

New Jersey Court of Errors and Appeals.

Between

THE MORRIS CANAL AND BANKING
COMPANY, LEHIGH VALLEY RAILROAD
COMPANY AND THOMAS OAKES, DAVID
OAKES AND GEORGE A. OAKES, PART-
NERS, TRADING AS THOMAS OAKES
AND COMPANY,

Complainants and Appellants,

and

DIAMOND MILLS PAPER COMPANY,

Defendant and Appellee.

On Bill for
Injunction

BRIEF.

for defendant + Appellee

The bill in this case prays the Court to enjoin the defendant from discharging into the Morris canal from its paper mills in Bloomfield, in this State, any matter which will pollute or discolor the water of the canal, and from depositing lime, sediment or any matter whatever in the canal other than the unpolluted water of Third river.

The complainants, the canal company and the railroad company, claim in their bill that they are injured by the discharge into the canal of impure and discolored water and water containing a sediment which fills up the bed of the canal. They also complain that they are greatly embarrassed because the water so polluted, at points below the point of such discharge, dam-

ages other persons to whom it is supplied, and especially Thomas Oakes & Company, who conduct a woolen mill, and who complain that the water, by reason of said deposit and pollution therein by the Diamond Mills Paper Company, has become offensive and strongly impregnated with lime and totally unfit for the scouring of wool and the washing of cloth, which is the business of said Thomas Oakes & Company, *and in which business they use said water*, and that such deposit and pollution of the water makes it impossible for them (Thomas Oakes & Company) to dye their woolens any color except black after the same have been washed in the said water (see Bill Book, p. 3, par. 8; p. 4, par. 10).

On the 4th of April, the day set for the hearing before Vice Chancellor Pitney, Thomas Oakes & Company applied to be admitted as parties complainant on the facts stated in the bill, and they were admitted as co-complainants, against the objection of the counsel for the defendant.

The evidence shows a material variation from the bill. The complainants, Thomas Oakes & Company, do not use the canal water in their business. They use the water of Third river (Book, p. 90, foot of page; p. 91, lines 1 and 2). Third river is at a lower level than the canal at that point, and the canal crosses over the river in an aqueduct (Book, lines 21 to foot of page). The water of the canal gets into Third river in two ways: 1. The canal passes over Third river in the aqueduct, probably six hundred feet below the inclined plane, and the excess of water in the canal flows over the sides of the aqueduct, and sometimes the gates are lifted in the side of the aqueduct and the water is allowed to flow from the canal into the stream (Thomas Oakes' Testimony Book, p. 92, lines 16 to 20). 2. There is a basin at the foot of the plane where the large wheel that carries the cable revolves, and that is some two or three feet below the bottom of the canal, and from the bottom of that basin, that depression, there is a sluice way into Third river, and they (the canal com-

pany or railroad company) open that sluice-way and allow the thick sediment and mud and lime and whatever may be around that wheel to run into our stream (Third river), and it is very thick and very strongly charged with lime (Thomas Oakes' Testimony Book, p. 92, lines 28 to bottom of page; p. 93, lines 1 to 5).

The bill also gives the impression that the cause of complainant first arose in the spring of 1895. It states that, from an early date in the spring of 1895, the defendant has been unlawfully discharging the water from its mills into the Morris canal, discoloring, contaminating and filling up the canal with sediment (Book, p. 3, par. 8; p. 4, par. 10).

But the use of this water of the canal in the defendant's mill and its discharge, containing lime or chloride of lime and sediment, has been going on for the last forty years, and is a lawful use and discharge.

It appears that on the 5th day of October, 1858, the Morris Canal and Banking Company entered into an agreement with one Christopher T. Unangst, by which it granted to him and to his heirs and assigns, the right to use or employ all the feed water of the Morris canal, as it is or may be used or passed around the inclined plane known as No. 11, east of the Morris canal planes, situated at the east end of the seventeen-mile level of the said canal, the feed to be under the direction and control of the company, and the water, after being used by the said Unangst in its passage from the level above to the level below the plane, to be conveyed into the canal by the said Unangst, his heirs and assigns. In the use of the water the navigation of the canal was not to be in any manner impeded or affected. The agreement was without limit as to time (see agreement, Exhibit A, annexed to the Bill Book, p. 6).

This agreement was assigned by Unangst to Jonathan W. Potter (Exhibit D 1, Book, p. 38). Potter, for the consideration of \$450.00 a year, permitted and granted to Southmayd & McCracken, their heirs and assigns, the right to use and employ the feed water on the second level of the said inclined plane, &c., as fully

and beneficially as Potter is, by the terms of the above mentioned (Unangst) agreement, authorized to grant the same and subject to the stipulations mentioned in the said agreement (Exhibit D 2, Book, p. 381). And this right is now vested by divers mesne assignments and conveyances in the defendant (see exhibits beginning with D 2, on pages 380 to 393 of printed book).

The mill of the defendant has been used as a paper mill ever since 1867, to Col. Thompson's knowledge (Book, p. 116, line 2). It was conveyed to Southmayd & McCracken, November 1st, 1865, and they were papermakers (Book, p. 116, line 20). Mr. Thomas Oakes says it was built way back in 1870, or maybe beyond that (Book, p. 97, line 28), and that it has been used as a paper mill ever since that time (Book, p. 99, line 13). The evidence also shows that the feed water of the canal passing around plane No. 11 has always been used in this mill for two purposes—for power and for the purpose of washing the stock used in the making of paper; that after its use for these purposes, this feed water has always been discharged into the canal by the person owning and operating the paper mill, and that when so discharged the water contained fiber and lime or chloride of lime or some other substance (Book, p. 51, line 34; p. 52, line 1; p. 57, line 22; p. 91, line 19; p. 97, line 26; p. 342, line 18; p. 343, line 4 to line 28). The only interruption to this use occurred when the mills were shut down for a year or two, but that was in 1888, more than twenty years after the use began (Book, pp. 230, 232, 238).

This practice of conveying water into the canal the paper mill charged with sediment was never stopped by the canal company or by the Lehigh Valley Railroad Company. The sediment has always been there since the paper mill was run (Book, p. 57, line 23). The evidence of Mr. Powers, the superintendent of the canal, shows that he gave verbal notice on two or three occasions to Mr. Boyne, the superintendent of the defendant company, that he objected to their running solid matter into the canal (Book, p. 63, lines 24

to 32), and that he gave instructions to the supervisor of that part of the canal to notify them to that effect (Book, p. 63, line 36). The evidence of Thomas Heaton, for the complainant, shows that whenever he saw any sediment coming in he used to mention the matter to Mr. Boyne and tell him it was his instructions to forbid it (Book, p. 65, bottom of page, and p. 66, lines 1 and 2). But it was never stopped. Heaton also complained to a man named McCarrick prior to the Diamond Mills going there (Book, p. 67, line 21). After these notifications they did better for awhile, and then would go on as before (Book, p. 66, line 22). It appears that the objection at that time was not to discoloration of the water, but only to sediment (Book, p. 70, lines 20 to 23). Boyne was the foreman of the Diamond Mills, and these verbal notices were never reported to Col. Thompson, the president of the company (Book, p. 125, lines 22 to 32). Notice in writing was finally given to the defendant in April, 1905 (Exhibit C 2, p. 377), and a few months before this suit was brought, and that was the first written notice that had ever been given to the defendant by the canal company or the railroad company that the defendant was polluting the water of the canal. Nor was any complaint made, Col. Thompson says, when the National Paper Company, with which he was connected, was running the mill, of the manner in which they used the feed water and discharged it into the canal, or of lime in the water (Book, p. 123, lines 19 to 25).

The water of the canal is not potable (Book, p. 130, line 29). Col. Thompson says: "We take out of our rack (for screening the water) all sorts of dead animals and offal of all kinds. It is fearful. We take out of our rack a great amount of stuff, and very filthy stuff, too" (Book, p. 130, lines 19 to 25).

In 1894, the Diamond Mills Paper Company bought the paper mill property at Bloomfield for \$27,000. The deed for the property included the grant of the water rights and privileges granted by Jonathan W. Potter to Southmayd & McCracken, above referred to

(Exhibit D 4, Book, p. 392). This right to use the feed water was valuable to the mill property. The grant to Southmayd & McCracken was in consideration of \$450.00 a year (Exhibit D 2, Book, p. 381, line 20). The water had always been used for power and for washing of stock, with the use of chlorine, or chloride of lime, and when it was discharged into the canal it contained a sediment (Book, p. 117, line 22 to bottom of page, and pp. 118, 119, 120, 121, 122, 123). Col. Thompson knew that and testified to it, and when his company, the defendant, bought the property in 1894, including the water rights, it proceeded to use it in the same way, without any complaint from the canal company or the railroad company until this complaint was brought (Book, p. 125), and without any complaint from Mr. Oakes until five or six years ago.

The complainants do not bring this suit because the cause of complaint has increased. There is less cause for complaint than there has ever been. Col. Thompson says that, prior to the time the National Paper Company used that mill, it was used by Fulton and other owners; that they made jute wrapping, and they had to bleach pretty strong. They used more lime (Book, p. 121, lines 10-11). He says his company does not use one-tenth; I don't know as one-twentieth the quantity of bleach they used to the same amount of stock (Book, p. 122, lines 18 to 23). Again, he says, that four or five years ago his company used to let the lime residue or chlorine, the settlings, into the canal, into the race-way. After the complaint from Mr. Oakes they took that out and let it settle in large vats, and shoveled it out and carried it out and emptied it outside (Book, p. 125, lines 33 to bottom of page; p. 126, lines 1 to 4). This testimony is corroborated by Mr. Ralph Thompson. He says (Book, p. 145, bottom of page, and p. 146): "Some years ago the insoluble matter at the bottom of our bleach tank was allowed to go into the tail-race. A complaint was made about that and it was stopped. There is no connection now with the lime tank and the tail-race; in other words,

between the lime tank and the canal. The water is now emptied outside the mill into the pit, where the water drains away, or rather it goes from there into another pit, where the water goes away and leaves a sticky mass of white insoluble salts of various chemicals of lime, principally calcium probably, and that is carried away and dumped away from the canal." He does not say who made the complaint, but it must have been the complaint Col. Thompson referred to in the letter of Mr. Oakes. The complainants' witnesses admit that the trouble is not increasing, but rather decreasing. Mr. Thomas Oakes admits that the trouble was worse in Fulton's time (Book, p. 97, bottom of page). Again he says (Book, p. 101, lines 6 to 12), that taking the things that come from the overflow, the opening of the floodgates at the aqueduct: "I don't think that the trouble is increasing lately." On the same page, lines 18 to 22, he says: "I cannot say whether the pollution from the Diamond Mills has been increasing, but from the looks of the canal I should say it was increasing." But Mr. George Oakes says that the trouble always existed as long as he remembers (since 1896), but that it has decreased since last fall (Book, p. 103, lines 30 to foot of page; p. 104, lines 1 to 15). Mr. Frank Oakes, who has been in the Oakes' mills since 1884, says that he does not think that the trouble has been increasing since the Diamond Mills Paper Company took the mill (Book, p. 109, lines 25 to 28). He says: "We have had very little trouble since last fall" (Book, p. 109, foot of page). Mr. Ward testifies as to the manner in which the mill was used in Fulton's time. He says the water after it was used all went into the lower level at the foot of the plane; and it used to be in a pretty bad condition in those days; that it was dirty, muddy, white, with everything else in it that went out of the mill, and with fibers of stuff (Book, p. 342, lines 10 to 30); that there was lime in it at that time, far more lime than there is now (Book, p. 343, lines 10 to 13); that at that time there was no pit to keep the lime from going into the canal; that the lime was emptied right

out of the tank (Book, p. 343, lines 18 to 28); that there was this rotary beater at that time; they had four of them, and they would be emptied twelve or thirteen times a week (Book, p. 343, lines 30 to 34); that now they have two and sometimes three cookings a week out of one boiler (Book, p. 343, foot of the page). He also says that in Fulton's time they handled a good deal more stuff. ^{and more of it} They made heavy paper, and now ^{they make tissues} ~~out of one boiler~~ (Book, p. 343, ^{lines 1 to 5} foot of the page). He also testifies that the solid lime is now run into a pool by itself (Book, p. 346, lines 1 to 23).

The rotary boiler referred to was used for cooking stock used in making paper. Water was put into it and ordinary papermakers' lime, and this made a milk of lime (Book, p. 150, lines 33 to foot of page). To this alkali, soda ash was added (Book, p. 149, lines 28 and 29). Part of the stock used in making paper was put into that boiler (Book, p. 149, foot of page) and there cooked. The Court below suggested on the hearing that the whole trouble was caused by the rotary boiler used by the defendant going into the tail-race (Book, p. ¹⁰² 125, line 20), and that they might be diverted and run somewhere else, and the defendant, after the first hearing, made arrangements by which none of the contents of the rotary boiler can get into the canal (Book, p. 333, lines 18 to 23; p. 346, lines 24 to 32).

The evidence is undisputed that the water of the canal is not injured by the discharge from the Diamond Mills. Mr. Axtell says: "The canal water is in no way deleteriously affected" (Book, p. 409). His analysis of the water taken on two occasions at the head-gate of the Diamond Mills (before it enters the mill) as compared with the water at the foot of the plane, below the point of discharge from the mills, clearly shows that. The water seems to have increased in hardness, by reason of the discharge, from 4.5 parts per million to 4.6 parts per million in one analysis, and in another from 4.13 parts per million to 4.36 parts per million. The fixed solids (including lime) seem to

have increased by reason of the discharge from the Diamond Mills from 54 to 61 parts per million in one case, and from 63 to 64 parts per million in the other case (see Exhibit C, Book, p. 410). *But this increase is inconsiderable*

This water of the canal as it leaves the Diamond Mills is much softer than the water of the pond of Thomas Oakes & Company (about twice as soft), and also contains a much smaller percentage of fixed solids, composed of iron and other mineral matters. Compare table on page 412 of Book. ~~But this increase is inconsiderable~~

I.

The complainants, Thomas Oakes & Company, have failed to make out the case against the defendant. If they are injured at all, they are not injured by the defendant, but by the independent act of the canal company.

Mr. Thomas Oakes testifies that his company is injured, first, in this way: The excess of water in the canal flows over the sides of the aqueduct running over Third river, and in times of heavy rains they (the canal company) lift the gates there in the side of the aqueduct and allow the water to flow from the canal into our stream (Book, p. 92, lines 13-20). He says on such occasions they have trouble (Book, p. 100, lines 10-21); that on such occasions they can see white discoloration of the water (Book, p. 100, lines 15-22; p. 108, lines 12-15); that the Clarke test which they made to determine the hardness of the water at the foot of plane No. 11, shows $27\frac{1}{2}$ degrees (Book, p. 111, lines 10-20) as against 10 to 12 in Third river (Book, p. 111, lines 1-2), and as against 6 to 8 in the canal above the Diamond Mills (Book, p. 110, lines 23-25). They cannot use it when it is over 14 to dye any color except black (Book, p. 107, lines 103). In other words, their theory is that the water of the canal which escapes from the gates into Third river contains lime and makes the water hard and unfit for use by Oakes & Company.

This evidence is unreliable, and does not convince the mind in view of the other testimony. It should be borne in mind that the Third river water, according to the testimony of the complainants' witness, Dr. Schweitzer, "is just on the limit, just on the edge of being used at all for dyeing purposes" (Book, p. 283, lines 21-40). Dr. Woodman testifies that the hardness of the water varies with the different seasons of the year—the drier the weather the harder the water (Book, p. 263, lines 20-32); and Mr. Axtell testifies that during the spring and summer months the total solids in such waters frequently amount to from 200 to 250 parts per million (Book, p. 409, lines 12 to 20). It also appears that the amount of water that goes into Third river at the overflow at the aqueduct varies. "When you pass a boat over the canal it swells, caused by the boat entering the foot of the plane (Book, p. 39, lines 30-40), and the quantity is greater in the summer season, the season of navigation, when the boats are moving" (Book, p. 40, lines 20-25).

It is quite probable that this water in Mr. Oakes' pond, just on the limit or edge of being used at all, became unfit for use in the summer months by reason of drought; and that, occurring at a time when the boats were running on the canal, and the gates were lifted and the canal was overflowing into Third river, caused Mr. Oakes to attribute the trouble to the lifting of the gates and to the overflow of the water rather than to the increase in hardness of the water due to the summer drought.

This impression was heightened by the fact that he and his witnesses thought that they could see the lime in the water; but on cross-examination they admit that they saw a discoloration, but could not say that it was caused by the lime (Book, p. 108, lines 20-33). As a matter of fact the testimony shows that the discoloration is caused from the little particles of fiber in the water (Book, p. 222, lines 29-30). Dr. Schweitzer's testimony (Book, p. 276, lines 3-10).

The only way to show the amount of lime in the

canal water is by chemical analysis of it. The complainants give us a soap test of this water—the Clarke test—which shows hardness $27\frac{1}{2}$ degrees, but this soap test is an empirical test at best—not always exact—and it is based on a supposition (at least it was in this case) that hardness of water is due entirely to lime, whereas it may be one of half a dozen other bases, such as aluminum, iron magnesium and manganese, all of which cause hardness in water, and of which minerals iron is the worst, so far as its effect on water for dyeing purposes is concerned (Mr. Axtell's testimony, Book, p. 297, line 4, and p. 298, lines 1-24). Mr. Oakes' soap test, inexact as it is, is the only proof presented by the complainants that the water of the canal as it spills over the aqueduct into Third river, might injure the water of that river for dyeing purposes, but that test is contradicted by Mr. Axtell's soap test, which shows the hardness of the water of the canal at the foot of plane No. 11, taken January 26th, 1906, to be 4.600 parts per million and 4.36 parts per million (Exhibit C, Book, p. 410, foot of page); and that the water taken from the pond at the intake to Oakes' mill on the same day was about twice as hard (Exhibit C, Book, p. 412, line 18).

Several things should be noticed about this report of Mr. Axtell, of his first analysis of the water taken January 26th and May 8th, 1906. First, it is the report of an expert chemist, and is therefore entitled to greater credit than the soap test of Mr. Oakes, made by a man who is not a chemist. Secondly, it is checked by the analysis made by Mr. Axtell, which shows the fixed solids found in the water he analyzed.

That analysis shows in canal water at foot of plane No. 11—

 Taken January 26th, 1906—Fixed solids, 61.000 parts per million.

 Taken March 8th, 1906—64.00 parts per million.

 And in water from pond at the intake of Oakes' mill—

 Taken January 26th, 1906—95.00 parts per million.

Taken March 8th, 1906—76.00 parts per million.

Now the fixed solids consist of mineral matter. They are ascertained by evaporating the known weight of the water and burning off the organic matter, which leaves the mineral in a platinum condition, and then weighing it with delicate scales. And that is the one real way of fixing the hardness (Axtell's testimony, Book, p. 214, lines 35-36).

On page 297, lines 10-20, Mr. Axtell says that lime was included in the fixed mineral water—fixed solids—in his first report.

