to a cesspool that has just been built.

Q. Have you been inside of the cesspool?

A. No, I saw it when it was built.

Q. Is there any overflow from the cesspool?

A. No, sir.

Q. How did that house formerly drain before the cesspool was built?

A. That went to this tile sewer.

Q. Do you know whether that was disconnected?

A. Well, that I am not positive of, although I presume that it was; one of our men went there and disconnected it.

Q. That was a part of your job to disconnect it?

A. Yes, but I didn't go there personally.

Q. Now take No. 10 East Blackwell street. Is the same true as to that as of No. 12?

A. Yes, sir.

Q. Drain into the same cesspool?

A. Yes, sir.

Q. Now, No. 8 East Blackwell street?

A. No. 8? I don't know the numbers of those.

Q. Well, No. 1 is Brick Row—Mr. Simpson's property?

A. Well, is that 10?

Q. Mr. Beach's property.

A. Mr. Beach's property; that is connected to a cesspool.

Q. The same cesspool?

A. No, sir.
Q. Did you see it constructed?
A. I did.
Q. Is there any overflow?
A. No, sir.
Q. Are any of these places connected with the Morris street drain at the present time?
A. No, sir.
Q. Are you aware of the fact that testimony has been produced here tending to show that there is such connection to every one of these?
A. I am not aware of it; no, sir.
Q. Is such connection possible at the present time?
A. No, sir.
Q. Now, do you know 34 and 36 Bergen street?
A. Yes, sir.
Q. Does the house drainage from that property connect with the electric light brook?
A. Not to my knowledge.
Q. Where does it go?
A. I think it goes to a cesspool.
Q. What makes you think it goes to a cesspool? Did you do the work?
A. I ran the pipe to the cesspool, yes, sir.
Q. Is there any overflow from that cesspool?
A. Not to my knowledge.
Q. You built it?
A. No, sir; I didn't.
Q. You had charge of it when it was being built?
A. No, sir.
Q. You saw it?
A. I saw it, but that has been some time ago.
Q. Didn't you give Mr. Hummer an affidavit that those two houses were not connected?
A. I don't know that I did. I gave him an affidavit that the two buildings on Blackwell street was not connected.
Q. Well, what did you do at 34 and 36 Bergen street?

A. Well, I don't just remember, and that is the reason why I am not entirely clear on that case. I was under the impression that it had been connected, and in fact think so yet, but I won't like to swear to that.

Q. What was the object of building the cesspool?

A. Take care of the sewage, I suppose.

Cross-examination by Mr. Vredenburgh:

Q. You have been a plumber in Dover for how many years?

A. I have been in Dover how many years? About nineteen.

Q. How long have you been a plumber there?

A. Ever since I have been in Dover.

Q. And have you ever worked for yourself?

A. Yes, sir.

Q. But now you are working for Mr. Hoey, did you say?

A. Mr. Kerr.

Q. How many plumbers are there in Dover?

A. I don't know.

Q. About how many?

A. Well, do you mean bosses or plumbers, mechanics?

Q. First bosses, yes.

A. Well, there are only four shops.

Q. And how many employees?

A. That I cannot tell you.

Q. Fourteen and 16 East Blackwell street you attended to for Mr. Hummer?

A. Yes, sir.

Q. Now, when you went there to attend to it there was a tile pipe leading from the water closets to the drain or sewer in the street?

A. Yes, sir.

Q. Was that sewer in front of the houses or in the rear of the houses?

A. In the rear.

Q. And when you connect a pipe with the cesspool how near ought that pipe go to this tile drain that formerly existed?

A. Well, it goes over the top of it, and I imagine there is probably six inches between it.

Q. What is the character of that pipe?

A. Tile.

Q. And when you say tile won't you tell us what you mean?

A. Why vitrified tile.

Q. Is it round tile?

A. Yes, it is round.

R. Round tile?

A. Yes, sir.

Q. And what size?

A. The tile that goes to the cesspool is six inches.

Q. Yes; well, the tile that goes to the sewer is what?

A. I think it is ten.

Q. And one is above the other?

A. Yes, sir.

Q. How are the tile connected together?

A. They are cemented together.

Q. In both the sewer pipe and the cesspool pipe?

A. Yes, both of them.

Q. How near does the drain pipe—the sewer pipe—go to the cesspool?

A. How near does the sewer pipe go to the cesspool?

Q. Yes.

A. Oh, I don't know, must be four or five feet; I should think probably six feet.

Q. And from that point to the cesspool there is the new pipe that you put in from the water closet to the cesspool?

A. Yes.

Q. And in what way is the new tile pipe connected with the cesspool?

A. It runs through the stone wall and runs inside perhaps four or five or six inches.

Q. And at that point it is about six inches above the tile pipe that leads to the sewer and about six feet from it?

A. No, the house tile is about six inches higher than the tile that goes to the river—that is, the main sewer line there.

The Court:

Q. That is where it crosses it?

A. Yes, sir.

Q. And of course it slopes down to a certain extent?

A. Yes, there is a fall to it.

Further Cross.

Q. Well, do the two pipes cross each other or are they laid in the same?——

A. They cross over.

Q. They cross each other?

A. Yes, sir.

Q. And that way is about—where they cross is about six feet from this cesspool?

A. Somewhere in that neighborhood, I wouldn't be positive.

Q. Well, at the point where they cross the tile that runs into the sewer is about six inches lower than the tile that runs to the cesspool?

A. Yes, sir.

Q. Now at what point is the connection between the water closet and the tile drain that leads to the sewer cut off?

A. Well, it is above the—that is, from which building?

Q. From 16?

A. From 16. Well, that is probably a couple of feet away from the main sewer main tile line.

Q. Well, how is it cut off?

A. The tile was taken out, broken off and the end was cemented up.

Q. How much tile was taken out?

A. Probably a couple of lengths.

Q. You don't remember?

A. No, I don't remember just how many.

Q. Well, I understood Mr. Hummer to say that in May last the test was made, and it was assumed to be connected. Is that your recollection?

A. Yes, not from 16.

Q. Which one was that?

A. That was from No. 14, I think.

Q. Well, wasn't 16 connected also at that time?

A. Connected to what? The cesspool?

Q. Or the tile drain that leads to the sewer?

A. No, sir.

Q. When was it that that was disconnected?

A. That was done in 1903.

Q. That is all.

JAMES ARTHUR sworn.

Direct Examination by Mr. Edwards:

Q. Where do you reside?

A. The Richard Mines, Rockaway Township.

Q. How long have you resided there?

A. Eleven years.

Q. What is your occupation?

A. Superintendent of the Richard mine.

Q. That is what is known as the Mt. Hope mine?

A. No, it is west of the Mt. Hope mines a mile and a half.

Q. And are you acquainted with the methods in vogue there for taking care of the sewer?

A. Taking care of the water that comes from the mines. Yes, I am familiar with it.

Q. Now just describe the system, will you, please?

Mr. Vredenburgh: May it please, Your Honor, what is the point of this testimony.

The Court: Are these the Hibernia mines?

Mr. Edwards: No, these are the mines mentioned in the testimony near Dover.

The Court: Is there any complaint in reference to these mines?

Mr. Edwards: I understand so. Is not that so, Mr. Vredenburgh?

Mr. Vredenburgh: I never heard of these mines before in my life.

Mr. Edwards: I understand there is some complaint that the water from the mines is polluted through Dover.

The Court: The Hibernia mines?

Mr. Edwards: Well, if they don't claim that then we won't ask about it.

Witness: Every drop of water that comes out of our mines comes at about four hundred and fifty gallons a minute; it all goes through our large condensers and every drop of water goes to supply the families for domestic use; they all live on it there and exist on it.

Q. That is the water coming out of your mine?
A. Yes, 150 feet down. The other water comes from 900 to 1,200 feet, and every drop of that water, from 400 to 450 gallons a minute, passes through

our condensing pump to overcome that—steam and water together—and the water, as it leaves the condensing pump is boiling hot, and I know that some of this water—I speak of that large body of water, a great many of the Hungarian people will go down and drink it as it flows down over the hill, so that it cannot be very impure, and after that it goes into the condenser.