So that not only by the empirical soap test, but also by the analysis showing the amount of fixed solids containing lime and other minerals, the water of the canal at the foot of the plane, after it leaves the Diamond Mills, is softer than the water of Oakes' pond, and its overflow into the river, and thence into the pond, would be of benefit to Mr. Oakes and his partners, rather than an injury to them.

It should be further observed that the complainants have accepted Mr. Axtell's analysis of the canal water. On page 262 of the Book, the Court asked for the complainants' analysis of the canal water. Judge Collins replied: "We didn't have that; that was proved by Mr. Axtell last time; we don't question that" (line 26 to foot of page).

It is also alleged by the complainants, Thomas Oakes & Company, that they are injured by the discharge of the wheel pit of the canal company in the Third river, when the canal is cleaned in the spring of the year. This, Mr. Oakes says, is the most serious trouble (Book, p. 92, lines 25-40). The sluice-way running from the wheel pit is opened and the thick sediment, mud and lime, are allowed to run into Third river, and it is very thick and strongly charged with lime; and the result is that last year, April or May, there was so much lime in it that we could not color

anything for six weeks except black (Book, p. 93, lines 1-10).

But the contents of this wheel pit were discharged from the sluice-way on the 5th of April, 1906, during the progress of the first hearing in this cause. This was done in the presence of the Court and counsel. Samples of the sludge and mud which were allowed to run into Third river, as well as the water from the wheel pit, were analyzed, and were found to contain large quantities of lime. They also contained iron, aluminum, magnesium, &c. (Book, pp. 259, 414). After this discharge of the contents of the wheel pit into Third river, further testimony was taken in the case. But there was no testimony offered on the part of the complainants that this discharge caused Thomas Oakes & Company any injury whatsoever. Instead of testifying that they were injured by this discharge, Thomas Oakes & Company offered the testimony of experts that in their opinion such discharge would injure them. On the other hand, it is in evidence that on the 3d of May, 1906, four weeks after the discharge of the contents of the wheel pit into Third river, and thence into Oakes' mill-pond, the water taken from the mill-pond at the intake to Oakes' mill was analyzed by the complainants' chemist and found to be almost identical with the water taken on the same day from Third river, above the Diamond Mills (Book, p. 272). The complainants have not only not proved any injury to Thomas Oakes & Company from the discharge of the wheel pit in April, 1906, but they have gone far towards proving that there was no injury to them from that source.

However that may be, the sole remaining possible source of injury to Thomas Oakes & Company would seem to be the discharge of the contents of the wheel pit of the canal into Third river. But this is the independent act of the canal company, or its lessee, the Lehigh Valley Railroad Company. They did this for their own convenience in cleaning the canal, and not from necessity. If this method of cleaning the canal

is the only method practicable, the complainants should show this, but they have not done so. On the other hand, it appears that there is no difficulty about cleaning the canal or the wheel pit without causing this pollution of Third river. Mr. Powers testifies that there is a lock a mile below this (Third river) aqueduct, and that they draw most of the water from there (Book, pp. 57-58). This lock is at Second river. For the purposes of cleaning they can draw the water from there, but they cannot draw it off at the foot of the wheel pit. They were obliged to draw it from the wheel pit at Third river (Book, p. 59). The water in the wheel pit, Mr. Powers says, is about three feet deep (Book, p. 50). That this water can be pumped out of the wheel pit on to the bed of the canal below, or that, as the Vice Chancellor suggested, it may be flushed out with a heavy flow of water and allowed to wash, together with the sludge or mud, in the wheel pit, further down the canal, is quite apparent. But it is for the complainants to find a way of cleaning the wheel pit, which will not injure Oakes & Company, and to adopt it, or at least to show there is no way; and they have done neither.

The result is that Thomas Oakes & Company, if they are injured at all, are injured by the independent act of the canal company or its lessees in discharging, once a year, this water from the wheel pit impregnated with lime, iron and other minerals, and the sludge and mud of the wheel pit, also containing lime and iron and other minerals, into Third river.

Assuming, then, for the sake of argument only, that the defendant had no right to deposit lime or material bearing lime into the canal, this act by itself would not injure Thomas Oakes & Company. The injury was caused by the canal company or its lessees, who discharged the lime into the Third river.

In *Cooley on Torts*, p. 68, the author says: "If an injury has resulted in consequence of a certain wrongful act or omission, but only through or by means of some intervening cause, from which last cause the in-

jury followed as a direct and immediate consequence, the law will refer the damage to the last or proximate cause and refuse to trace it to that which was more remote." And, on p. 70, he says: "If the original act was wrongful and would naturally, according to the ordinary course of events, prove injurious to some other person or persons, and does actually result in injury through the intervention of other causes which are not wrongful, the injury shall be referred to the wrongful cause, passing by those which are innocent. But if the original wrong only becomes injurious in consequence of the intervention of some distinct wrongful act or omission by another, the injury shall be imputed to the last wrong as the proximate wrong, and not to that which was more remote." Citing the Squib case, *Scott vs. Shepherd*, 3 Wil. 403; *Morrison vs. Davis*, 20 Pa. St. 171; *Michaels vs. N. Y. Cen. R. R.*, 30 N. Y. 564. *See also Buff v. Newark* 6 Vr. 32 & 33.

But, as pointed out by the Vice Chancellor, the deposit of lime water into the canal was not inherently injurious to the canal. The canal is not a stream of potable water. It is a very dirty stream, polluted by dead animals and decaying vegetable matter. To deposit lime water into it would not injure it, and there is much force in the ruling of the Vice Chancellor that the parties secondarily injured shall not be allowed to go back to the original cause of the injury when the original act was not a wrongful act in itself, as in the case of the original thrower of the squib.

It is submitted that the bill should be dismissed as to Thomas Oakes & Company.

If the bill is dismissed as to Thomas Oakes & Company, there would seem to be nothing left of the case even from the complainants' point of view. Judge Collins stated repeatedly during the course of the hearing that the purpose of the suit was to protect Mr. Oakes (Book, p. 350, lines 29-40; Book, p. 351, lines 1-4). It now appears that Thomas Oakes & Company

are not injured by the defendant, but by their co-complainants. The defendant has done everything it reasonably could do to carry on its business, so as not to injure Oakes & Company. Let the canal company do the only thing that there is left to do, and dispose of the contents of their wheel pit as we suggest.

But if the canal company should insist on their larger claim, and should ask an injunction against the discharge of sediment into the canal, we reply: 1. So far as the sediment consists of vegetable and other organic matter we do you no injury, because we carefully screen your water at our intake (Book 1, pp. 142-144, lines 22 to 40), and, as a matter of fact, we discharge into the canal less sediment ~~from that source~~ than we take out of it (Book, pp. 180, 181 and 182, lines 20-31).

2. So far as the sediment is alleged to consist of lime, we have not for years discharged any solid lime or other solid matter into the canal from our bleaching tanks, but have disposed of it elsewhere, and now have taken other means, at the suggestion of the Court, to prevent any discharge from our rotary boiler into the canal.

3. The evidence shows that ashes and mud or sand are washed into the bed of the canal and in your wheel pit (Book, p. 77, lines 16-30; p. 78, line 36; p. 84, line 26), and there is no doubt that you would have to clean it occasionally even if we stopped business.

So we do no injury by this discharge of sediment, and you have admitted that by your conduct. You have allowed it to go on for many years without any protest, except as to the discharge of solid matter.

But further the complainants are precluded in equity from obtaining the injunction they ask for. 1. By their contract with Unangst, which has been in part assigned to the defendants, and the construction given to that contract by all the parties. 2. By adverse user for over twenty years by the defendant. 3. By long acquiescence by the complainants in the acts they now complain of, and 4. Because the complainants have a remedy at law.

I.

The Practical Construction of the Unangst Contract.

The language of the contract of 1858 is very vague and indefinite. The feed water of the canal is to be used as it is or may be passed around plane No. 11. It is to be used as it has ^{been} or shall be fed around the plane, and after it is used it shall be conveyed by the lessee to the canal. It is to be used in such manner as not to impede navigation. The purpose and manner of the use of the feed water are no further specified. Is it to be used for manufacturing purposes? The agreement is silent, but the water of the canal is not potable, and it always has been used for manufacturing purposes in this mill. That fact furnishes a practical construction of the contract.

Is the feed water to be returned to the canal without change in its condition and without any sediment? This is impossible. There would be some sediment from the washing of the mill wheel alone. Referring to the contract we find that it is silent upon this point, except that there is a provision that the navigation of the canal shall not be impeded. But as a matter of fact the water always has been returned to the canal, since 1867, containing sediment, and there was no serious objection to this course except when the sediment consisted of solid matter (Book, p. 63, line 30), and then only by a verbal protest made, not to the mill owners, but to their employes. The objection to the discharge of solid matter into the canal was probably because it might impede navigation. But even that practice was not stopped by the canal company. Here again we have a practical construction of the contract that the water may be used as it has been used since 1867, and that it may be discharged into the canal containing sediment, but not so as to impede navigation.

The construction which the parties have by their acts placed on an ambiguous instrument is entitled to

great if not controlling weight in the determining of its appropriate construction. *Chicago vs. Selden*, 9 Wall. 50; *Topliff vs. Topliff*, 122 U. S. 121; *District of Columbia vs. Gallagher*, 124 U. S. 505; *Nearpass vs. Newman*, 106 N. Y. 47-55; *Helme vs. Strater*, 7 Dick. 603; *Robinson vs. U. S.*, 13 Wall. 363.

In *Chicago vs. Selden*, 9 Wall. 50-54, the North Chicago Street Railway company made a contract with the city of Chicago in which it was provided that "the said company shall, as respects the grading, paving or macadamizing, filling or planking of the streets * * * upon which they shall construct their said railways * * * keep eight feet in width along the line of the said railway * * * in good repair and condition during all the time to which the privilege hereby granted shall extend in accordance with whatever order or regulation respecting the ordinary repairs thereof may be adopted by the common council of said city."

The main question was whether, under this contract to keep the road for a certain number of feet "in good condition and repair," the company could be made to pay for what was a new curbing, grading and paving altogether.

It appeared that some of the streets occupied by the company had formerly been graded, curbed and paved without any attempt being made by the city to assess the railway corporation for their costs.

The Court held (Mr. Justice Nelson) that the company were not to grade, pave, macadamize, fill or plank * * * except so far as such work came within the category of repairs.

In the course of the opinion, Mr. Justice Nelson said: "In cases where the language used by the parties to the contract is indefinite or ambiguous, and hence of doubtful construction, the practical interpretation by the parties themselves is entitled to great if not controlling influence. The interest of each generally leads him to a construction most favorable to himself, and when the difference has become serious and beyond amicable adjustment, it can be settled only by the ar-

bitrament of law. But in an executory contract, and where its execution necessarily involves a practical construction, if the minds of both parties concur, there can be no great danger in the adoption of it by the court as the true one."

Topliff vs. Topliff, 122 U. S. 121.

In this case the Court held that a contract made in 1870 relating to the manufacture and sale of bows and bow sockets for carriage tops, for which one of the parties had obtained letters patent in 1870, which were referred to in the contract, extended to the manufacture of the same article under letters patent, obtained in 1875, that having been the practical interpretation put upon the contract by the parties down to the year 1879.

District of Columbia vs. Gallagher, 124 U. S. 505.

When in the performance of a written contract both parties put a practical construction on it which is at variance with its literal meaning, that construction will prevail over the language of the contract.

In this case the defendant in error having, under a written contract with the agents of the plaintiff in error, constructed a sewer which, in the course of construction, was by mutual consent and for reasons assented to by both parties made to vary in some respects from the plans which formed part of the contract, but without any agreement as to change in the contract price, it was held that the judgment of the court of claims awarding the contract price for the work be affirmed.

Robinson vs. U. S., 13 Wall. 363.

The plaintiffs contracted with the government to deliver 1,000,000 bushels of first quality clear barley without stating any particular manner in which the barley was to be delivered, as whether in sacks or loose, and in what is known as bulk. Under this contract they delivered in sacks all of the barley required to be de-

livered from July 1st, 1867, to January 1st, 1868. On the 10th of January he undertook to deliver 30,000 in bulk; that is, loose in wagons. The government refused to receive it. Robinson abandoned his contract and the government brought suit.

The Court held that "it is obvious by the steps which the plaintiffs took to perform their contract that there are two modes in which barley may be delivered, for they delivered part in sacks and tendered part in bulk. And it is equally obvious, on account of the additional cost, that they would not have delivered the barley in sacks for a period of six months if the contract on its face was satisfied by a delivery in bulk.

The judgment of the Court below in favor of the government was affirmed.

Nearpass vs. Newman, 106 N. Y. 47, involved the construction of a certain conveyance and agreement, and the Court said (on page 55): "The practical construction given to this conveyance and agreement by the subsequent dealings and conduct of the parties, and the various contracts executed between them, is quite controlling as to their intention in making it."

Helme vs. Strater, 7 Dick. 591.

This case involved the construction of a will and also an agreement which the Chancellor said were crude and inaccurate in expression. After construing the agreement the Chancellor (McGill) said: "This is hardly the grammatical construction of the sentence in which the enigmatical words occur, but it is not only what I conceive to be the underlying intent, but also the practical construction which the parties to the agreement put upon it in this settlement in February, 1893. The Court then quotes the words of Mr. Justice Nelson above quoted in *Chicago vs. Selden*, 9 Wall. 50, and also the cases of *Topliff vs. Topliff*, *District of Columbia vs. Gallagher*, *Nearpass vs. Newman*, above cited, and adds that "this rule has been frequently ap-

plied in this State when the descriptions in grants of land are ambiguous."

I submit that the defendants are permitted by the practical construction which has been put upon the contract by all parties to it to ~~discharge the feed water~~ ^{use the water of the canal for power and for treating stock and} into the canal, after use, containing sediment, so long as they do not thereby impede navigation. By their acts the complainants have assented to this construction. They have permitted this use ever since the year 1867. Their only objection was to solid matter—to lime in its crude condition. But this has not been discharged into the canal for years. The sediment that is now discharged consists of very fine linen or cotton fibers that have passed through wire screens 80 and 100 meshes to the inch (Book, p. 145, line 20). This fiber does not fill up the bed of the canal. It is so unpalpable that when it is touched by any vessel for the purpose of gathering it, it dissipates (Book, p. 158). And it is much less in amount than ever before. #

II.

The defendant, if it has no right under the contract of 1858 to use and discharge the feed water of the canal, as it is now doing, has acquired such right by adverse use against all the complainants.

In *Beach vs. Sterling Iron and Zinc Co.*, 9 Dick. 76, Vice Chancellor Pitney recognizes the right of persons to pollute even a natural stream by adverse use or otherwise.

In *Ross vs. Butler*, 4 C. E. Gr. 306, the Court (Chancellor Zabriskie) said: "Some part of a town may, by lapse of time or prescription, by the continuance of a number of factories long enough to have a right as against everyone, be so dedicated to smells, smoke, noise, dust, that an additional factory which adds a little to the common evil would not be considered at law a nuisance or be restrained in equity."

In *Shields vs. Arndt*, 3 Gr. Ch. 235, it was held that

The water cannot be used for treating stock and returned to the canal except with some sediment in it, and possibly some chloride of lime, or chlorine. Therefore to grant the injunction would be to prevent the use of the water for treating stock. But that has been done under the contract for forty years.

“any particular use of water or diversion from its accustomed channel for twenty years will raise the presumption of a grant.”

In *Hulme vs. Shreve*, 3 *Gr. Ch.* 116, it was decided that “the right to flow back-water acquired by prescription is as absolute as any other right.”

And further: “The Court will not by injunction ~~re-laid down: “Where there has been an enjoyment of a~~ ^{strain a defendant from the use ailed.} work constructed with the express or implied assent of the complainant, though it prove prejudicial to his rights.”

In *Shreve vs. Voorhees*, 2 *Gr. Ch.* 32, the rule was laid down: “Where there has been an enjoyment of a stream of water in a particular mode for a long time without interruption on part of the proprietors, their natural rights may be seriously impaired or even lost. The person in possession is considered as having acquired a title and as having a right to remain undisturbed in his possession as he has held and enjoyed it. In England the lapse of time necessary to secure this right is twenty years. * * * The same principle has been adopted and acted upon in this State.”

In *Holsman vs. Boiling Spring Bleaching Co.*, 1 *McCart.* 335, the defendant claimed the right to pollute the waters along the complainants’ land, and the Court examined the evidence, and denied the right only because it was not proved in that case.

The feed waters of the canal have been used in this mill ever since 1865 in the manufacture of paper, and then have been discharged into the canal containing a fibrous sediment and lime or chloride of lime. The complainants have never interrupted this use. They have acquiesced in it. The only interruption of this use occurred in 1889 or 1889, after it had continued for more than twenty years.

The verbal protests of the complainants we have shown related to “solid matter,” and not to the fibrous sediment now discharged. But mere protests and denials of right, complaints, remonstrances or prohibition against user, unaccompanied by any act which

would amount to a disturbance and be estimable as such, will not prevent the acquisition of a right by prescription. They rather add to the strength of the claim of the prescriptive right. *Lehigh Valley R. R. Co. in McFarlan*, 14 *Vr.* 606-630.

III.

The complainants are estopped in equity from obtaining the relief they seek by long acquiescence, though it may be for less than twenty years, in the practice which they now seek to enjoin. This ~~point~~ ^{point} is made as to all of the complainants.

The leading case on this subject in this State seems to be *Carlisle vs. Cooper*, reported in 6 *C. E. Gr.* 576. The bill was filed by Eliza Carlisle and others to ascertain and settle the height at which the defendant, Cooper, was entitled to maintain his dam and to enjoin the defendants from overflowing the complainants' lands with the back-water from the dam of the defendant. The position was taken in that case that the complainants had lost their rights to relief by long delay. The Court said on this subject (Mr. Justice Depue speaking for the Court of Errors), page 951: "Mere delay in applying to the Court is frequently a ground for denying a preliminary injunction, and is also a reason for courts of equity refusing to take cognizance of a case, where there is a remedy at law. But where the legal right is settled, and the more efficacious remedy of a court of equity is necessary to complete relief, delay is no ground for a denial of its aid, unless it is coupled with such acquiescence as derives the party of all right to equitable relief. A person may so encourage another in the erection of a nuisance as not only to be deprived of the right of equitable relief, but also to give the adverse party an equity to restrain him from recovering damages at law from such nuisance. *Williams vs. Earl of Jersey*, 1 *Cr. & Ph.* 91. So a party who knowingly, though passively, encourages

another to expend money under an erroneous opinion of his rights, will not be permitted to assert his title, and thereby defeat the just expectation upon which such expenditure was made. *Dann vs. Spurrier*, 7 Ves. 231; *Rochdale Canal Co. vs. King*, 2 Sim. (N. S.) 78; S. C. on final hearing; 21 Eng. L. & Eq. 178; *Ramsden vs. Dyson*, L. R. 1 H. of L. 140; *Dawes vs. Marshall*, 10 C. B. (N. S.) 697; *Wendell vs. Van Rensselaer*, 1 Johns Ch. R. 354; *Ross vs. The E. & S. R. R. Co.*, 1 Green Ch. 422; *Hulme vs. Shreve*, 3 Green Ch. 116; *The Morris and Essex R. R. Co. vs. Prudden*, 5 C. E. Gr. 531; *The Raritan Water Power Co. vs. Veghte*, ante p. 463.”

The case of *Rochdale Canal Company vs. King*, 2 Sim. (N.S.) 78; S. C., on final hearing, 21 Eng. L. & Eq. 178, quoted ~~as above~~ by Mr. Justice Depue, is particularly in point. The plaintiffs were a canal company incorporated by the 34th Geo. III, c. 78, and moved to restrain the defendants, the owners and occupiers of a cotton mill near the banks of the Rochdale canal from drawing water from the canal for any other purpose than that of condensing steam. The 113th section of that act under which the plaintiffs were incorporated provides that the owners of land within the distance of twenty yards from the canal may make communication between the water of the canal and any steam engine by means of pipes, and draw from the said canal such quantities of water as shall be sufficient to supply the said engine or engines with cold water for the sole purpose of condensing the steam used for working any such engines as aforesaid; provided always, that the proprietor of every such engine shall return to the canal in every day in which he shall use such engine, a quantity of water, on the same level in which it shall be taken, equal to the quantity so taken in every such day from the said canal (the inevitable waste thereof by condensing such steam only excepted), so that no obstruction shall arise therefrom to the navigation; provided also, that such water so taken shall be applied to the working of the said engine and to no other purpose.”

The plaintiffs first brought a suit at law in which they complained that the defendants drew large quantities of water from the canal which they ought to have used for the sole purpose of condensing the steam used for working their engines; nevertheless they had used it for other purposes. Judgment was given for the plaintiff with one shilling damages. Then the bill was filed setting up the same facts and the further fact that the defendants continue in defiance of the judgment to abstract and use the water of the canal for other purposes than the condensing of steam in working the engines in their mill, and praying an injunction to restrain them from so doing, without returning daily an equal quantity of water on the same level, the inevitable waste by condensing the steam excepted.

The motion for the injunction was resisted, mainly on the ground that the plaintiffs had by acquiescence precluded themselves from asserting the legal right on which they insist. It set forth by their answer that the mill was built in 1830 by James King, the father of the defendant King; that it was well known to the plaintiffs that King erected the mill in the belief that he might lawfully take and use, and that ever since that time he and the defendants deriving title under him have in fact taken and used, the water of the canal for all purposes for which they had need of it, and not merely for condensing steam, and that all this was well known to and acquiesced in by the plaintiffs, and that they were cognizant of the great expense incurred.

The court (Lord Cranworth, Vice Chancellor) said: "Now, unquestionably if this be true the plaintiffs can have no relief in this court. Such conduct, even if it be not sufficient to sustain a plea of leave and license in bar to an action, certainly incapacitates the plaintiffs from obtaining any assistance *in a court of equity*. It is not necessary to go further and say whether it would not entitle the defendants to restrain them from proceeding at law according to what was stated by Lord Eldon in *Barret vs. Blagrove*.

The court held also that the evidence of long-contin-

ued use of the water for all purposes may be very important, as tending to satisfy the court that when the mill of the defendants was erected the plaintiffs must have known that King, who was building it, was laying out his money in the expectation that he would have the same privilege of using the water as was enjoyed by all his neighbors.

Rochdale Canal Co. vs. King, 21 *L. & Eq. Reps.* 178. This is the same case as last above stated, on appeal.

In 1794 an act of parliament was passed empowering a company to make and maintain a canal, and the act provided that "It should be lawful for the owners of lands within the distance of twenty yards from the canal to take water from the canal for the sole purpose in condensing the steam used in working any engine, but for no other purpose." The defendants were the owners of two mills, one of which was begun in the year 1829, and during the erection of it an application was made by the then owners to the company to be allowed to lay down pipes from the canal to his engine-house to convey water for steam and injection. No objection was made by the company that the use of the water should be confined to condensing purposes; and the owner with the knowledge of the company, and under the superintendence of their engineer laid down pipes for both of the above purposes. After the lapse of several years an action was brought by the company against the owners of the mill for getting water for other than condensing purposes; and they obtained a verdict with damages and then filed a bill for a perpetual injunction.

Held, that the company were precluded by acquiescence from disputing the right of the owners of the mill to obtain water for both the above purposes.

As to the use of water for both purposes in the other mill, the court held there was no acquiescence.

These cases are important as showing that even where the acquiescence is in the doing of a thing which the complainants had no right to permit, it will still estop them. The Rochdale Canal Company had no

authority by the act of parliament under which it was incorporated to permit water to be drawn from their canal for any other purpose than that of condensing steam. Yet the defendants used it for all purposes for which they had need of it, and because the complainants had acquiesced in this they were precluded from obtaining any relief in a court of equity.

In the case *sub judice* the charter of the Morris Canal and Banking Company (P. L. 1824, section 27, p. 158) authorized them to take or appropriate only such lands and waters as are actually necessary for the use of such canal for purposes of navigation only, and provided that they shall not be authorized to demise, grant, alien or sell any such lands, waters or streams taken or acquired for the use of the said canal as aforesaid, or any part thereof to any person or persons whomsoever, and that the said corporation or any other person shall not be authorized to use or appropriate any part of said waters for mills or any other purpose than the mere navigation of the said canal.

Afterwards in 1836 (P. L. 1836, p. 262) there was an amendment of the charter of the company which provided, section 2, "that the 27th section of the act to which this is a supplement shall not be so construed as to prohibit or prevent the said Morris Canal and Banking Company from letting to use the water necessary for the purposes of the canal in working other machinery than that necessary for the plains between Boonton, in the county of Morris, and the Passaic at Newark, but no other person or persons shall appropriate the waters of the said canal without the consent of said company.

And again by further supplement to the charter of the canal company, approved March 17th, 1871 (P. L. 1871, p. ~~142~~¹⁴⁴), authority was given to the Morris Canal and Banking Company to lease the canal, boats, property, works, &c., and to the canal company or its lessee to use the surplus water of the canal or any of its feeders, not needed for the purpose of navigation, in furnishing and supplying the inhabitants of any city,

&c., along the line of the canal, with a sufficient quantity of pure and wholesome water for manufacturing and domestic and other uses.

There was no authority when the charter was passed to let the water of the canal. There was perhaps only doubtful authority to do so in the supplement of 1836, and it was while this act was in existence that the contract of 1858 was made. But under the act of 1871 the authority seems to be given to make contracts of this kind. So that our case is much stronger than the case of *Rochdale vs. The Canal Company*, in which there was no authority by the statute for the use of the water of the canal in the manner sought to be enjoined by the complainants. (P. L. 1871, p. 445, sec. 3.)

The case of *Wood vs. Sutcliff*, 8 *Eng. L. & Eq. Reps.* 217, is also in point.

The injunction asked for in this case was to restrain the defendant Sutcliffe from pouring into a stream or beck called the "Bowling Beck" by means of a channel which connects his works with the beck, any dye wares or dye liquors, or madder, indigo or potash, or matters of that description, or any other matters which tend to pollute the stream to the damage of the plaintiffs' works. The plaintiffs, more than twenty years before the suit began, established their works on the stream, they being worsted spinners and the stream then being pure, and insisted that they had acquired by long use as against all new-comers a right to have the water still come to them in the same pure state. It appeared that Sutcliffe completed his works in the year 1845, and that by means of his dye works he polluted the stream by means of coloring matter and by the other matters which are held in suspension in the water as it floats down to the plaintiffs' mills. The plaintiffs brought an action and recovered a verdict, and judgment was entered in January, 1851.

The Court, V. C. Sir R. T. Kindersley, recognized the right which the plaintiffs insist they have, and also that a person may acquire another right, namely,

a right to pour his polluted water into the stream as against new-comers. The Court then considers whether the injunction should be granted in this case, and refused it, saying: "The principal ground upon which I conceive I must refuse this injunction is, I will not say the acquiescence of the plaintiffs, using that term in the active sense, but the fact that from the beginning of 1845 down to the beginning of 1850, the defendant was allowed to construct and use his dye works *for a period of five years* without a hint having been given on the part of the plaintiffs that he was doing anything which he had not a lawful right to do."

The Court then proceeded to argue that, from the nature of the case, the plaintiffs must have known that these dye works were building and should have given notice to the defendant; and that the defendant finding the stream already used by many persons could not be aware that he was infringing any right.

In case of *Williams and others vs. Earl of Jersey*, 1 Cr. & Ph. 91, the bill was filed to quiet the enjoyment of the complainants of certain copper works in the neighborhood of Swansea, and that the defendant might be restrained from prosecuting an action against them for an alleged damage to his lands occasioned by the works. The bill was demurred to.

The only allegations that the Court considered were to the effect that in the years 1810 and 1811 the complainants erected extensive copper works on part of the land in question and had ever since used the same without interruption or disturbance. The remainder of the same piece of land was not so applied until the year 1829, when the plaintiffs, having obtained a lease of it from the Duke of Beaufort, erected on it by his authority the copper works in question, called the Norfa Works. The bill alleged that during the erection of the last mentioned works, the defendant well knew or was aware of their being erected and made with a view to the smelting and manufacture of copper, and that he was also well aware of the deleterious effect

on vegetation produced by such manufacture, but that he nevertheless allowed the plaintiffs to proceed in the erection of the works and to expend large sums of money in completing and finishing them and in furnishing them with the requisite machinery and plant without making any objection thereto, and that he *acquiesced* in and encouraged the erection of such works and the expenditure of the plaintiffs upon or with respect to the same. The bill further alleged that ever since these works had been built and completed the smelting and manufacture of copper had been carried on therein without any interruption or disturbance, and without any complaint on the part of the complainant until the action at law was brought.

The Court overruled the demurrer, saying: "I think it quite clear that there is in this bill sufficient allegation to make it competent for the plaintiff to give such evidence as would operate in raising an equity against the title asserted by party claiming compensation at law for a nuisance.

In *Ocean City Association vs. Schurch*, 57 N. J. ~~L. & Eq.~~ 268, which was a suit to enforce a covenant to restrict the use which the defendant might make of his property, the Court (Vice Chancellor Gray) said: "In cases of this character it is the duty of a covenantee, if he desire to invoke the aid of this Court, to restrain breaches, to make his application with due diligence, else, because of his laches, a restraint will be denied him. *Roper vs. Williams*, 1 Turn. & R. 16, was a case where, under a general plan, a covenant restricting to a certain character of building was imposed upon the grantees of a common grantor. Repeated violations of the covenant were permitted for some four or five months, then a bill was filed against a later offending grantee, seeking to restrain him from building in disregard of the covenant. Lord Eldon declared that in cases of this nature *very little is sufficient to show acquiescence, and courts of equity will not interfere unless the most active diligence has been exerted*

throughout the whole proceedings. In every case of this sort the party injured is bound to make immediate application to the court in the first instance, and cannot permit money to be expended by a grantee even though he has notice of the covenant, and then apply for an injunction." See, also, *Peek vs. Matthews*, 3 Eq. Cas. L. R. 514.

Morris and Essex R. R. Co. vs. Prudden, 5 C. E. Gr. 530.

"Where a person entitled to a right in the nature of an easement encourages another, *though passively*, to acquire title and expend money on the assumption that that right will not be asserted, he will not be permitted in a court of equity to assert his right to the prejudice or injury of those who have been encouraged by his acquiescence to expend money on the faith that his right will not be exercised to defeat the just expectations upon which such expenditures were made, where such acquiescence has continued for the period of twenty years *or even less* his right will be extinguished by estoppel."

In *Raritan Water Power vs. Veghte*, 6 C. E. Gr. 475, Mr. Justice Bedle (in the Court of Errors) said:

"Where improvements of a permanent nature have been made by a person on his own lands, the enjoyment of which depends upon a right recognizable at law, affecting the land of another, and to which his consent is necessary, and where such consent is expressly proved or *necessarily implied from the circumstances*, and the improvements have been made in good faith upon it, equity will not permit advantage to be taken of the form of the consent, although not according to the strict mode of the common law, or within the statute of frauds, and to defeat such purpose will, upon proper bill filed, enjoin the licensor from accomplishing his fraud, or when he asks relief it will be refused, or if granted, will be allowed merely in the shape of

compensation, but protecting the right of the licensee." Citing *Rochdale vs. Canal Co.*, above cited, and other cases.

Even where the complainant appears in a public capacity the rule is the same.

High on Injunctions, Sec. 837, citing the following cases: *Atty. Genl. vs. N. Y. & L. B. R. R. Co.*, 12 *C. E. Gr.* 1; *Atty. Genl. vs. B. & B. R. R. Co.*, 12 *C. E. Gr.* 49.

In *Atty. Genl. vs. N. Y. & L. B. R. R. Co.*, the Chancellor said:

"Though a stronger case of delay is required to affect those who assert a public right than when a private right alone is in dispute, delay even in such cases is not without effect."

In *Atty. Genl. vs. B. & B. R. R. Co.*, 12 *C. E. Gr.* 27, there was a bill to abate a nuisance caused by the erection of a bridge across the Delaware river.

The Chancellor, in denying relief, said: "In the case before me there is no purpesture, the structure, which is for a public purpose and for the public advantage, is completed. It creates no impediment to the navigation of the river. It has been built bona fide and there is cogent evidence of *acquiescence* on the part of the State in the construction, which the defendants have put upon the law under which they have acted. Under such circumstances an injunction will not be granted. *Atty. Genl. vs. N. J. R. R. & T. Co.*, 2 *Gr. Ch.* 136; *Allen vs. Chosen Freeholders*, 2 *Beas.* 68; *Atty. Genl. vs. N. Y. & L. B. R. R. Co.*, 9 *C. E. Gr.* 49; *City of Georgetown vs. Alexandria Canal Co.*, 12 *Peters* 93, 98; *Atty. Genl. vs. United Electric Tel. Co.*, 30 *Beav.* 287; *Atty. Genl. vs. Eastern Counties Railway Co.*, 7 *Jur.* 806."

Traphagen vs. Mayor and Aldermen of Jersey City, 2 *Stew.* 208, was decided by Vice Chancellor Van Fleet, who said: "The Court will even refuse to exert its prohibitory power in aid of rights ~~and~~ asserted on be-

half of the State when it appears that its representatives, by silence and inaction, have *presumably* encouraged the outlay of large sums of money in the prosecution of an important public enterprise undertaken in good faith and which arrested would bring disaster upon its projectors.”

Atty. Genl. vs Sheffield Gas Consumers Co., 3 De Gex, McNachlen & Gorden, 304.

In this case, Lord Justice Turner said, p. 323: “With reference to this proceeding, so far as it is a proceeding by the Attorney General, I do not concur in the argument urged on the part of the plaintiffs that there is no ground for imputing delay, or that delay can have no influence on such a question as the present. In truth, the case as to the Attorney General stands thus: The works of this company were begun in October, 1851, and it is not until July, 1852, that the Attorney General takes any proceedings to restrain the execution of these works. In the meantime the company have been allowed to enter into contracts and take proceedings without any interference on the part of the Attorney General. That delay will affect the Attorney General as much as a private individual, I am not prepared to say, but in my opinion it is a circumstance to be considered in determining the question whether this Court shall interfere, although the application to the Court be on behalf of the Attorney General, and I ground myself in that opinion upon what fell from Lord Eldon in the case of *Attorney General vs. Johnson* (2 *Wils.* 87). In that case Lord Eldon distinctly states his opinion to be that delay is to be considered in determining a question of injunction, though the application may be by the Attorney General on behalf of the public. I think, therefore, that the case fails so far as the public are concerned.”

The bill was dismissed.

In the present case the owners of this mill have been permitted for over nearly forty years to use the water

in the manufacture of paper and to return it to the canal charged with some fibrous deposit and with lime or chloride of lime. They are required to return the water to the canal. They cannot return it after using it in their business, except with some sediment in it and possibly some chloride of lime and chlorine (Book, p. 129, lines 35 to 40, and p. 130). They have used it themselves and conveyed it again to the canal, just as they are doing now, since January, 1894, without objection from the Canal Company or the Railroad Company, until April, 1905, and without objection from Thomas Oakes & Company until five or six years ago. The bill in this cause was not filed until November 29th, 1905. Relying on the acquiescence of the complainants, they have spent \$114,000, more or less, in buying, enlarging and equipping their plant. ^{Book p. 124 & 132} It would, I submit, be inequitable to enjoin them under these circumstances, and it would be contrary to the well-established doctrine of this court.

IV.

The complainants should be left to their remedy at law. They have not only an adequate but an extraordinary remedy at law, if they have really suffered any injury by the acts of the defendant.

The 13th section of the charter of the Morris Canal and Banking Company provides: "If any person or persons shall in any manner wilfully and maliciously destroy, injure or obstruct said canal or any of its parts * * * to the detriment of said company, he, she or they shall be considered guilty of a misdemeanor, and being convicted thereof, shall be punished by fine and imprisonment, or both, at the discretion of the court," the fine not to exceed twenty-five dollars, the imprisonment not to exceed two years. The civil action for damages not to be impaired. P. L. 1824, p. 165.

In *Raritan vs. Port Reading R. R. Co.*, 49 Eq. 16, it

was held that "Where a grievance is a misdemeanor subject to indictment, equity will interfere with great reluctance, even though its intervention is sought by the Attorney General, and then only to prevent a very serious public injury."

In the case of the *Morris and Essex Railroad Company vs. Pruden*, 5 C. E. Gr. 530, the Court of Errors (Judge Depue) held: "The remedy by indictment being so efficacious, courts of equity entertain jurisdiction over public nuisances with great reluctance, whether their intervention is invoked at the instance of the Attorney General or of a private individual who suffers some injury distinct from that of the public."

In *Morris Canal and Banking Company vs. Fagan*, 7 C. E. Gr., the Court refused the injunction asked for because the remedy at law was adequate, and quoted with approval the remarks of Justice Depue in the case last cited.

This rule that a court of equity will not interfere where the remedy at law is adequate is more strictly applied where the complainant has not applied promptly for the relief which he seeks, is not in the full enjoyment of the right which he asserts, and that right is disputed. In *Carlisle vs. Cooper*, 66 C. E. Gr. 579, the Court of Errors, speaking by the late Chief Justice, considers the jurisdiction of a court of equity over nuisances. After stating the English doctrine that the court will not as a general rule entertain jurisdiction to finally dispose of a case where the right has not been previously established and is in any doubt, and the fact that that rule has been somewhat relaxed in this State, Mr. Justice Depue, speaking for the Court, considers the New Jersey cases apparently for the purpose of ascertaining the rule of our courts, and shows that in *Shields vs. Arndt* (3 Gr. Ch. 235) the complainant had been in the enjoyment of the flow of water upon his land without interruption until just before

the bill was filed. "In the other cases," the learned justice says, "in which Chancery has granted relief on final decree by injunction, the complainant was either in the full enjoyment of the right, which was protected from threatened invasion, when the bill was filed, or his right originally was not disputed, and its continued existence was clearly established at the hearing, and the act of the defendant which interrupted the enjoyment of it *had been done within a recent period before the bill was filed.* These considerations seem to be independent of the doctrine of equitable estoppel referred to in another part of the opinion.