The Court:

Q. What is the name of your mine?

A. The Richard mine.

Q. How far is it from the mines at Hibernia?

A. About five miles—four to five miles; it is only two miles, I guess, from Dover, and a mile from Wharton.

Q. Are you acquainted with the system at Hibernia?

A. No, sir; I have only been there on one or two occasions.

Q. How do you take care of the excretia from the men working in the mine?

A. That is as you find all over the world, in all parts. They go off on the old abandoned workings; they cannot get up very well, and they stay down there. Of course seepage, etc.—the water will in time I suppose naturally carry it on down into the regular channel, natural channel, and it gets to our pumps in time.

Mr. Edwards:

Q. Then it turns into steam?——

Mr. Vredenburgh: He doesn't say that; he says condensed.

A. It is boiling hot; it comes out of those condensers hot, you know. We have 1,250 horse-power

boilers, and that generates an immense quantity of steam, and every particle of that steam that is utilized for running those powerful engines goes into that pump, and also the water acts together, and as the water passes out it is scalding hot—boiling.

Cross-examination.

Q. You were speaking of what mine when you said the Richard mine?

A. I was speaking of the Richard mine owned by the Thomas Iron Company.

Q. Where are they?

A. Located a mile east of Wharton.

Q. On what stream?

A. On what street?

Q. On what stream?

A. Well, I guess they are about a quarter of a mile, known as the Rockaway river.

Q. And the water from your mine—that is pumped out from your mines runs down into the river?

A. Goes down into the river.

Q. How many men have you employed in this mine?

A. We have employed altogether—that is, in the mine—about 225 men, down in the mine.

Q. You say that when they need to do so why they use any portion of the mine?

A. The old abandoned workings; go off in the old abandoned workings anywhere.

Q. And that the water from that gradually makes its way down to the pump?

A. Well, it may in ages; I don't know as it does always. If there is any seepage or anything of that kind from the adjoining rocks it may in time, but doesn't very often; I don't know of anything of that kind, but that is possible though, that is nature.

Q. When it gets to this wall it is pumped up and used for condensing purposes?

A. Goes into a large place that we have on the surface, and there we have a condensing pump that takes water out.

Q. When you use it for condensing purposes you don't waste your money for heating it any hotter than is necessary for forming condensing purposes?

A. It is enough for me to know it is boiling hot. I am there every day.

Q. You don't heat that water any hotter than is necessary for the purpose of condensing steam, do you?

A. Nothing further than the steam will produce.

The Court:

Q. Have you ever tested it by thermometer?

A. No, I have never tested it that way, but I know you couldn't dare touch it or go near it.

Further Cross.

Q. If you should make it above 212 it would not condense steam, would it—it would be too hot to condense steam?

A. Yes, sir.

Q. You have to keep it down below 212 to condense steam?

A. Yes, the lower the temperature the better for condensation.

Q. Now you have never tested by thermometer to know how hot it was?

A. I wouldn't want to get my hands in there.

Q. Well, that water runs on down to the Rockaway river, does it?

A. It leaves the condensing pump and runs a quarter of a mile, I think, and goes down into the Rockaway river.

Q. It is really Green Pond Brook and not the Rockaway river?

A. Well, I only know it—well, it may be Green pond; it comes down—there are different streams, and they all go there by the name of Rockaway river.

Mr. Edwards:

Q. It gets into the Rockaway river finally?

A. Yes, sir; it goes into the Rockaway afterwards.

Q. That is all.

JOHN B. RICHARDS sworn.

Direct examination by Mr. Edwards.