The complainant's right to prevent us from discharging sediment into the canal, which shall not impede navigation, is disputed; it has not been asserted or enforced; if they ever had such a right they have slept on it for nearly forty years. No case can be found in this State in which an injunction has been granted under such circumstances. The complainants should be left to their remedy at law.

FRED'K T. JOHNSON,

For Defendant and Appellee.

New Jersey Court of Errors and Appeals.

Between

MORRIS CANAL & BANKING COMPANY, LEHIGH VALLEY RAILROAD COMPANY, and THOMAS OAKES, ET ALS., partners as Thomas Oakes & Co.,
Complainants-Appellants,

On Appeal from
Chancery.

AND

DIAMOND MILLS PAPER COMPANY,
Defendant-Respondent.

BRIEF OF COLLINS & CORBIN ON BEHALF OF APPELLANTS.

Bill was filed November twenty-ninth, Nineteen Hundred and Five by The Morris Canal & Banking Co., and its lessee, The Lehigh Valley Railroad Company, to procure an injunction against the defendant to restrain it from polluting or discoloring the water issuing from its paper mill in the Township of Bloomfield and flowing into the Morris Canal, and from depositing lime, sediment or other matter in said Canal (p. 5, lines 10-20).

It is charged in the bill that the defendant since the Spring of Nineteen Hundred and Five, and thereafter daily, had discharged into the Canal discolored, im-

New Jersey State Library

pure and offensive water, carrying a heavy sediment which precipitates and becomes a deposit in the bottom of the Canal, thereby causing a nuisance and expense to the Complainants, and also damaging other persons to whom the water was afterwards supplied, and especially Thomas Oakes & Co., who complain that the water has become offensive and strongly impregnated with lime, so that it is unfit for the use of Oakes & Co. in their business of scouring wool and washing cloth in dyeing woollens. The particular complaint by Oakes & Co. was, that by reason of such deposit in, and pollution of, the water, it was impossible for them to dye their wools any color except black (p. 4, lines 1-30).

The pollution and deposit complained of was at the foot of the Bloomfield Plane, connecting what is known as the 17-mile level with the 1-mile level. At this point the water of the Canal descends about 60 feet into the wheel-pit at the foot of the Plane. A part of the water of the Canal is passed into a raceway near the head of the Plane, and thence carried to the Paper Mill of the Defendant and used by it in the manufacture of paper. Defendant's mill is located on the West side of the Canal. A natural water course known as Third River is to the West of Defendant's mill; near the foot of the plane, it flows toward and alongside of the Canal. The River as it flows alongside of the wheel pit at the foot of the Plane, is at a somewhat lower level, so that when the Canal is cleaned the water from the wheel pit is customarily turned into the river by means of a conduit leading under the Canal bank. The water of the Canal after descending the Plane passes along the 1-mile level toward Newark. About 1200 feet south of the wheel pit Third River turns to the East and passes under the Canal, the water of the Canal being carried over the River by means of an aqueduct. The waters of the Third River, after passing under the Canal, flow in an Easterly direction and about one quarter of a mile to the East of the Canal form a large

pond which is used by Oakes for manufacturing purposes, as above stated.

The defendant claims the right to use, for manufacturing purposes, the surplus water of the Canal on the second level of the Plane by virtue of certain assignments (pp. 380-393) of an agreement given originally to one Unangst, dated October fifth, Eighteen Hundred and Fifty-eight, whereby the Canal Company granted to Unangst, his heirs and assigns, "the right to use and employ all the feed water of the Morris Canal as it is, or may be, usually passed around the inclined plane known as Plane No. 11 East, of the Morris Canal planes situated at the East end of the 17-mile level on the said Canal." (p. 6, lines 15-25).

The agreement further provides that the water after being used by Unangst, his heirs or assigns, "shall be conveyed into the Canal by the said Unangst, his heirs or assigns, and in the use of the said water the navigation of the said Canal is not in any way or manner to be impeded or affected" (p. 7, lines 5-15).

The main motive for the suit was the protection of Thomas Oakes & Co., who at the hearing were admitted as co-complainants (p. 24). Their complaint was, that the water which passed into the Third River from the wheel pit at the foot of the Plane and from the aqueduct where it passed over the River, was so impregnated with lime as to be unfit for use in the dyeing of cloth, so that at times it became necessary for them to cease operations at their factory. The complaint of the Canal Company was, that the defendant emptied into the wheel pit at the foot of the Plane, solid matter, which accumulated and had to be removed every year by the Canal Company at a considerable expense in order to keep open navigation on the Canal.

The further facts are stated in detail in the opinion of Vice-Chancellor Pitney. (See pp. 358 to 364). He concluded that the Complainants were not, nor were any or either of them entitled to the relief prayed for in the bill, and on September twelfth, Nineteen Hun-

dred and Six, a decree was entered dismissing the bill as to all of the Complainants (p. 357). From this decree the Complainants have appealed to this Court.

Summary of Argument on Behalf of Appellants.

I. The nuisance complained of exists.

- (a) The facts as to the Canal Company.
- (b) The facts as to Thomas Oakes & Company.
- (c) The observations of the Vice-Chancellor and the tests for lime made under his suggestion.

II. The complainants are entitled to have the water returned to the Canal unchanged in quality.

III. The defendant is responsible for the nuisance.

IV. Defendant has no prescriptive right to continue the nuisance.

- (a) The user has not been continuous.
- (b) Defendant did not prove that the right claimed had been exercised in the same manner during the period of prescription.
- (c) The defendant could not, as against the Canal Company, acquire a prescriptive right to pollute the canal in the manner complained of for the reason that the Canal Company could not grant a right which would interfere with the navigation of the canal.

V. The Canal Company is not estopped by acquiescence.

VI. The remedy at law is not adequate.

VII. The act of the defendant in depositing lime in the Canal is wrongful.

VIII. The act of the Canal Company in permitting the water to pass into third river from the wheel-pit and from the over-flow of the Aqueduct is not wrongful.

IX. The injunction should be allowed even if the nuisance has ceased.

I.

The nuisance complained of exists.

There is practically no dispute as to the fact of the existence of the nuisance. A brief reference to the testimony will demonstrate this.

(a) *The Facts as to the Canal Company.*

POWERS, Superintendent of Canal Company.

Has been employed by the Company for 43 years.

After the Paper Company uses the water it discharges it into the wheel pit at the bottom of the Canal, and is then carried across the Third River by an aqueduct (p. 34). The water is drawn off from this pit in order to remove the sediment that gets into the Canal from the Mill, and to examine the pit and make necessary repairs (p. 41, line 20). The water is drawn off in the Spring of the year, March or April (p. 42, line 15). In the year 1905, at least three or four times, saw the water coming into the Canal from the Paper Mill "very much discolored and a great deal of sediment in it." It was a dark, milky color and had a sort of a pungent odor. When the water is drawn off there is probably a foot of hard sediment which has to be taken out (p. 43). It has a light color, stringy, good deal of fiber in it—lime I should think; it appears to be lime" (p.

44, line 5). This sediment is taken out by means of shovels—there are tons of it. It is dumped on a bank somewhere on top of the tow path and then removed on a scow. This is a source of annual expense every year (p. 47). Noticed the discoloration and sediment coming from the Paper Company within two months (prior to the hearing) (p. 50, line 12).

HEATON, Supervisor.

The water when discharged from the Mill was discolored, "sort of white, milky looking color" (p. 66, line 35). In 1900 it filled up the basin at the foot of the Plane and gave extra work to take it out (p. 69, line 10). Sediment and lime were taken out; it could be handled with a shovel. In the basin it was over the tops of the rubber boots of the men that cleaned it out (p. 71, lines 20 to 30). Every Spring after the mill was operated there were the same conditions (p. 72, line 18).

SHEARS, Plane Tender at Plane No. 11.

Made observations of the water issuing from defendant's factory. It was light—sometimes muddy—sort of lime. Kept a memo. of it, showing the dates when the water was discolored. These were from May 26 to July 17, and from August 31 to September 11 (p. 72 to 74; and Ex. C-4, p. 377 to 379). The water was discolored at the foot of the Plane, saw employees of Canal Company in the Spring taking out deposit of bags and bagging and fibrous matter (p. 76, line 25). Saw them taking out sediment. It was a white fibre mixed with sand, looked like lime but cannot say it was lime (p. 77, lines 10 to 25).

RUGG, Brakeman.

Kept watch with Shears (p. 83, lines 20 to 30). Saw the water,—was regular milky color, quite thick; sometimes thicker than others—sometimes reddish, dark, muddy color (p. 84, lines 1 to 10). Helped to clean out the Canal in the Spring. Saw thick slimy

stuff mixed with sand (p. 84, line 30). It is pretty near the top of your rubber boots (p. 85, line 1). Smelled like slaked lime (p. 85, line 5). The stuff was a thick slimy white—kind of a lightish color. As soon as the water drained off it would pack down and get stiffer (p. 85, line 35). The sediment settles in the wheel pit and works around through the wheel (p. 88, lines 1-10).

(b) The Facts as to Thomas Oakes & Company.

THOMAS OAKES.

A woolen mill has been established at the place where it is now carried on since the year 1830 (p. 89, line 30); manufactures different kinds of woolen goods—all colors from light to black. "It is necessary to have water that is comparatively free from lime; the purer the better the results" (p. 90, line 20). Has had trouble in the use of the water of the Third River on account of too much lime. This seriously affects the cloth. Cannot get perfect colors when the water is very heavily charged with lime, cannot color any colors except blacks, and even they were not satisfactory (p. 91, lines 10-15). Has had serious trouble in the Spring of the year when the basin at the foot of the Plane is cleaned out (p. 92, line 25). The water is very thick and strongly charged with lime—so much lime in it "we couldn't color anything for six weeks, except black." That was in the Spring of 1905. "Could not color blues, could not get the light shades, it was a very serious loss last year and is every year about the same time" (p. 93, lines 1-20). The natural flow of the Third River is all right (p. 100, line 35).

GEORGE OAKES.

When we do not get the lime we have no trouble with the coloring and finishing of our goods; when we do get it we have trouble in coloring the blues (p. 102, lines 20-30). It is a serious matter, there have been times when we could not color blues at all, and

our blacks were very inferior. It has lasted as long as five or six weeks at a time in the Spring of the year (p. 103, lines 20 to 30). The first trouble I remember was in 1896 (p. 103, line 35).

FRANK V. OAKES.

It is impossible to color any goods except black with water that has an excess of lime, that is, with water that has over 14%, according to the Clark scale (p. 106, line 30 to p. 107, line 10). On account of the lime we have been unable to color anything except black ; in some cases six weeks at a time (p. 108, line 15).

(c) The observations of the Vice-Chancellor and the tests for lime made under his suggestion.

The existence of the nuisance as to both Complainants, is further shown by the observations of the Vice-Chancellor made April fifth, Nineteen Hundred and Six, and dictated on the spot to his stenographer.

“ Water drawn out of the pool, dark, grayish color ; muddy. After running awhile not quite so muddy, about the same color—slight smell of chlorine—at the end of the tail-race on the rocks, plain indications of fibre sticking on the rocks. Further along the tail-race plain marks of fibre right on the stones on the bottom of the tail-race. The water still milky ” (p. 240, lines 1-20). “ Half an hour later, after going through the mill, the outlet from the wheel pit, the water nearly all out and running much thicker and more like the original color ; a dark gray ” (p. 241, line 40 to p. 242, line 3).

At the suggestion of the Vice-Chancellor, and in his presence, samples of the slush were taken from the wheel pit in order that a test might be made for the existence of lime (p. 242, lines 1-20). The further hearing of the case was then adjourned until May sixteenth, at which time the reports of the tests were submitted. The testimony thereon is as follows :—

GEORGE OAKES.

Took two samples of water, one of them at the Intake of Oakes factory where the water runs into the head-race, the other above the paper mill in Third River. These were submitted to Dr. Woodman and were labeled "Water from Third River above the Paper Mill" and "Water taken from the Intake to the factory" (p. 242, line 30 to p. 244, line 20).

DR. WOODMAN, Consulting Chemist. Graduate of Stevens Institute, engaged in profession since 1880.

Made a series of analyses of water and sludge (p. 244, line 20, to p. 245, line 10). The water from the end of trunk, shortly after gate was opened, April 5th, 1906, showed 9.00 degrees of hardness (p. 250, line 40). This would correspond to about 15.60 degrees according to the scale used by George Oakes (p. 251, line 35). (George Oakes testified that they began to have trouble in dyeing when the percentage of lime was about 14. according to the scale used by him) (p. 102, line 40).

The water from Canal at foot of Plane from wheel pit, April 5, 1906, showed 9.33 degrees of hardness. This was the water taken without any "sludge" in it (p. 254, line 30). Then was given an analysis of liquor from the sludge collected April 5th, 1906, but in this analysis the total hardness was not given, for the reason, as the witness said, "*It is way out of sight*" (p. 256). The analysis shows a very large percentage of lime. The sludge was then separated from the liquor and dried and analyzed separately (p. 258).

On comparing these analyses with that of the water from the stream above the paper mill, the difference becomes apparent at once. That water showed only 3.10 degrees of hardness (p. 260, line 35), and the water from the pond at the Intake of Oakes factory showed only 3.67 degrees of hardness (p. 261, line 35), as compared with 9.00 and 9.33 degrees in the water from end of trunk and from wheel pit.

The doctor then testified that the effect of the substances shown in his first three analyses of water taken from the Canal, would be to make much trouble in dyeing and bleaching, owing to the formation of insoluble soap which is fixed in the fibre and makes an unevenness in the dyeing, resulting in stains and spots. The chlorine shown in the first three samples would also be detrimental; would increase the hardness and destroy a certain amount of soap, that is, render it useless for the purpose of scouring (p. 264, line 33 to p. 265, line 20). If enough of the sludge and water comprising these first three samples went into the pond from which Oakes drew his water, and went in in sufficient quantities to discolor it, the water would be very detrimental for dyeing and bleaching or scouring (p. 265, lines 30 to 40).

DR. SCHWEITZER, Chemist. Specialist in Coal Tar chemistry.

Examined the analyses of Dr. Woodman. The waters which were taken on April 5th "are absolutely unfit for dyeing purposes and scouring purposes" (p. 273, lines 30-35). If this water was poured into Oakes pond, in sufficient quantities to discolor the water "it would be preposterous to attempt to use it for dyeing purposes" (p. 274, lines 1-10). The lime would have a deleterious effect on the water for dyeing purposes, and the free chlorine would tend to increase the hardness (pp. 276, 277). The witness then explained how the lime affects the color on the fibre of the cloth (p. 281, lines 20-40). The waters taken on April 5th are absolutely unfit for dyeing; the water which was taken out of the pond from the stream above the Paper Mill is good enough but is just on the limit (p. 283, lines 20-30).

AXTELL, Chemist. Witness for defendant.

Made analyses of water as directed by the Court (p. 287). "*My analyses compare very closely with those of Dr. Woodman*" (p. 292, lines 30-40). The analyses are

given in detail on pages 413 to 421. It was admitted by defendant's counsel that there was no difference between the analyses of the respective chemists (p. 296, line 20). Defendant's chemist admitted that this water would affect the dyeing operations of Oakes & Co. (p. 299-302).

Mr. Axtell was examined at length as to his analyses, but it is unnecessary to refer further to his testimony.

The Vice Chancellor in his opinion criticises the complainants because no evidence was offered at the next hearing to show that the contribution of lime water on the occasion of his examination affected the hardness of the water at Oakes mills, "though it was quite easy to make the test" (p. 364, lines 16 to 25). The suggestion that it must be assumed because no such evidence was offered that the water in the mill pond was not affected we respectfully submit was altogether unjustified. The self-evident explanation of there being no injury to Oakes & Co. at that time is that they were prepared for the occurrence and made no use of the water for dyeing of colors until a sufficient time for settlement had elapsed. It would have been very foolish for them to ruin a large quantity of cloth for no other purpose than to furnish evidence of a character already complete and uncontradicted.

The evidence is undisputed that the water when it entered the wheel pit from defendant's mill was charged with lime to such an extent as to make the water unsuitable for dyeing cloth. It is also proved, beyond question, that the water before it passed through defendant's mill was suitable for that purpose; that is, the defendant by the use to which it put the water, changed its quality.

II.

The complainants are entitled to have the water returned to the Canal unchanged in quality.

It was claimed by the defendant that the Unangst agreement had been practically construed by the parties to permit of the Canal water being used for manufacturing purposes. This we do not dispute. The Canal Company does not object to the use of the water for manufacturing purposes. All it asks is that the water be returned to the Canal *as water*, without the addition of other substances, such as lime and fibrous matter. We want water and nothing but water.

It was conceded that much of the lime put into the water could be removed therefrom before its discharge. This is shown by the fact that after the complaint was made by Mr. Oakes, some four or five years before the suit, the defendant emptied the lime into a large pool in its lot and then carried it away (p. 125, line 33, to p. 126, line 10 ; p. 132, lines 10-30). And it was also admitted that the water could be filtered and this would prevent the escape of the fibres (p. 120, line 35 ; p. 130, line 5).

But whether or not there is any practicable means of preventing the pollution of the water, that does not affect the legal right of the Complainants to have the water come to them unchanged in quality. This was decided in the case of *Beach v. Sterling Iron Co.*, 54 *N. J. Eq.*, 65. Vice-Chancellor PITNEY in that case says :—

“ The right of a Riparian proprietor to have the
 “ waters of the stream come to him unchanged in
 “ quality as well as undiminished in quantity, has
 “ been determined in the clearest and most posi-
 “ tive manner.

“ In fact the doctrine stated so tersely by Chan-

“ cellor KENT in *Gardiner v. Newburgh*, 2 *John. Ch.*, 162 (at p. 166)—‘ A right to a stream of water is as sacred as a right to the soil over which it flows. It is a part of the freehold ’—has always been adhered to by our Courts. I need refer only to *Holsman v. Boiling Spring Co.*, 1 *McCart.*, 334, and *Acquackanonk Water Co. v. Watson*, 2 *Stew. Eq.*, 366 (p. 73).

“ In the Holsman case Chancellor GREENE says :

“ Every owner of land through which a stream flows is entitled to the use and enjoyment of the water, and to have the same flow in its natural and accustomed course, without obstruction, diversion, or corruption. The right extends to the *quality* as well as to the quantity of the water.

“ If, therefore, an adjoining proprietor corrupts the water, an action upon the case lies for the injury ” (14 *N. J. Eq.*, p. 342).

A riparian owner is entitled to have the water retain its natural purity so far as possible. The upper owner cannot use the water in such an unreasonable manner as to unnecessarily pollute it to the injury of the lower owner. This rule prevents the upper owner from casting into the stream chemicals from his manufacturing plant or dyes from his dye house.

2 *Farnham on Waters and Water Rights*, p. 1689, Sec. 515 ; citing *Weston Paper Co. vs. Pope*, 155 *Ind.* 394, 56 *L. R. A.* 899, 57 *N. E.* 719 ; *Muncie Pulp Co. vs. Martin*, 23 *Ind. App.* 558, 55 *N. E.* 796 ; *Holsman vs. Boiling Spring Co.*, 14 *N. J. Eq.* 335. See also to same effect *Attorney General vs. Stewart*, 20 *N. J. Eq.*, 415, affirmed 21 *N. J. Eq.* 340.

The fact that the business cannot be conducted without polluting the stream is no excuse.

Farnham on Waters and Water Rights, p. 1691, Sec. 516.

Conceding that the defendant has the right to use the water for manufacturing purposes, as well as for power, this right does not authorize an improper use. The defendant cannot defend against an injunction based upon an improper user of its privileges. There is no practical or any other construction of the contract which authorizes the defendant to change the quality of the water for the worse and to turn it into the Canal in a polluted condition. If the defendant desires to use the water for manufacturing purposes, we submit it must use it in such a manner that it can be returned to the Canal without the addition of deleterious substances.

III.

The defendant is responsible for the nuisance.

It has been shown that the nuisance exists both as to the Canal Company and as to Oakes & Co. Under the evidence we submit that there can be no doubt about the fact that the defendant is responsible for the existence of the nuisance, and that such nuisance is the result of defendant's operation of its mill in the manufacture of paper. The following is a summary of the testimony on this point :

POWERS, Superintendent of Canal Company.

Saw discoloration and sediment coming from the Paper Company within two months (*i. e.*, within two months prior to the hearing, which was on April 4th, 1906) (p. 50, line 15). In 1894, or 1895, objected to defendant running a solid matter into canal. Saw Boyne, Superintendent two or three times, and he said they "did not want to do it, did not intend to do it" ; it was on

account of the carelessness of employees that the solid matter ran into the Canal (p. 63, line 30).

HEATON.

Whenever I saw sediment coming in would mention the matter to Boyne (p. 65, line 40). After the notifications, the water would be discolored, but there would not be so much sediment. Boyne told the employees to be more careful and not to dump that in the canal (p. 66, lines 20 to 30). Mr. McCarrick ran the mill before Boyne, and he promised to stop it, and did to a certain amount, and again would continue to let it come (p. 67, lines 20 to 30). Every year that the mill was running notified them to stop the pollution. (p. 68, lines 1 to 10). When the water was discharged in the raceway, the canal water would be discolored (p. 69, lines 20 to 25). "Whenever this mill was running the condition was the same" (p. 72, lines 10 to 15).

SHEARS.

Made observations of the water coming from the raceway. Sometimes it was light, and sometimes muddy (p. 73, lines 1 to 5). It was discolored nearly every day (p. 74, line 15). The witness then referred to a list of the dates and hours on which he had noted discolored water coming from the mill (See pages 377 to 379).

RUGG.

Saw water running discolored (p. 84, lines 1 to 20).

THOMAS OAKES.

The deleterious matter came from the Paper Company. Found this out by following up the stream and noticing the color of the water above the mill and below in the canal (p. 91, lines 20 to 25).

FRANK OAKES.

Followed the overflow from the aqueduct. The discolored water comes from the paper mill. Saw it

in the raceway that comes in at the foot of the plane; followed it down the canal and past the aqueduct (p. 107, lines 20 to 40).

GEORGE THOMPSON, President of Defendant Company.

We used chloride of lime for bleaching powder in the mill (p. 117, lines 30 to 40). "There may be a little lime carried away with the water when it is emptied from the rotary bleach" (p. 120, line 15). "There are some properties in that lime that may go into the water" (p. 127, lines 10 to 20). The water itself will take up some of the lime (p. 128, line 5). A little of the fibre works through the wire (p. 129, line 25).

The testimony of the chemists referred to under Point I (c) also indicates that the pollution is caused by the paper mill. Their test shows that there was a much larger proportion of lime in the water below the plane than there was in the water above.

IV.

Defendant has no prescriptive right to continue the nuisance.

(a) *The user has not been continuous.*

In order that there may be a conclusive presumption of a grant or right, the enjoyment thereof must be adverse, exclusive and uninterrupted for twenty years. *L. V. R. R. Co. v. McFarlan, 14 Vr., 605, 619.* The owner of the servient tenant may defeat the acquisition of the right by showing that the continuity of the enjoyment was interrupted during the period of prescription. *Idem., p. 621.*

The user must be continuous and uninterrupted. A total cessation of the enjoyment of an easement for a

considerable time is such an interruption of the user as will prevent the maturing of a prescriptive right. *14 Cyc.*, 1149.

“ It is not sufficient that a person entering upon lands, has entered more than twenty years ago, if there had been one or two years in which he has had no possession within the twenty years. The possession must be continued. The same rule must apply to the acquisition of easements.”

Carlisle vs. Cooper, 4 C. E. Gr., 256, 259. (Affirmed on this point, and reversed as to form of decree, in 6 C. E. Gr., 576.)

In the case of *Pollard vs. Barnes*, 2 Cush. (Mass.) 191, plaintiff claimed an easement in land adjoining his mill on the ground that from the year 1822 to the year 1846, the premises had been used by him as a part of his mill land for the purpose of lodging logs and lumber thereon. The defendant claimed that from the year 1829 to the year 1834 no such use had been made of the premises; held, that this fact, if proved, would be such an interruption of the use as would prevent the plaintiff from acquiring a title to the easement by prescription.

“ To ripen into a prescriptive title, the use must have been continuous for the whole prescriptive period.”

Farnham On Waters and Water Courses, Vol. 2, p. 1750, Sec. 539, citing *Hunt vs. Huspeler*, 6 U. C. C. P. 269; *McKechnie vs. McKeyes*, 9 U. C. Q. B. 563; *American Co. vs. Bradford*, 27 Cal. 360.

The testimony in the present case brings it clearly within the authorities above cited.

THOMAS OAKES.

The mill has always been used for a paper mill, but was not run continuously; for about two years and a

half it stopped altogether. This was in 1888 or 1889 (p. 99). The fact that the mill stopped is fixed in my mind because we had a great deal of trouble at the factory on account of lime in the water and when it stopped we had no difficulty; it stopped, I should think, for two years (p. 238, lines 10 to 20).

DILLON.

Worked at paper mill up to the time it closed down in 1888. The mills were shut down two years (pp. 230, 231).

MONAHAN.

Works for Oakes. Began work there in 1888. Before that tended the plane on the canal. The mill stopped and remained vacant a year and a half more or less (pp. 232, 233).

GEORGE W. THOMPSON, President of Defendant Company.

He admits the fact that before the mill went into the hands of the National Paper Company it was idle for some time, and says :

“ I don't remember that it was shut down for “ over eight or ten months; perhaps a year ” (p. 140, lines 1 to 20).

The witness says that there was no interim from the time the receiver sold it until he got it, but he refers to the conveyance by the receiver of the United Paper Company to Fulton July 3rd, 1894.

The hiatus on which the complainants rely is that from 1888 to 1891, which can be clearly inferred from the dates of the deeds. The Sheriff conveyed the property to Whitlock August 3rd, 1889; the latter conveyed to Fulton June 4th, 1891, and Fulton to the National Paper Company July 13th, 1891. The National Paper Company conveyed to the United Paper Company October 1, 1893, and the Receiver of that Company conveyed to Fulton July 3rd, 1894, and Ful-

ton to the Diamond Mills Paper Company of New York July 3rd, 1894, and that Company to the present defendant September 28th, 1894 (pp. 387 to 393).

It is apparent from the undisputed evidence that the user was not continuous, and therefore no prescriptive right could be acquired by the defendant.

The Vice Chancellor is of the opinion that a prescriptive right became complete before the hiatus to which we have referred. He holds that because it appears that a paper mill had been in existence for more than twenty years before the suspension of manufacturing, that the use had "ripened into a right"; and he upholds the defendant's argument of a practical construction placed by the parties upon the terms of the grant (p. 370, line 30, to p. 371, line 10). We respectfully submit that the Vice Chancellor has confused the right to use the water for manufacturing purposes (such right being based upon the practical construction of the contract and which right we concede) and the right to pollute the water. There is a vast difference between using the water for manufacturing purposes and using it in such a way as to cause pollution. We admit the right to use for manufacturing purposes but deny that the defendant by practical construction acquired any right to pollute the water thus used. Furthermore, the complainants Oakes & Company were not parties to the agreement under which the defendant has obtained the right to use the surplus water of the canal. They cannot be bound by any practical construction placed upon such agreement by the parties thereto, and as to Oakes & Company that question must be eliminated.

Moreover we contend on behalf of all of the complainants that the evidence does not justify a finding that the defendant acquired a prescriptive right to pollute the water—certainly not to the extent complained of at the time of the filing of the bill.

The evidence even of a user for twenty years before the hiatus mentioned is too meagre to warrant the finding of prescription. It depends altogether upon

the testimony of George W. Thompson, which was wholly hearsay evidence. He says, in an off-hand way, that he thinks he has known of the mill "since about 1867" (p. 116, line 5). Bearing in mind that the burden of proof is on the defendant to show the existence of the claimed prescriptive right, we submit that this loose evidence is insufficient even to prove the existence of the right to use the water for manufacturing purposes, and still less the right to pollute it.

(b) Defendant did not prove that the right claimed had been exercised in the same manner during the period of prescription.

Not only must the user be continuous, but it must be of the same character during the entire period of prescription. In the case of *Holsman vs. Boiling Spring Co., 1 McCarter, 335*, the defendant claimed the right by prescription to pollute a stream of water which ran through complainants' land by emptying into it certain chemicals and other substances used in bleaching. At page 345 Chancellor GREEN says :—

"To prove, therefore, that there was a fulling and dyeing mill or other manufactory for twenty years on defendant's land, and that they discharged drugs and dye stuffs into the stream during that period, proves nothing unless it is shown that the materials discharged into the stream were of such character, and of such an amount as to pollute the water which flowed upon complainant's land, and rendered it unfit for use. If the evidence stopped short of that it proves no adverse enjoyment in the defendants or those under whom they claim" (p. 345).

In 14 Cyc., 1154, the principle is stated thus :

"In order to acquire an easement by prescription, the adverse user must not only be continu-

“ous in point of time, but substantially identical
 “during the whole of the statutory period with
 “respect to manner and extent.”

In the case of *Cotton vs. Pocasset Co.*, 13 Met., 429, it was held that where a town had enjoyed a drain to discharge the water on another's land for a period of less than twenty years, and then deepened and enlarged it, and varied its course, but continued to use it, such change interrupted the use and prevented an acquisition of the easement short of twenty years' enjoyment of it as it then was.

A prescriptive right to pollute a river in a certain manner does not justify pollution thereof by an additional and different use. *Platt Bros. vs. City of Waterbury*, 72 Conn., 531; 48 L. R. A., 691.

A prescriptive right to foul the water is limited to the use which has been made of it, and in case a new use is attempted which renders the stream much more foul, the lower proprietor may recover for the injury (*Moore vs. Webb*, 1 C. B. N. S., 673).

One claiming a prescriptive right has the burden of showing its existence. The right is limited strictly by the use which has been made of the stream during the time the right is being acquired (*Farnham on Waters & Water Courses*, Vol. 2, Sec. 521, p. 1707; *Blair vs. Deakin*, 57 L. T. N. S., 522).

In *Clarke vs. Somersetshire Commissioners*, 59 L. T. N. S., 670, it was held that persons who had a prescriptive right to cast the washings and foul water from their factory into a water course could not change the character of their business and throw the washings into the water course, although it was less foul and injurious than that cast therein by the previous business under a statute forbidding the pollution of water courses, but excepting from the operation of the statute those having “a legal right” to cause such foul water to flow into a water course.

In *Miss. Mills Co. v. Smith*, 69 Miss., 299, 11 So. 26, plaintiffs brought an action for damages for the pollu-

tion of a stream by a factory. The defense was uninterrupted use of the stream for twenty years. There was evidence that within less than five years from the time when the action was brought defendant had so changed the bed of the stream and increased the volume of water by piping from a distance that a much greater amount of impurities was deposited on plaintiff's land than before. Held that defendant's right of use by prescription did not extend to its enlarged and changed use of the stream, and that plaintiffs were entitled to damages therefor.

In *McCallum vs. Germantown R. R. Co.*, 54 Pa. 40, held that an upper riparian owner who claims a prescriptive right to pollute a stream cannot pollute it to a greater extent than it was polluted at the commencement of the period of prescription; and that the prescriptive right must be measured by the enjoyment during the prescriptive period, and that it could not be used in a different or more extensive manner; held, further, that such right requires the strictest proof in its support.

In the present case defendant did not attempt to show that the user had been the same during the period of prescription. The proof was directly to the contrary. President Thompson says he thinks the mill was used as a paper mill since 1867, but that it manufactured an entirely different sort of paper from that which the present defendant made. The mill was first used for making a writing paper out of cane brought from the West Indies (p. 116). The paper made by the Diamond Mills Company, he says, is different from the paper made by the company that formerly ran the mills. The Diamond Company's paper is a little better (p. 119, line 20) and he further says that when the National Paper Company discharged the water into the canal it was changed a little by the washing of the stock and "that is all", and that there was "very little sediment" in it, and no lime except what might be carried from the boiling (p. 119, line 30, to p. 120, line 5). The deeds show that the National Company ac-

quired the mill in July 1891, and transferred it to the United Paper Company in October 1893 (pp. 388, 389). Prior to the time that the National Company used the mill, Fulton was the owner and he used jute stock. He ran it three, or four, or five years (p. 121). The deeds show that Fulton had the mill from March 1882 to December 1883, and again from June 1891 to July 1891 (pp. 384 to 386). Thompson stated in a general way that he never knew of any paper made there that did not require the use of chloride (p. 122, lines 1-5), but we submit that the defendant failed to meet the burden of proof resting upon it to show that the user under which the prescriptive right was claimed had been the same for twenty years.

(c) The defendant could not, as against the Canal Company, acquire a prescriptive right to pollute the canal in the manner complained of for the reason that the Canal Company could not grant a right which would interfere with the navigation of the canal.

The proof is that a large quantity of lime accumulated every year in the bottom of the wheel-pit. The defendant claims it has a prescriptive right to dump lime therein. If this be true it would soon come to pass that the entire canal at that point would be so choked with lime that it would be impossible for boats to pass. Prescription depends upon the theory of a grant, but the Canal Company could not grant the right to thus interfere with the Canal, and if such right could not be granted it could not be acquired by prescription. It may be shown that the right claimed is one that could not be granted away or that the owner of the servient tenement was legally incapable of making such a grant. *L. V. R. R. Co. vs. McFarlane*, 14 Vr. 605, 621.

A grant must be of something which the one party could lawfully have granted to the other. 14 Cyc. 1153.

The canal is a public highway and must be kept

free for the transportation of goods on payment of the legal tolls. *Sec. 25 of Charter.*

The Canal Company could not grant the right to interfere with navigation and hence the defendant could not acquire by prescription the right to dump lime into the wheel-pit.

V.

The Canal Company is not estopped by acquiescence.

The Vice Chancellor held that the Canal Company was estopped by standing by without objection while the defendant was spending money in repairs to the mill building and introduction of new machinery. It appears that the representative of the Canal Company as far back as 1885 objected and protested against the pollution running from the mill into the canal, and continued the protests down to the time of the filing of the bill. See testimony of Heaton, p. 65, lines 20 to 30; pp. 66, 67, 68, line 5; p. 70, line 10; Shears, p. 88, line 20. Defendant's President said that he never heard of these complaints (p. 125, line 30), but they were made to the Superintendent of the paper mill who certainly was the proper party to receive them and *he was not called as a witness by the defendant.* Admitting that, as stated by the Vice Chancellor, verbal protests are not enough to arrest the running of time, so far as concerns the prescriptive right (p. 371, line 25), an entirely different question is presented as to estoppel. So far from standing by without protest and watching the defendant spend money in repairs and additions, the evidence is that the Canal Company's representatives were continually protesting. Oakes also protested and even Thompson admits that he

knew something about that (p. 25, lines 30 to 40). Even if the Canal Company was silent during the making of repairs, and the installation of machinery, that would not operate as an estoppel because the Canal Company had the right to presume that the defendant would not use the mill in an illegal manner. If there was any presumption, it would be that the new machinery would cause the pollution to cease. The Canal Company had no reason to suppose that the new additions and the new machinery would increase or continue the pollution. It was not bound to assume that the defendant would continue an illegal act. Thus in the case of *Weston Paper Co. vs. Pope*, 155 Ind. 394, 56 L. R. A. 899, it was held that the fact that riparian owners acquiesced in the expenditure of large amounts of money in the construction of strawboard works, did not estop them from asserting a claim for damages on account of the pollution of the stream by discharge of the waste from said works, it appearing that the riparian owners had no knowledge of the intended illegal corruption of the waters of the stream. "They had the right to believe that appellant would conduct its business lawfully, and so conducting it, that they would not suffer injury to their property."

In *Indianapolis Water Co. vs. American Strawboard Co.*, 57 Fed. 1000, it was held that mere silence during the erection of a factory on a stream creates no estoppel against a riparian proprietor in respect to his right to have the water flow in its natural purity.

In the case of *Acquackanonk Water Co. vs. Watson*, 2 Stew., 366, held that the silence of the complainant during the erection of water works by the defendant did not operate as an estoppel against a suit for an injunction to prevent the diversion of water.

The doctrine is thus stated in the case of *Carlisle vs. Cooper*, 6 C. E. Gr., 576 :

"Where the legal right is settled and the more efficacious remedy of a court of equity is necessary to complete relief, delay is no ground for a

“ denial of its aid, unless it is coupled with such
 “ acquiescence as deprives the party of all right
 “ to equitable relief. A person may so encourage
 “ another in the erection of a nuisance, as not only
 “ to be deprived of the right to equitable relief,
 “ but also to give the adverse party an equity to
 “ restrain him from recovering damages at law for
 “ such nuisance. So a party who knowingly
 “ though passively encourages another to expend
 “ money under an erroneous opinion of his rights,
 “ will not be permitted to assert his title, and
 “ thereby defeat a just expectation upon which
 “ such expenditure was made ” (p. 591).