Q. Where do you reside?

A. Dover.

Q. How long have you lived there?

A. 35 years or 38.

Q. What is your business?

A. Wholesale slaughterer.

Q. Where do you have your slaughter house?

A. Rockaway Township, adjoining Dover.

Q. How far from the Rockaway river, is it?

A. Oh, 1,200 or 1,500 feet perhaps.

Q. Is there a brook running near your place going down to the Rockaway river?

A. Yes, going through my place.

Q. Are you north or south of the Rockaway river?

A. North.

Q. What is the name of the brook?

A. Well, I don't know as the brook was ever named, not that I know of.

Q. How near is your establishment to that brook —the slaughter house?

A. The brook—nearly under the establishment.

Q. Well, now it is claimed that refuse and pollution goes from your slaughter house into that brook. Is that true?

A. Impossible.

Q. Why do you say it is impossible, and what do you do to prevent it?

A. Because the brook is covered.

Q. With what?

A. Fine old stone and then with dirt—water tight.

Q. For how great a distance?

A. For two or three or four hundred feet below my place of business.

Q. How far above your place of business?

A. Just a little above, not much—oh, 25 or 30 feet.

Q. And how thick is the stone wall?

A. Well, the wall is about two feet or three feet high and four feet across, covered with a very heavy stone.

Q. And how much earth on top?

A. Oh, two feet.

Q. Now then what did you do with the offal from your slaughter house? What becomes of it?

A. We utilize it all.

Q. And so much of the refuse as you cannot utilize, what becomes of that?

A. There is nothing we cannot utilize except the manure that goes on the land.

Q. Where do you keep your manure heap?

A. Up in the upper side of the place.

Q. Anywhere near the brook?

A. No, sir.

Q. Does any of your refuse get into that brook?

A. Nothing.

Q. How many men do you employ?

A. Two and three sometimes.

Q. Where do the water closets empty?

A. I don't know as we have any; we only have two or three men there.

Cross-examination by Mr. Vredenburgh:

Q. You don't know whether you have any water closets or not?

A. We had a piece of a one, and I think it was torn down a week or two ago. I didn't use it much.

Q. Well, you used it daily, didn't you?

A. I don't know as I ever used it, and I never seen any one else use it.

Q. What did you tear it down for?

A. Because it was nearly ready to fall down, and we tore it down.

Q. How many cattle do you kill?

A. Well, we kill in cattle 12 to 20 a week.

Q. Twenty a week?

A. Yes.

Q. Where do you stable them before you kill them?

A. Well, we have a stable on the other side of the farm for the stabling of them.

Q. Where does the drainage from that stable go?

A. I don't know where that goes. We have no outlet for that.

Q. What do you have there—pig pens?

A. Yes, ordinary cattle yard.

Q. You use some of your offal to feed to your pigs, I suppose?

A. Yes, sir.

Q. And these pig pens are connected with your stable, or near your stable?

A. That is, with the slaughter house.

Q. And the drain from the pig pen goes where?

A. We drain it on one side of the stream into a low place, and there it goes through the ground.

Q. Well, you can see it go to the low place, but you cannot see it go through the ground, can you?

A. We cannot see any evidence of where it goes

otherwise; we have been around it and watched it every day.

Q. How near does it run to this stream, as it runs to this low place?

A. As it runs to this low place it runs sometimes within a few feet of the stream.

Q. When it gets to the low place what receptacle is there there for it?

A. Why, a natural hollow with a sand bottom.

Q. How long has that been used in that way?

A. Ever since I built the place.

Q. When did you build the place?

A. About 16 or 18 years ago.

Q. And this hollow is how near the river?

A. How near the river?

Q. How near the brook?

A. It breaks away from the brook; it is 200 or 300 feet from the brook where this hollow is, or three or four hundred feet from the brook.

Q. Is that low place covered in times of freshet?

A. Never seen any water there, not enough to notice any to cover.

Q. How much is it above the river?

A. Oh, I don't know, the river is—I don't know, maybe half a mile from that.

Q. How much is it above the brook?

A. Above the brook?

Q. Yes.

A. I really think it is lower than the brook.

Q. Why don't the brook run into it then?

A. Because they have cut the brook too deep and straight to run through the lot.

Q. Is that the same brook that you say is covered in the way you have described?

A. That is it is covered around the buildings, this same brook.

Q. What is the purpose of covering that brook?

A. When I first started I thought it was necessary to cover it for fear something would drop in it, and then below cattle would hardly care to drink

out of it, and I covered it for the benefit of my cattle, and I didn't think about any water business, not then at least.