In that case the Court concluded that the doctrine of estoppel would not apply for the reason that the defendant knew that by the construction of his dam he would interfere with the complainant's farm. In the present case it surely cannot be claimed that the defendant did not know that the pollution of the water of the canal would be a nuisance. Even if it had not been informed of the fact by repeated protests both from the Canal Company and from Oakes, it nevertheless is apparent that Mr. Thompson must have known that lime and fibrous matter were carried into the canal by the mill. The fibrous matter at least could be readily seen, and whenever the wheel-pit at the bottom of the plane was cleaned out the existence of the nuisance was apparent. If the one who is committing the wrong knows that he has no right to do so, mere non-action will not prevent a suit by the party injured. *Farnham on Waters and Water Rights, Vol. 2, Sec. 508, 1672*. This doctrine has generally been applied to causes of diversion of waters, but there is no reason in principle why the same rule should not apply to the case of a claim to right to pollute. Moreover it was not proved by the defendant that it made these expenditures in reliance upon any prescriptive right to pollute. The only claim that was made was that it had a right by the course of business established between

the parties to use the water for manufacturing purposes as well as for power. We are willing to concede that the doctrine of estoppel would apply so far as concerns the use of the water for manufacturing purposes, and would prevent the Canal Company from now claiming that the defendant was limited to the use of the water for power only. But the Canal Company does not object to the use of the water for manufacturing purposes. All it asks is that after the water has thus been used it be returned to the canal unchanged as to quality. The fact that the defendant has expended money in erecting and improving its mills may operate as an estoppel against any claim of the Canal Company that the defendant cannot use the canal water for manufacturing purposes, but that will not justify the defendant in making a careless and improper use of the water, and certainly it does not justify the defendant in polluting the water to such an extent as to create a positive nuisance.

VI.

The Remedy at Law is Not Adequate.

The defendant's counsel in his argument in the Court of Chancery laid stress upon the claim that the complainants should be left to their remedy at law. It is sufficient answer to such claim to refer to the testimony already cited showing the nature and extent of the nuisance. The authorities are plain that under the circumstances shown in this case the complaining party is not limited to his remedy at law. In *Beach vs. Sterling Iron Co.* 54 N. J. Eq. 65, Vice Chancellor PITNEY says:—

“It was suggested that in this case no injunction should be ordered, but that the complain-

“ants should be left to their action at law for damages. I am unable to adopt that view. It must now be considered as settled law in this state that the maintenance of a nuisance of the kind here in question is in effect a taking of property. * * * The result of my consideration of the subject is, that there is no principle which will sustain a court of equity in refusing an injunction against the maintenance of an established continuing nuisance and leaving the injured party to his remedy at law. To do so is in effect to permit a party to take his neighbor's land for his own use upon terms of making such compensation as a jury shall assess. This is inadmissible. The object and office of a verdict and judgment at law is to establish the right and give compensation for past injuries. The right being once made clear, whether by judgment at law or upon incontrovertible rules of law and well established facts, the remedy in equity by injunction to prevent future injury is a matter of right and the relief cannot be refused” (pp. 79, 80).

To the same effect see *Bloom vs. Koch*, 63 N. J. Eq., 10, 20; *Carlisle vs. Cooper*, 21 N. J. Eq., 576, 579; *Strobel vs. Kerr Salt Co.*, 164 N. Y., 303.

In the last cited case the New York Court of Appeals said :

“Where the natural and necessary result of the place selected and the method adopted by an upper riparian owner in the conduct of his business is to cause material injury to the property of an owner below, a court of equity will exercise its power to restrain on account of the inadequacy of the remedy at law, and in order to prevent a multiplicity of suits” (p. 321).

In *Farnham On Waters and Water Rights* it is said :

“ A riparian proprietor whose right to the use
 “ and enjoyment of the flow of a stream of pure
 “ and wholesome water free from corruption and
 “ pollution has been actually invaded is without
 “ adequate remedy at law, and injunctive relief
 “ will be granted where such invasion will be con-
 “ tinuing, and the extent of the injurious conse-
 “ quences is contingent and of doubtful pecuniary
 “ estimation ” (vol. 2, p. 1708, § 522).

VII.

The act of the defendant in depositing lime in the canal is wrongful.

The Vice Chancellor held that even if the defendant committed a wrong as against the Canal Company in depositing lime in the canal, that wrong would never have injured the complainant Oakes if the Canal Company had not in turn deposited it in Third River ; so that, according to the well settled canon in such cases, the Oakes Company have no cause of action against the defendant (p. 373, lines 20 to 30). This, of course, necessarily assumes that the act of the defendant in depositing the lime in the canal was not in itself wrongful. The reading of the opinion on pages 372 to 374 makes it evident that the conclusion of the Vice Chancellor is dependent upon the assumption that the act of the defendant was not wrongful, thus he says :

“ It is of the essence of the proposition that a
 “ party secondarily injured shall not, under any
 “ circumstances, be allowed to go back to the
 “ original cause of the injury for a remedy when
 “ the original act was not a wrongful act in itself,

“ as in the case of the original thrower of the squib. I find no authority for the position that an act originally innocent of itself can be turned into a wrongful act by the intervention of the act of some third party ” (p. 373, line 40 ; p. 379, line 10).

We have tried to demonstrate in the preceding points of the brief that the nuisance complained of exists as to all the complainants ; that the defendant is responsible for this nuisance ; that it has no right by prescription to continue the nuisance ; and that the Canal Company is not estopped by acquiescence. If we are right in these contentions, it certainly cannot be held that the act of the defendant in permitting the lime to flow into the canal was innocent. If it was wrongful, then it follows that the defendant is responsible for all the evil that results from this wrong. In the Squib case which is cited by the Vice Chancellor as authority for his holding, the Judges agreed that the intermediate throwers of the squib between the first thrower and the plaintiff were not liable for the reason that they acted in self-defense. The case is an authority for the complainants rather than for the defendant.

VIII.

The act of the Canal Company in permitting the water to pass into Third River from the wheel-pit and from the over-flow of the aqueduct is not wrongful.

The argument of the Vice Chancellor that the wrong to Oakes & Co. is due to the act of the Canal Company in depositing the lime in Third River, assumes that the Canal Company had no right to thus dispose of the

lime. The evidence shows that this is the ordinary method of operating the canal which has been in use for many years. The aqueduct is a common contrivance for carrying the canal across rivers, and the canal has always been provided with them. So far as the underground conduit leading from the wheel-pit into Third River is concerned, the evidence shows that it was part of the original construction of the canal. Powers, Superintendent, says that it has been there as long as he can remember (p. 48, line 5), and he has been with the Company for forty-three years (p. 30, line 35). So far as the foot of the wheel-pit is concerned it is necessary for the Company to draw that into Third River (p. 59, line 15). If there is any question of prescriptive rights involved in the case, the Canal Company has such rights to drain the canal in Third River, and to draw the waters through the aqueduct across Third River. Moreover it must be noted that the necessity of cleaning the canal by draining it into Third River arises from the wrongful act of the defendant. The evidence is also clear that it is not practicable to prevent altogether the discharge from the aqueduct. It is a necessary construction (pp. 38, 39). We submit that if the natural result of the original wrongful act of the defendant in depositing the lime in the canal is to have such lime pass into Third River and thus injure Oakes & Co., the defendant, as the original wrongdoer is the party that is liable, and it could not escape liability even by showing that the intervening act of the Canal Co. is wrongful. But we submit further that the act of the Canal Co. is not wrongful.

In the case of *Tenn. Coal & Co. vs. Martin*, 100 Ala., 252, 14 So., 167, the plaintiff sued the Company for damages caused by pollution of the water. It pleaded that the plaintiff was guilty of negligence which contributed to the injury in that plaintiff failed "to take due precautions to prevent the alleged grievances". A demurrer to this plea was sustained.

In the case of *Gulf & C. R. R. Co. vs. Reed*, 22 S. W.,

283 (*Texas*), plaintiff sued for damages caused by defendants using the water above plaintiff's land as a dumping ground for the depositing of the carcasses of dead cattle. It was claimed that plaintiff's water supply was thereby poisoned, causing sickness and suffering to his stock and family. Held, that the plaintiff was not guilty of contributory negligence in not removing the carcasses.

“ The law requires only the use of ordinary care and effort for the protection of one's self from the injurious consequences of the wrongful act of another ”.

In the case of *Satterfield vs. Rowan*, 83 Ga., 187, 9 S. E. 677, plaintiff sued for pollution of the water, caused by defendant's constructing a dam and using the water to wash ores. It was claimed by the defendant that plaintiff did not exercise ordinary care to diminish or avoid the damage. The Court overruled this contention saying that as the pollution of the stream was a positive continuous and tortious act, the plaintiff was not bound to do anything to avoid the consequences thereof.

According to the Vice Chancellor's reasoning it would follow that the Canal Company was legally bound to filter the water as it came from defendant's mill, or to otherwise prevent the passage of the deleterious substances therein into Third River. It was not suggested how it would be practicable or even possible for the Canal Company to do so. It surely cannot be said that there is any legal duty on the part of the Canal Company to abandon its aqueduct or wheel-pit, both of which have been in use for many years, and contrive some new scheme for preventing the escape of the water into Third River.

Moreover, it should be noted that so far as Oakes & Co. are concerned, it is immaterial whether the Canal Company could prevent the escape of the polluted water from the canal into Third River. If in the ordinary method of operating and cleaning the

canal, the discharge into the Third River naturally occurs, Oakes & Co. have a right to enjoin the original source of the nuisance, to wit, the discharge from defendant's mill. It seems self-evident that Oakes & Co. are entitled to protection against the nuisance. An injunction by Oakes & Co. against the Canal Company would put upon that Company the burden of preventing the water of the canal from flowing into Third River; that is, it would make it incumbent on the Canal Company to abolish its aqueduct, and devise some new scheme of cleaning the wheel-pit. This would be an obvious injustice, as the Canal Company is not to blame for the polluted condition of the water. The water of the canal does not injuriously affect Oakes & Co. except in so far as it may be in a polluted condition because of the act of the defendant.

IX.

The injunction should be allowed even if the nuisance has ceased.

At the final hearing before the Vice-Chancellor, had subsequent to the examination of the premises by the Vice-Chancellor, Thompson, President of the Company, said that he had disposed of the contents of the so-called rotary boiler, and that this was done within the past two weeks. He claimed that as a result of this, nothing passed into the tail race or into the Canal from this boiler (pp. 333, 334). The Vice-Chancellor calls attention to this in his opinion, (p. 369, lines 1-10). We do not understand, however, that the defendant claims that as a result of this change in the method of operating the mill, there is no longer any pollution of the Canal water; no proof was offered by it on that subject. Even if the pollution had ceased, nevertheless we submit that the injunction should be allowed, as was done

in the case of *Beach vs. Sterling Iron Co.*, 54 *N. J. Eq.*, 65. As was said by Vice-Chancellor PITNEY himself, in that case :—

“ The complainants have established their case, and it would seem to be a most lame and impotent conclusion to refuse to give them the very relief prayed for, viz., a perpetual injunction. I am unable to imagine any other decree in their favor which would adequately meet the case and give them the just fruits of their suit ; and surely, if there is no danger of further discoloration the injunction will do the defendant no harm, but will be of value as a muniment of title to the complainant’s property ” (p. 82).

In the case of *Babcock v. N. J. Stock Yard Co.*, 20 *N. J. Eq.*, 296, the defendants showed that the nuisance complained of could be remedied and that they had adopted certain measures and proposed to adopt others, to remedy the evils. Chancellor ZABRISKIE, however, permitted the injunction to issue and appointed a commissioner to examine the premises and the proposed measures, and report, giving leave to either party to move on notice for a modification of the injunction.

The decree appealed from should be reversed and injunction allowed as prayed for.

COLLINS & CORBIN,
Solicitors of Complainants, Morris Canal &
Banking Co., and Lehigh Valley R. R. Co.
HARRY E. RICHARDS,
Solicitor of Complainant, Thomas Oakes & Co.
GILBERT COLLINS,
GEORGE S. HOBART,
Of Counsel with Complainants.

INDEX.

	PAGE
Bill.....	1
Exhibit A.....	6
Answer.....	8
Replication.....	16
Order of Reference.....	16
Designation of Hearing.....	16
Petition for Leave to Amend Answer.....	17
Order Giving Leave to Amend Answer.....	22
Petition to Admit Thomas Oakes & Company as Parties Complainant.....	23
Order Admitting Thomas Oakes & Company as Parties Complainant.....	24

TESTIMONY.

COMPLAINANTS.

WILLIAM I. POWERS.

Direct.....	30
Cross.....	51
Re-direct.....	61

THOMAS HEATON.

Direct.....	64
Cross.....	70
Re-direct.....	72

RICHARD SHEARS.

Direct.....	72
Cross.....	75
Re-direct.....	81
Re-cross.....	8

CHARLES RUGG.	PAGE
Direct	83
Cross	85
RICHARD SHEARS.	
Recalled	88
THOMAS OAKES.	
Direct	89
Cross	93
Re-direct	100
Re-cross	101
GEORGE A. OAKES.	
Direct	102
Cross	103
Re-direct	105
FRANK V. OAKES.	
Direct	106
Cross	108
GEORGE A. OAKES.	
Recalled	110
RESPONDENT.	
GEORGE W. THOMPSON.	
Direct	115
Cross	135
RALPH H. THOMPSON.	
Direct	141
Cross	167
CHARLES E. HODGKISS.	
Direct	167

	PAGE
FRANK C. AXTELL.	
Direct	168
Cross	202
Re-direct	215
GEORGE W. THOMPSON.	
Recalled	217
Cross	222
RALPH H. THOMPSON.	
Recalled	226
Cross	228
Re-direct	228

COMPLAINANTS' REBUTTAL.

JOHN H. CULLEN.	
Direct	229
THOMAS DILLON.	
Direct	230
Cross	231
THOMAS MONAHAN.	
Direct	232
Cross	233
WILLIAM I. POWERS.	
Recalled	234
THOMAS OAKES.	
Recalled	238
Observations of the Vice-Chancellor	239

COMPLAINANTS' REBUTTAL CONTINUED.

GEORGE A. OAKES.	
Recalled	242

DURAND WOODMAN.	PAGE
Direct	244
Cross	267
HUGO SCHWEITZER.	
Direct	273
Cross	282
GEORGE OAKES.	
Recalled	285
Cross	286

RESPONDENTS' CASE CONTINUED.

FRANK C. AXTELL	
Recalled	287
Cross	322
Re-direct	331
GEORGE W. THOMPSON.	
Recalled	332
Cross	334
RALPH H. THOMPSON	
Recalled	335
JOHN H. WARD.	
Direct	340
Final Decree	357
Opinion	358
Appeal	375
Petition of Appeal	375

EXHIBITS.

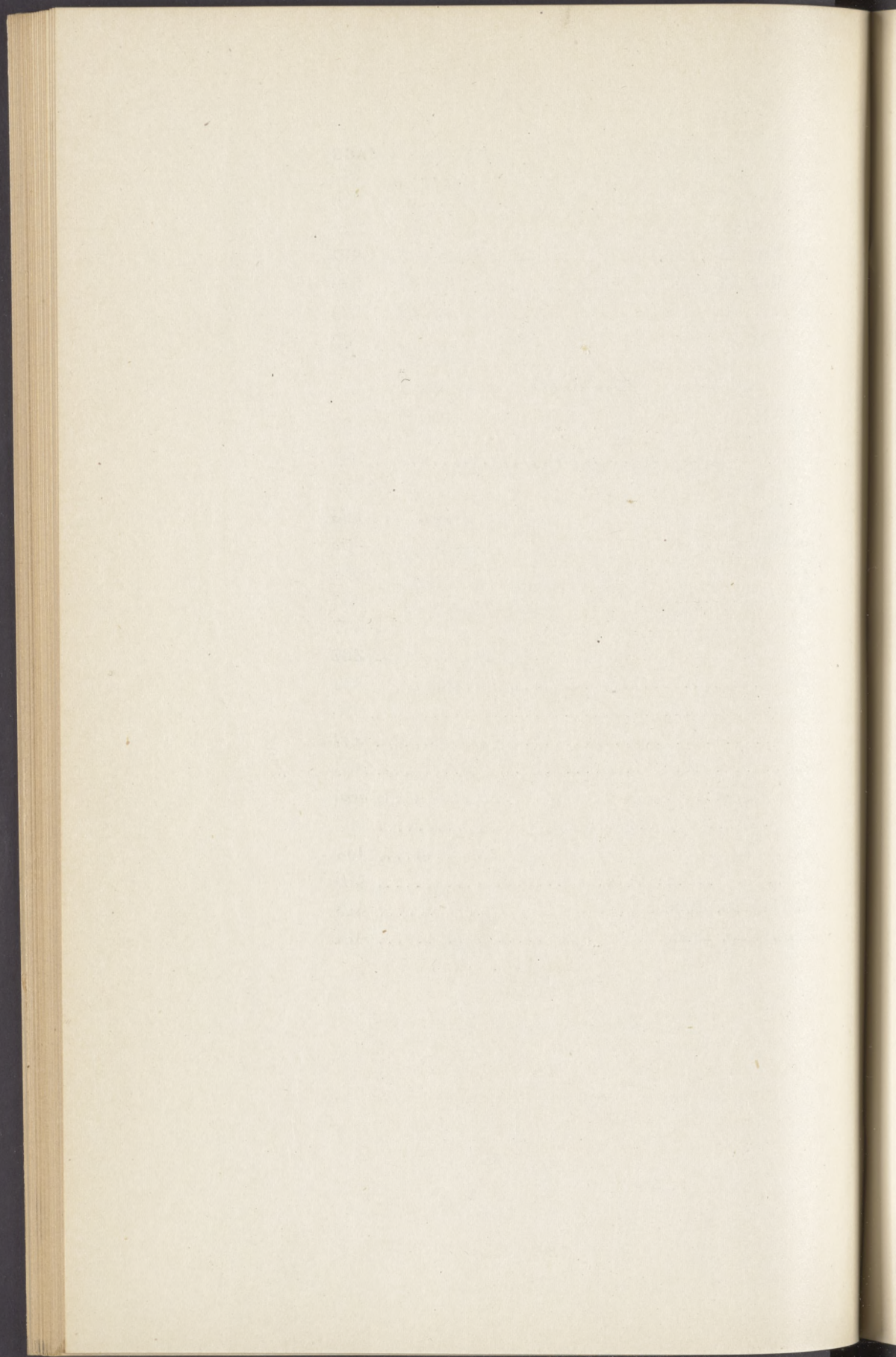
COMPLAINANTS.

C 1	377
C 2	377
C 3	377

	PAGE
C 4.....	377
C 1, May 16.....	379
C 2, May 16.....	379
C 3, May 16.....	379
C 4, May 16.....	379
C 5.....	379
C 6, May 16.....	379

DEFENDANT.

D 1.....	380
D 2.....	381
D 3, May 16.....	382
D 4, May 16.....	383
D 5, May 16.....	384
D 7.....	385
D 8.....	386
D 8a.....	387
D 9.....	388
D 10.....	389
D 3.....	390
D 4.....	392
D 5.....	393
D 6.....	394
A.....	398
B.....	404
C.....	410
D 1, May 16, 1906.....	413
D 2, May 16, 1906.....	421



BILL OF COMPLAINT.

FILED NOVEMBER 29, 1905.

To his honor, William J. Magie, Chancellor of the
State of New Jersey:

Humbly complaining, show unto your Honor 10
your orators the Morris Canal and Banking Com-
pany, a corporation of the State of New Jersey,
and the Lehigh Valley Railroad Company, a corpora-
tion of the State of Pennsylvania, lessee of the
Morris Canal and Banking Company, as follows:

First—Your orator the Morris Canal and Bank-
ing Company is a corporation of the State of New
Jersey, chartered by an act of the Legislature
passed December thirty-first, eighteen hundred and
twenty-four, entitled “An act to incorporate a com- 20
pany to form an artificial navigation between the
Passaic and Delaware Rivers;” and said company
obtained and has the powers granted by said act,
and the various supplementary and amendatory
acts which have been passed from time to time by
the Legislature.

Second—By virtue of its said charter the Morris
Canal and Banking Company constructed, and 30
previous to the year eighteen hundred and
thirty completed and put in use, a public canal
or waterway from the Delaware River to the
Passaic River at Newark; and afterwards, in pur-
sueance of an act passed January twenty-sixth,
eighteen hundred and thirty-eight, extended the
said canal to the Hudson River at Jersey City, and
the said canal has been in continuous use for more
than seventy years past for the transportation of
goods from the Delaware River to the Hudson
River, pursuant to the charter of said company. 40

Third—The said canal is a public waterway and a public highway, free for the use of all people desiring to navigate the same with suitable boats, subject to the payment of the established tolls.

Fourth—By a supplement to the charter of said company approved March fourteenth, eighteen hundred and seventy-one, the Morris Canal and Banking Company was authorized to lease its boats, property, works, appurtenances and franchises, either perpetually or for a shorter time, and by virtue thereof did execute a lease to your orator, the Lehigh Valley Railroad Company, dated the fourth day of May, eighteen hundred and seventy-one, whereby it did let and demise unto the last named company, its successors and assigns, the entire canal and navigation works of the said Canal Company from the River Delaware at Phillipsburg to the River Hudson at Jersey City; to have and to hold the same unto the Lehigh Valley Railroad Company, its successors and assigns, to and for its and their only proper use and behoof forever.

Fifth—Pursuant to said lease and on or about the date thereof the Lehigh Valley Railroad Company took possession of the said canal and its appurtenances, and has ever since retained possession thereof and operated the same as a public canal and public highway under the terms of said charter and of the lease of said canal.

Sixth—The Diamond Mills Paper Company is a corporation of the State of New Jersey, incorporated in eighteen hundred and ninety-four under the General Corporation Act for the purpose of conducting a manufacturing business; and its manufacturing works and paper mills are located upon a stream known as the Third River in the Township of Bloomfield, Essex County, New Jersey, the

said works being located near the canal of your orators.

Seventh—In the process of manufacture by said Diamond Mills Paper Company, said company discharges into the water flowing from its mills a sediment which fills up the bed of the stream into which it flows and discolors the water and renders it impure and unsuitable for the use of other persons in their manufacturing operations. 10

Eighth—Said Diamond Mills Paper Company has recently, and from an early date in the spring of nineteen hundred and five, been unlawfully discharging the water from its mills into the Morris Canal, thereby discoloring and contaminating the water therein and filling up the said canal with the sediment issuing from the said Diamond Mills.

Ninth—Your orators show that under the contract made October fifth, eighteen hundred and fifty-eight, between the Morris Canal and Banking Company and Christopher T. Unangst, who was the predecessor in title to the Diamond Mills Paper Company, the said Diamond Mills Paper Company has obtained the right to use certain feed waters of the Morris Canal coming from the Third River under agreement to return the same to the canal; and it is the lawful duty of the said company to return the same uncontaminated and without sediment or coloring or offensive matter, so that they may be suitable for the use of your orators in operating their canal and may not be a nuisance to your orators or other people residing in the neighborhood of the canal, or to other persons by whom the waters are used at lower points where they flow out of the canal. (A copy of said contract is hereunto annexed, marked "Exhibit A," and made a part hereof.) 20 30 40

Tenth—The Diamond Mills Paper Company, against the repeated protests of your orators, have continued since the spring of nineteen hundred and five, and still do continue daily, to discharge into the canal, water discolored, impure and offensive, and carrying a heavy sediment which precipitates and becomes a deposit in the bottom of
 10 the canal, causing a nuisance to your orators by reason of the offensive character of the water, and a great expense to your orators because it fills up the canal, and likewise greatly embarrassing your orators, because the water so polluted at points below the point of such discharge into the canal injures and damages other persons to whom the water is afterwards supplied, and, especially, the same is a nuisance and annoyance to Thomas Oakes & Company, who conduct a woolen mill at Bloom-
 20 field, who complain that the water, by reason of said deposit and pollution therein by the Diamond Mills Paper Company, has become offensive and strongly impregnated with lime and totally unfit for the scouring of wool or the washing of cloth, which is the business of said Thomas Oakes & Company, and in which business they use said water; and they complain, also, that such deposit and pollution of the water makes it impossible for them to
 30 dye their woolens any color except black after the same have been washed with said water, which complaints of the said Thomas Oakes & Company your orators show have foundation in fact and are due, and solely due, to the wrongful acts of the Diamond Mills Paper Company, above complained of.

All which actings and doings of the said Diamond Mills Paper Company are unlawful and contrary to equity and good conscience, and tend to the manifest wrong, injury and oppression of your
 40 orators.

Forasmuch, therefore, as your orators have no adequate remedy at the common law, but can only be relieved in equity touching the premises; and to the end that the Diamond Mills Paper Company, who are the defendants in this suit, may answer all and singular the premises, but without oath, fully and particularly as if the same were here again rehearsed and they particularly interrogated thereto, and that the said Diamond Mills Paper Company may be restrained and enjoined from in anywise polluting or discoloring the waters issuing from their premises in the Township of Bloomfield aforesaid which flow into the Morris Canal, and from depositing any lime, sediment or other matter whatsoever, other than the unpolluted water of the Third River issuing from their premises, into the Morris Canal;

May it please your Honor, the premises considered, to grant unto your orators, not only the State's Writ of Injunction, to be directed to the said defendants, restraining and enjoining them in manner and form aforesaid, but also the State's Writ of Subpoena, issuing out of and under the seal of this Honorable Court, to be directed to the said defendants, commanding them, upon a certain day and under a certain penalty therein to be expressed, to be and appear before your Honor in this Honorable Court, to answer all and singular the premises, and to stand to, abide and perform such order and decree as your Honor shall make therein, and that your orators may have such other and further relief as may be agreeable to equity.

And your orators, as in duty bound, will ever pray, etc.

COLLINS & CORBIN,
Solicitors for and of Counsel
with Complainant.

EXHIBIT "A."

An agreement made this fifth day of October, A. D. 1858, between the Morris Canal and Banking Company, a body corporate of the State of New Jersey of the first part, and Christopher T. Unangst of the Township of Bloomfield in the State aforesaid of the second part;

Witnesseth, that the said party of the first part for and in consideration of the fulfillment of the stipulations hereinafter mentioned to be performed and kept by the party of the second part, his heirs and assigns, does hereby agree with the said Unangst and does permit and grant to him, his heirs and assigns, the right to use and employ all the feed water of the Morris Canal as it is or may be usually passed around the inclined plane known as Plane No. 11 East of the Morris Canal planes, situated at the east end of the seventeen mile level on the said canal.

This grant to be expressly understood as conveying only the right to use the water as it is or shall be fed around the said plane from the upper to the lower level of the canal, and which feed is to be under the control and direction of the said company and their agents. It is likewise understood that this grant is upon the further condition that the said company reserves to itself, the right to alter and change the form and situation of the said plane from time to time as the said company may consider expedient and for the best interests of the said company, and that whenever any changes or alterations, in any part of the canal or its works, or any change in location of the canal, which shall, in the judgment of the said company, their successors and assigns, render it convenient or requisite to divert entirely the said water from the said Unangst, his

heirs or assigns, that nothing herein contained shall be construed to prevent it or to entitle the said Unangst, his heirs or assigns, to damages therefor.

It is further understood that the water, after being used by the said Unangst, his heirs or assigns, in its passage from the level above to the level below the plane, shall be conveyed into the canal by the said Unangst, his heirs or assigns, and in the use of the said water the navigation of the said canal is not in any way or manner to be impeded or affected. 10

The said party of the second part, for and in consideration of the privileges hereinbefore stipulated, agrees to and with the said company, for himself, his heirs and assigns, to pay to the said company an annual rent for the right to use the said water, payable quarterly on the first day of January, April, July and October of each year. The amount of said rent to be two hundred dollars per annum for the first fall of about twenty feet six inches, and two hundred dollars more, making four hundred dollars per annum whenever the said Unangst, his heirs or assigns, shall use the said water on a second fall, or use it on a head and fall of more than twenty feet six inches. 20

It is understood that in case the said company shall at any time take the water out of the canal during the suspension of navigation, except for the purpose of ordinary cleaning of the canal, then the said rent is to cease for so long as the water shall be so taken out of the canal, but in no other case is the rent to cease so long as the said party of the second part, his heirs or assigns, shall be at liberty to use the said water, as above stipulated. 30

In witness whereof, the said company has caused 40

their corporate seal and the signature of their president to be hereunto affixed the fifth day of October, A. D. (1858) eighteen hundred fifty-eight, and the said Unangst has signed and sealed the same.

E. MARSH, President,
M. C. & B. Co. [SEAL.]

10 Attest:

W. D. WILLIAMS,
Secretary.

CHRISTOPHER T. UNANGST. [SEAL.]

ANSWER.

20

FILED JANUARY 11, 1906.

The answer of the Diamond Mills Paper Company, defendant, to the bill of complaint of the Morris Canal and Banking Company, and the Lehigh Valley Railroad Company, complainants.

30 These defendants answering, admit that the Morris Canal and Banking Company is a corporation of the State of New Jersey, chartered by the act of the Legislature mentioned and referred to in the complainants' bill, and that the said company has obtained and has the powers granted by the said act and the various supplementary and amendatory acts which have been passed from time to time by the Legislature.

40 And this defendant further answering admits that by virtue of the said charter the said Morris Canal and Banking Company constructed, completed and put in use a public canal or water way from the Delaware River to the Passaic River at

Newark, and extended the same to the Hudson River at Jersey City, at the times in the said bill stated, and that the said canal has been in continuous use as in the said bill stated, and for the period therein stated; and it admits that the said canal is a public waterway and a public highway, free for the use of all the people desiring to navigate the same, with suitable boats, subject to the payment 10 of the established toll.

And this defendant further answering admits that, by virtue of the provisions of a supplement to the charter of the said company, approved March fourteenth, eighteen hundred and seventy-one, the Morris Canal and Banking Company was authorized to lease its boats, property, works, appurtenances and franchises, either perpetually or for a shorter time, and that by virtue thereof it did execute the lease mentioned in the said bill to the com- 20 plainant, the Lehigh Valley Railroad Company, dated the fourth day of May, eighteen hundred and seventy-one, and that the said lease is of the purport and effect mentioned and described in said bill.

And this defendant further answering admits that the said complainant, the Lehigh Valley Railroad Company, took possession of the said canal and its appurtenances, and has retained possession 30 thereof since that time, and has operated the same ever since that time as a public canal and highway.

And this defendant further answering admits that it is a corporation of the State of New Jersey, incorporated in the year eighteen hundred and ninety-four, under the general corporation act, for the purpose of conducting a manufacturing business, said business being that of the manufacture 40 of paper, and that it has and operates manufactur-

ing works and paper mills in the Township of Bloomfield, in this State, which are located upon a stream known as Third River, the said works being located near the Morris Canal.

And this defendant further answering denies that in the process of manufacture by it, it discharges into the water flowing from its mills a sediment
10 which fills up the bed of the stream referred to in the said bill, and it denies that any of the water from the said mills flows therefrom into the said stream and discolors the water thereof and renders it impure and unsuitable for the use of other persons in their manufacturing operations.

And this defendant further answering denies that it has recently and from an early date in the spring of nineteen hundred and five been unlaw-
20 fully discharging the water from its mills into the Morris Canal, thereby contaminating the water therein and filling up the said canal with the sediment issuing from the said Diamond Mills.

And this defendant further answering admits that under the contract mentioned and referred to in the said bill made October fifth, eighteen hundred and fifty-eight, between the Morris Canal and Banking
30 Company and Christopher T. Unangst, who was the predecessor in title to this defendant this defendant has obtained a right to use certain feed waters of the Morris Canal under agreement to return the same to the canal. But it denies that by the said contract its rights to use the said water was limited to certain feed waters of the Morris Canal coming from the Third River, and it further denies that the said feed water, the right to use which was obtained by this defendant as aforesaid, did or does in fact come from the said Third River.

40 And this defendant further answering admits

that it has since the spring of nineteen hundred and five, and for many years prior to that time, and ever since the twenty-ninth day of August, eighteen hundred and ninety-four, discharged into the canal water to some extent discolored, but it denies that it has since the spring of nineteen hundred and five, or at any other time, discharged into the said canal water impure and offensive, and carrying a heavy sediment which precipitates and becomes a deposit in the bottom of the canal, causing a nuisance to the complainant by reason of the offensive character of the water and a great or any expense to the complainants by the filling up of the canal by such sediment and in any manner embarrassing the complainants, because the water so polluted at points below the point of such discharge into the canal injures and damages other persons to whom the water is afterwards supplied. And this defendant denies that the same is a nuisance and annoyance to Thomas Oakes & Company who conduct a woolen mill at Bloomfield, and that they complain that the water, by reason of said deposit and pollution therein by this defendant has become offensive and strongly impregnated with lime and totally unfit for their business of the scouring of wool or the washing of cloth, and that such deposit and pollution of the water makes it impossible for the Thomas Oakes & Company to dye their woolens any other color except black, after the same have been washed with the said water. And this defendant say that the said Thomas Oakes & Company do not use the water of the canal in their said business, but draw their water from their own pond which is entirely supplied by the water of said Third River and by springs; that said canal and the Third River are entirely separated and are at different levels or heights, and that at a point near the

10

20

30

40

mill pond of the said Oakes the water of the said canal flows over and across the said river in and through an aqueduct of the said complainants, which said aqueduct is in bad repair and in a leaky condition, and that by reason of the neglect of the complainants or one of them to repair the said aqueduct considerable quantities of canal water escape
 10 therefrom and fall into the said river which may contain lime, some of which may find its way into the pond of the said Oakes, though not, this defendant believes, in quantities sufficient to interfere with the use of such water by the said Thomas Oakes & Company in their said business.

And this defendant further answering says that by the contract referred to in the complainants' bill, dated October fifth, eighteen hundred and
 20 fifty-eight, between the Morris Canal and Banking Company and Christopher T. Unangst, the said canal company permitted and granted to the said Unangst, his heirs and assigns, the right to use and employ all the feed waters of the Morris Canal as it is or may be usually passed around the incline plane known as plane number eleven, east of the Morris Canal planes, situated at the east end of the seventeen mile level and that the only limitation expressed in said contract to the use
 30 of the said water so passing around the said plane was that the water after being used by the said Unangst, his heirs or assigns, in its passage from the level below the plane should be conveyed into the said canal by the said Unangst, his heirs or assigns, and that in the use of the said water the navigation of the said canal should not in any manner be impaired or affected. And this defendant further says that immediately after the execution of the said contract the said Unangst, or his heirs
 40 or assigns, began to use the said water for manu-

facturing purposes, and that the same has been so used ever since that time; that on the seventh day of December, eighteen hundred and sixty-one, the said Unangst assigned the said contract to Jonathan W. Potter, by deed dated on the day and year last aforesaid; that on or about the first day of December, eighteen hundred and sixty-five, the said Jonathan W. Potter, by a certain agreement in writing, dated on that day, leased to Robert W. Southmayd and Charles A. McCracken part of the privileges and water rights granted in said agreement between the said canal company and the said Unangst, to wit, the right to use and employ the said feed water on the second level of the said inclined plane, after the same had passed into and from the tail-race of the said Jonathan W. Potter, as fully beneficially as the party of the first part was by the terms of the first mentioned agreement authorized to grant the same; that ever since the last mentioned agreement, dated December first, eighteen hundred and sixty-five, the said feed water on the second level of the said inclined plane has been used in the manufacture of paper in the paper mill described in the said bill belonging to this defendant; that on the twenty-ninth day of September, eighteen hundred and ninety-four, this defendant acquired the said right by deed dated on the day and year last aforesaid, that had formerly been granted to the said Southmayd and McCracken; and that ever since the last mentioned date this defendant has used the said feed waters in its business of manufacturing paper.

And this defendant further answering says, that ever since the first day of December, eighteen hundred and sixty-five, the owners of the said mills now owned by this defendant, acting under the assignment above referred to, to the said South-

mayd and McCracken, and under divers assignments of the said grant or permit to them, have used the said feed water in the manufacture of paper, and that by reason of such use the said water after it left the said mill at all times contained chloride of lime and a sediment consisting of fibrous matter; that for many years since the use of
10 the said water for a paper mill, and up to the year eighteen hundred and ninety-four, the said chloride of lime and fibrous matter were discharged into the said canal from the said mill in greater quantities than during the time when the said mill was operated by this defendant; that ever since the said mill was operated by this defendant, to wit. the twenty-ninth day of August, eighteen hundred and ninety-four, the said chloride of lime and fibrous matter
20 have been discharged into the said canal in very small quantities: that such discharge apparently discolors the water of the canal at the point of discharge, but does not pollute such water or render it offensive or a nuisance in any way, but on the contrary thereof the chloride of lime contained in the water discharged into the canal from this defendant's mill tends to purify such water, and frees it to a considerable extent from organic matter contained in it before its use by this defendant; that
30 during all the period of time last aforesaid the fiber discharged into the canal by this defendant has been a very fine linen fiber, which settles and is deposited on the bed of the canal, but it does not fill up the bed of the canal or impair navigation therein to the slightest extent, or put the complainant to any expense whatever in cleaning or dredging the canal or in any other way.

And this defendant further answering says, that the said complainant, the Morris Canal and Bank-
40 ing Company, has, ever since the said first day of

December, eighteen hundred and sixty-five, to the fourth day of May, eighteen hundred and seventy-one, the date of its lease to the complainant, the Lehigh Valley Railroad Company, acquiesced in the use of the said feed water in the manufacture of paper and the discharge into the said water, in the process of such manufacture, of chloride of lime and fibrous matter and made no complaint to the owners of the said mill in respect thereto; and that ever since the lease to the complainant, the Lehigh Valley Railroad Company mentioned in the said bill, and up to the spring of nineteen hundred and five, both of said complainants have acquiesced in such use of said feed water, and to the discharge by reason of such use into the said canal of chloride of lime and fibrous matter, and made no complaint to the owners of the said mill in respect thereto; and this defendant charges that the practical construction put upon the said contract of October fifth, eighteen hundred and fifty-eight, between the Morris Canal and Banking Company and the said Christopher T. Unangst, his heirs and assigns, is such as to permit the use of the said feed waters and their conveyance into the said canal in the manner and condition in which the same have been used and conveyed into the said canal, by the defendant and the other paper makers who have used the same as aforesaid, ever since the first day of December, eighteen hundred and sixty-five.

And this defendant prays to be hence dismissed with its reasonable costs and charges in this behalf most wrongfully sustained.

LINTOTT, JOHNSON & CAPEN,

Solicitors for and of Counsel with the Defendant.

REPLICATION.

FILED JANUARY 30, 1906.

The complainants join issue on the answer of the defendant.

COLLINS & CORBIN,
Complainants' Solicitors.