Q. You covered it so that your cattle would not drink it?

A. I covered it so that nothing should drop in it.

The Court:

Q. Your meadow is below this covered part then?

A. Yes, sir; it is below where the slaughter is.

Further Cross.

Q. Is that where this hollow is?

A. Yes, sir.

Q. What do you do with your blood?

A. Feed it to the hogs.

Q. Well, do you say the hogs eat all the blood?

A. Yes, sir.

Q. What do you do with the entrails?

A. Tank it. Do you understand that? Put it into a vat and cook it with steam to get the grease out for fertilizer.

Q. You make fertilizer out of the entrails?

A. Yes, sir.

Q. Do you slaughter anything but hogs there?

A. We slaughter every kind, sir.

Q. How many hogs do you slaughter there?

A. In the winter time we slaughter a hundred a week.

Q. A hundred hogs a week?

A. Yes, sir.

Q. What becomes of their blood?

A. That goes down into that little hollow that I spoke of.

Q. Well, now, how many sheep do you kill?

A. A hundred sheep a week, more or less.

Q. Where does their blood go?

A. That goes with the cattle blood.

Q. Do you slaughter anything else besides sheep and hogs?

A. Cattle, hogs and sheep, that is all.

Q. How is the slope of your land; you said you had your cattle at the upper part of your property?

A. No, lower part—that is the barns.

Q. Does your property slope toward the stream?

A. Toward the Rockaway stream; it slopes in that direction.

Q. Is the slope steep or easy?

A. Very gradual, easy.

Mr. Edwards:

Q. How far away is this stable that you have for the animals you are going to slaughter?

A. From the slaughter house?

Q. From the brook?

A. Oh, from the brook, 300 or 400 or 500 feet perhaps.

Mr. Vredenburgh:

Q. How many cattle do you pasture on this meadow land that you speak of?

A. Well, we pasture all that we get in to kill, that is more or less—say on an average of ten more.

Q. That would make how much on the average?

A. Well, on the average say—you see, what we bring in to-day, what we unload to-day we begin to kill to-morrow, and by two days or three days we have them mostly killed, so that the average would be very small—say ten or twelve.

Q. And you keep on an average ten or twelve cattle on this meadow land?

A. On the whole farm.

Q. And this brook that you speak of runs through this meadow land?

A. Yes.

Q. And that brook, where it runs through the

meadow land, is open, so that the cattle can get at it?

A. Yes, sir.

Mr. Edwards:

Q. How many acres of land have you there?
A. Eighty-nine and a half.
Q. That is all.

ETHELBURT BYRON sworn.

Direct examination by Mr. Edwards:

Q. Where do you reside?
A. Dover, N. J.
Q. What is your occupation?
A. Marshall of the Town.
Q. How long have you been marshal there?
A. Three years.
Q. Have you any other business?
A. No, sir.
Q. Do you have charge of the lock-up or police station?
A. What we have there, yes, sir.
Q. Where is that located?
A. On Sussex street, near the river.
Q. It has been claimed in this case that that is a source of pollution to the river. Will you just tell us what the arrangements there are for taking care of human excrement—is there any drainage from the place?
A. There is a place for drainage, but it is not for that purpose.
Q. What drainage is it?
A. When the place was built there in the lock-up in one of the cells there was a groove made into the concrete, and the groove let out into a drain.
Q. And is that now used?

A. No, sir.

Q. When was it stopped?

A. Yes, sir.

Q. At whose suggestion?

A. Mr. Gibson.

Q. What was that place used for?

A. Why, I don't know, I always use it as a flush-out place.

Q. Just to wash out the place?

A. Yes, sir.

Q. It wasn't used for any toilet purposes?

A. Not at all, not to my recollection.

Q. Now, then, will you tell us what toilet arrangements you had there?

A. Why, if we happened to have a person in there over night or any length of time at all why we put a pail in there.

Q. Do you have people in there over night very often?

A. Not very often.

Q. How many times in the year do you have people there over night?

A. Probably three nights a week.

Q. Where is the pail emptied?

A. Out in a closet in the rear.

Q. What does that connect with?

A. It don't connect with anything.

Q. Oh, a cesspool. Then to your knowledge no pollution ever came from this lock-up to the river?

A. No, sir, not to my knowledge.

Cross-examination.

Q. Well, after the hobo that you had there had deposited his stuff on the floor, how did you get it back into the pail?

A. I never seen any hoboes doing such.

Q. Liable to do it?

A. Liable to do anything.

Q. And you have pretty rough characters up there sometimes?

A. Not any more than any other place.

Q. All places are alike in that respect?
A. I guess they are.
Q. The floor was a stone or cement floor?
A. Yes, sir.
Q. And it was on such a place that it ran down to the center—the center was the lowest part of the cell?
A. Yes, sir.
Q. And that was so as to both cells?
A. No, only the one cell.
Q. It certainly went through both cells?
A. No, it didn't.
Q. Wasn't there a hole through the hall from one cell to the other?
A. There is no wall partition there.
Q. What kind of partition is it?
A. Plank.
Q. Wasn't there a hole through that plank partition at the bottom?
A. There was no hole there; most of the water could run under it in places.
Q. It was so high above the floor?
A. Water could run through all the whole cell, yes, sir.

Mr. Edwards:

Q. That is the way you clean house?
A. Yes, surely.

Mr. Vredenburgh:

Q. That is the way you clean the cell?
A. Yes.
Q. Well, now, this pail that you had in there, so that they could use it if they wanted to, what was that pail used for?
A. Used for that purpose.
Q. Used also for bringing water in there to wash the cells up?

A. No, there is a faucet in there in the lock-up.

Q. It is connected with the public water supply?

A. Yes, sir.

Q. Where is the faucet.

A. It is in the upper part before you get to the cells.

Q. How would you get the water from that faucet to the cells?

A. Attached a hose to it.

Q. Did you have a hose for that purpose?

A. Yes, sir.

Q. You washed out the cells with that water from this hose?

A. Once in a while.

Q. What other way had you of cleaning the cells except that way?

A. Sweeping it up.

Q. Well, would you only wash those cells out once in a while?

A. Yes, didn't require it.

Q. Didn't you have regular times for washing it?

A. No, sir, it didn't require it. We didn't keep anybody in there at all only when necessary just for a short time; it is only a small place, just a little lock-up.

Q. How long would you let the dirt collect there before you washed it?

A. Well, there was no particular time; whenever I thought it needed it or looked like it.

Q. Looked like what?

A. Looked as if it needed sweeping out. I would sweep it out first and then I would put the hose in.

The Court:

Q. Did you have any bed with furniture in there?

A. Only two bunks.

Mr. Vredenburgh:

Q. What were those bunks?
A. Plain wooden.
Q. Have any seat?
A. Two plain bunks; there are two in each cell.
Q. Were these bunks water tight?
A. No, sir; it is nothing but a little common lock-up.
Q. Now I show you a photograph, exhibit C48; it was taken some time, I think, in February. Now, Chief, do you say that there was no fecal matter just where that picture shows that there was fecal matter, or shows appearances of fecal matter, in the early part of this year?
A. I don't see where it shows any here.
Q. You don't see any here?
A. I don't see any.
Q. You see where the pipe comes out from the cells, don't you?
A. Yes, sir, that is about where it comes out, about in here (indicating).
Q. Well, just under there now, at that point, do you say that in February last there wasn't fecal matter there that had come from these cells?
A. If there was any there I don't know how it got there; I don't know that there was any there; I didn't look.
Q. How long have you been chief, did you say?
A. I have been marshal three years.
Q. And your age is what?
A. Twenty-nine.

Mr. Edwards:

Q. Outside of the lock-up is a handy place for tramps, as well as inside?
A. Yes.
Q. That is all.

Adjourned.