10

ORDER OF REFERENCE.

FILED FEBRUARY 2, 1906.

20 On consent of the solicitors of the respective parties it is, on this thirtieth day of January, in the year of our Lord one thousand nine hundred and six, ordered, that the above entitled cause be and the same is hereby referred to Honorable Henry C. Pitney, one of the Vice Chancellors of this Court, to hear the same for the Chancellor, and to report thereon to him and advise what order or decree should be made therein.

W. J. MAGIE, C.

30 We consent to above order, that the Vice Chancellor fix a time and place of hearing of the same, without notice of motion so to do.

COLLINS & CORBIN,
Complainants' Solicitors.

LINTOTT, JOHNSON & CAPEN,
Solicitors of Defendant.

40 Designation of hearing of cause was duly made and notice of hearing given for April 4th and 5th, 1906, at the Chancery Chambers in Newark.

PETITION FOR LEAVE TO AMEND
ANSWER.

FILED MARCH 13, 1906.

*To his Honor, William J. Magie, Chancellor of the
State of New Jersey:*

Your petitioner, the Diamond Mills Paper Com- 10
pany, the above-named defendant, respectfully
shows that the complainants' bill was filed on the
twenty-ninth day of November, nineteen hundred
and five, complaining that the defendant discharges
unlawfully into the Morris Canal water flowing
from its mills containing a sediment which dis-
colors and contaminates the water of the said canal,
and which fills up the bed of the said canal, to the
great damage and expense of the complainants,
who control and operate the said canal as a public 20
highway, and to the injury and annoyance of other
persons to whom the water of the canal is after-
wards supplied, and especially to Thomas Oakes &
Company; and praying that this defendant may
be enjoined from in any wise polluting or discolor-
ing the waters issuing from said mill property
which flow into the said canal, and from depositing
any lime or sediment therein.

That this defendant, on or about the twenty- 30
eighth day of December, filed its answer to the
said bill, denying the injury complained of, and
also claiming that under a contract between the
Morris Canal and Banking Company and one
Unangst for the use of the water of the said canal,
which contract was also referred to in the said bill,
and a copy of which contract was annexed thereto,
this defendant and its predecessors in the use of
the said water had for many years, with the acqui-
esence of the complainants, been using the water 40

of the said canal for the purpose of manufacturing paper in the said mill and discharging it into the said canal after such use containing chloride of lime and fibrous matter, and charging that they were permitted by the practical construction put upon the said contract to continue to use the said water and to discharge the same after use therein
 10 into the canal in the same manner and condition in which the same have been used and conveyed ever since the first day of December, eighteen hundred and sixty-five; which answer was not sworn to, answer under oath having been waived by the complainants.

And your petitioner refers for greater certainty to the same bill and answer so as aforesaid filed with the clerk of this Court.

20 That after the filing of the said answer the complainants submitted and filed in this Court affidavits in support of their bill and applied for and obtained a rule to show cause why a preliminary injunction should not be issued according to the prayer of the bill, returnable January thirtieth, nineteen hundred and six, that the defendant submitted counter affidavits which were also filed in this Court; that the matter came on for hearing on the said return day of the said rule before his Honor, Vice-Chancellor Pitney, when the said preliminary injunction
 30 asked for was refused; and that afterwards the said cause was regularly referred by order of this Court to the said Vice-Chancellor who appointed the fourth and fifth of April, nineteen hundred and six, at the Chancery Chambers, in Newark, for the hearing of the same.

That the said affidavits filed for the defendant stated facts responsive to the facts alleged in the said bill, and in the said answer and consistent with
 40 the facts and defense set up in the said answer,

but in addition thereto to which affidavits and the facts therein stated your petitioner respectfully refers.

That from the facts stated in the said answer and affidavits, defendant is advised that the defence claimed in the said answer that it is permitted by a practical construction of the said contract, to use the feed waters of the said canal and to convey the same into the canal after such use in the same manner and condition in which the same have been used and conveyed into the canal by this defendant and the other paper makers who have used the same ever since the first day of December, eighteen hundred and sixty-five, is too narrow and may mislead the complainants; that this defendant may also claim and insist on proof of the said facts so stated; that independently of the said contract the defendant has acquired the right by continuous user for over twenty years by itself and its predecessors to use the said feed waters in its said business, and to discharge the same into the said canal in the manner and condition in which they have been formerly so used and conveyed into the said canal; and that it may further claim and insist on proof of the facts set forth in the said answer and affidavits on its part that by reason of the acquiescence of the said complainants in the use of the said feed water of the canal by the Diamond Mills Paper Company of New York, and by this defendant since January, nineteen hundred and four, the complainants are precluded and estopped from obtaining the decree prayed for by them.

And this defendant further shows that the limitation of its defence in the said answer to a denial of the injury complained of, and to the effect of practical construction of the said contract between the Morr's Canal and Banking Company and the

said Unangst was made inadvertently and without a full knowledge and consideration of its rights in the premises, and it prays that it may be permitted, on condition that the hearing of the said cause may proceed on the days already fixed for the same, to amend its said answer or to file a supplemental answer in the words and language following:

10 And this defendant further answering says that independently of the contract referred to in the said bill between the complainant, the Morris Canal and Banking Company and the said Unangst, and his heirs and assigns, dated October fifth, eighteen hundred and fifty-eight, this defendant has acquired the right by continuous user thereof by itself and its predecessors for over twenty years to continue to use the said feed waters in its said business and to discharge them after use into the said canal in
20 the manner and condition in which the same have been used and conveyed into the said canal by the defendant and the other paper makers who have used the same as aforesaid ever since the first day of December, eighteen hundred and sixty-five.

And this defendant further answering says that the Diamond Mills Paper Company of New York, its immediate predecessor in the ownership and operation of the said mill, a corporation having the
30 same stockholders, officers and directors as this defendant, began to use and occupy the said mill in January, eighteen hundred and ninety-four, and continued to operate the same substantially as this defendant has been operating it ever since the twenty-ninth day of September, eighteen hundred and ninety-four, without any objection on the part of the complainants; that on or about July third, eighteen hundred and ninety-four, the said Diamond Mills Paper Company of New York purchased said
40 mill and the right to use and employ said feed waters

on the second level of the said inclined plane for about the sum of twenty-two thousand dollars; that on the twenty-ninth day of August, eighteen hundred and ninety-four, this defendant was incorporated in this State; that on the twenty-ninth day of September, eighteen hundred and ninety-four, the Diamond Mills Paper Company of New York conveyed to this defendant the said mill property and water rights, for the said sum of twenty-two thousand dollars or about that sum payable in the stock of this defendant; that this defendant and its immediate predecessors bought the said mill property and water rights, relying on their right to use the said feed water in their business of paper making in the manner set forth in the original answer filed in this cause; that still further relying on their said right to use the said feed water in their said business, this defendant expended, besides the first cost of said property, in additions to the said mill and equipping the same, more than the sum of ninety-eight thousand dollars up to and including the year nineteen hundred and two, before any complaint was made to it by the said complainants, or either of them, as to the use by this defendant of the said feed water in its said mill and its discharge of the same into the said canal, discolored, containing fibrous matter and lime, chloride of lime, chlorine or other substance; that the complainants well knew of the purchase of the said mill property by this defendant and of its erection of an addition or additions thereto and equipping the same at great cost and expense, and of the use by the defendant of the said feed water and the discharge of the same after use into the said canal in the manner and conditions above stated, and that no complaint was made by the complainants, or either of them, of the matters complained of in the said bill until April, nineteen hundred and five. And this de-

10

20

30

40

10 feendant says that unless it can carry on its business in the manner stated by it in its said answer it will be compelled to give up the said business in the said mills to its great loss and damage; and it charges that by reason of the facts set forth in this paragraph the complainants are precluded and estopped from obtaining the decree of this Court prayed for by them.

And this defendant submits to the Court that all and every of the matters in the said complainant's bill mentioned and complained of are matters with respect to which the said plaintiff is not entitled to any relief from a court of equity, and this defendant hopes he shall have the same benefit of this defense as if he had demurred to the said complainant's bill.

20 Duly verified.

Order giving leave to amend answer.

FILED MARCH 13, 1906

30 It is ordered, on this thirteenth day of March, nineteen hundred and six, on motion of counsel for defendant and by consent of counsel for the complainants, that the defendant have leave to amend its answer in accordance with the prayer of its petition for that purpose filed this day, on condition that the replication already filed shall stand as a replication to the amended answer and that the cause shall be heard on the days already fixed for the said hearing.

W. J. MAGIE,
C.

Respectfully advised.
H. C. PITNEY,

40

V. C.

Petition to Admit Thomas Oakes and Com-
pany as Parties Complainant.

FILED APRIL 4, 1906.

*To the Honorable William J. Magie, Chancellor of
the State of New Jersey:*

The petition of Thomas Oakes and Company, 10
composed of Thomas Oakes, David Oakes and
George A. Oakes, manufacturers of woolens, of
Bloomfield, New Jersey, respectfully shows unto
your Honor that it is, among other things, engaged
in the business of scouring wool and the washing
of cloth, and its factory is located on the Third
River, which is crossed by the Morris Canal in the
Township of Bloomfield; and that the water, as it
comes down to the petitioners' property, is greatly 20
polluted and discolored by the operations of the de-
fendant, Diamond Mills Paper Company, and that
the grievance set forth in the bill of complaint
affect your petitioners more than any other persons;
and the causes of complaint set forth in the bill are
grievances of your petitioners which they suffer in
common with the complainants, and respecting
which they desire to be relieved in this Court.

They, therefore, respectfully pray that your 30
Honor will make an order admitting them as parties
complainant in this suit, and allowing them to join
the complainants in the prosecution of the same.

And your petitioners will ever pray, &c.

THOMAS OAKES AND COMPANY,
by

THOMAS OAKES.

HARRY E. RICHARDS,
Solicitor.

Duly verified.

Order admitting Thomas Oakes & Company as Parties Complainant.

FILED APRIL 4, 1906.

10 A petition having been filed by Thomas Oakes, David Oakes, and George A. Oakes, composing the firm of Thomas Oakes & Company, praying to be made co-complainants in the above entitled cause, and said petition coming on to be heard in the presence of Harry E. Richards, solicitor of said petitioners, Collins & Corbin, solicitors of complainants, and Lintott, Johnson & Capen, solicitors of defendant;

20 Ordered, on this fourth day of April, nineteen hundred and six, on motion of Harry E. Richards, solicitor as aforesaid, that said petitioners be admitted as co-complainants.

W. J. MAGIE,
C.

Respectfully advised,
H. C. PITNEY,
V. C.

30

40

TESTIMONY.

 BETWEEN

 THE MORRIS CANAL AND BANKING
 COMPANY AND THE LEHIGH VAL-
 LEY RAILROAD COMPANY,

Complainants,
and

DIAMOND MILLS PAPER COMPANY,

Defendants.

10

Transcript of shorthand notes of testimony taken in the above entitled cause before Hon. Henry C. Pitney, Vice Chancellor, at the Chancery Cham- 20
 bers, Newark, N. J., on April 4th, 1906, in the presence of Gilbert Collins and George S. Hobart, representing the complainants, Frederick T. Johnson, appearing for the defendants, and Harry E. Richards, counsel for Thomas Oakes & Company.

April 4, 1906.

MR. COLLINS—Mr. Richards desires to intervene and have Thomas Oakes & Company made parties 30
 complainant.

THE COURT—Are there any objections to Thomas Oakes & Company being joined as complainants?

MR. JOHNSON—Yes, sir; I don't think that he is a proper party.

THE COURT—Well, the rule was made by Chancellor Zabriskie; I don't know how long ago it was made, on account of a series of suits that I brought for damages against the same dam for flooding. 40

MR. COLLINS—It is a rule now.

THE COURT—Yes; I tried to combine them; the Chancellor declined. I don't know whether he wrote an opinion; but then he made the rule, I recollect very well. As I understand it a suit is brought to restrain the defendants from polluting the water of a stream.

10 MR. COLLINS—Third River.

MR. JOHNSON—Not Third River; Morris Canal.

THE COURT—One moment, Mr. Johnson. And Mr. Oakes has a mill situated on what is called Third River, and that is fed in part by the overflow of the canal; the overflow of the canal gets into it, is that it?

20 MR. COLLINS—The damage comes in two ways; one from the overflow at the spillway and the other is this: At the foot of the inclined plane there is quite a deep pit where the wheel revolves, and this chloride of lime and other matters that the mill charges empties into the canal and settles there, and has to be cleaned out before the canal can be put in navigation. The only way it can get out is to flow into the Third river, and for six weeks a year that every spring the thing is an absolute nuisance; so that the trouble comes from the spillway partly
30 and partly from this periodical difficulty.

THE COURT—You mean to say that the necessity for cleaning out the canal—

MR. COLLINS—Which has been fouled by the Diamond Mills Paper Company.

THE COURT—Results in the canal being obliged to dig this stuff out and put it into the river; is that it?

40 MR. COLLINS—There is no other way to get rid of it.

THE COURT—That may appear at the hearing. It isn't very clear to me now. If they dig it out I can't see why they can't cart it away somewhere else.

MR. COLLINS—You misunderstood me. I don't mean they put the solid matter in the river. They draw the water out. It is the water that runs down in the river—not this solid matter. 10

MR. JOHNSON—Mr. Oakes, as I understand it, and as he has stated, Thomas Oakes, he now asks to be admitted as a party complainant, gets his water from the Third river and from springs. We, the Diamond Mills Paper Company, use the water of the canal and return it to the canal—does not return it to the river at all. The canal and the river, as your Honor understands, is entirely separate, the canal being on a higher level than the river, crossing the river through an aqueduct, and that aqueduct is used as a spillway to allow the surplus water to be removed, and it goes into the river. Also there is a leak in the spillway which allows the water from the canal to flow in there at all times, at least there was. Now, your Honor can take three views of this case, one of three views. Either that we have a contract which allows us to use the water of the canal, as we have been using it, and discharge it again into the canal, polluted, perhaps—that is to be shown—in which case that is our right, and the canal company must see that that water does not get into the river, and if it does get in to the river, then Thomas Oakes & Company have a claim against the canal company and not against us. Again, we may have the right by long acquiescence, long usage, to continue to use this water, as we have been using it and discharging it into the canal. In that case also they must prevent; the canal company must prevent it from run- 20 30 40

ning into the river. If they allow it to go into the river, then Thomas Oakes & Company has a claim against them, and not against us; and if we are evil doers, wrong doers, and allow our polluted water from our mill to run into this canal, still the claim of Thomas Oakes & Company is not against us, but against the canal company, because they
 10 are the owners, the lessees of the canal; they are using it and operating it, and they must use it and operate it in such a way as to not injury anybody. In other words, we do not defile the river at all, except the canal water is allowed by the canal company to flow into the river.

THE COURT—It seems to me, Judge, as this bill was originally filed by the canal company and framed in that way that the application should now
 20 be by petition.

MR. COLLINS—It is; that is what we have.

THE COURT—Oh, I will see your petition then.
 (Court read petition.)

MR. JOHNSON—The petition does not set up very much. I have nothing further to add. The facts that I have stated are the facts that appear in the pleadings already filed and in the affidavit of Mr.
 30 Oakes.

THE COURT—Well, the Chancellor did not mean to make an absolute hard and fast rule which could not be subject to his control during the progress of the case. Now, Mr. Johnson's objection is, that Mr. Oakes, if at all, is injured secondarily, and though the complainant might succeed, it does not result that Mr. Oakes would succeed as against them, that their remedy is against the canal. Now, what have you got to say to that, Judge?

40 MR. COLLINS—I have to say this, sir, the bill is

no possible surprise. The bill states distinctly that the reason that the Morris Canal and Banking Company as lessee come here, is, in addition to their own grievance that Thomas Oakes, who has the place below, and into whom necessarily, under their franchise, they have to discharge water, for it is not only overflow at the spillway, cannot manage their canal in any other way than to send the water which the Diamond Mills Company uses under a contract with them not to pollute the water. Not at all. The contract has no such provision, but contract to use water and return it, and if they pollute it, of necessity it injures Mr. Oakes, and Mr. Oakes calls on them, the Lehigh Valley Railroad Company, lessee, to stop that thing, and they came in and met that, or attempted to, on our motion, these allegations in the bill, and we supported it by affidavits, and your Honor will recall the motion was made for injunction. Finally it was put for to-day without injunction, they agreeing to speedy hearing, and this is the hearing. Now, they undertake to say that Mr. Oakes did not really complain; that Mr. Oakes hadn't any grievance at all. It was because of Mr. Oakes's complaint that we were here, and Mr. Johnson has stated the strongest possible reason why Mr. Oakes should be a party to this suit, otherwise you will try the whole thing piecemeal. If Mr. Oakes is also brought in, and the rights of all the parties ascertained, it does not follow under that rule that the rights of two parties affected by a common nuisance shall be identical. They have varying degrees and they may have varying conditions that exist, and the very defence that they put in as against the Lehigh Valley Company in regard to this contract, would be available if Mr. Oakes filed a bill.

THE COURT—It strikes me the argument has

led to this point, that Mr. Oakes might have been made a party defendant to the original bill. You might have said you are between two fires: Oakes is after us. We want him bound by whatever the canal company could have said. Mr. Oakes is complaining of us for something that we have done or permitted to be done. It is the Diamond Mills Paper Company that is injuring, if anybody, and we want this controversy settled, and we will make Oakes a party defendant. I am not sure you could not have done that, but upon the whole I think he ought to be made complainant. I think the petition of Mr. Oakes should be granted, and I will make an order to that effect, subject, of course, to the objection of Mr. Johnson. I think it would be an advantage, if anything, to the defendant to have Mr. Oakes a party, decidedly. I don't think that he will be harmed at all by that, because if Mr. Oakes has got any claim against him, the bill would be dismissed as to Oakes, and that will settle the thing forever. If Oakes has a claim against him, then he ought to have it. If Oakes' claim is good, he is entitled to have a decree in his favor. If it is not good, as between Oakes and the defendant, why, the defendant will have a decree of dismissal against Oakes on the merits. The point that the counsel makes for the defendant is not lost at all by this being put in. You have got it still.

WILLIAM I. POWERS, sworn:

Direct examination by Judge Collins.

Q. You are the Superintendent of the Morris Canal Company, are you not? A. I am.

Q. And have been such for how long? A. I have been with the company for forty-three years, and I was Superintendent since 1888, and supervisor for this part of the canal since 1885.

Q. Are you familiar with the canal and appurtenances in the vicinity of the Diamond Mills Paper Company's works and Thomas Oakes & Company's works? A. I am.

Q. There is what you call the seventeen mile level that runs from where to where? A. From Lincoln Park to Bloomfield.

By the Court.

10

Q. From above Paterson, isn't it? A. Yes; from Lincoln Park to Bloomfield.

Q. At that part what is the construction that works that inclined plane at the end of the seventeen mile level? A. Inclined plane at Bloomfield.

THE COURT—Lower end is the plane; upper end, isn't there a lock in there, the upper end of the seventeen mile level? 20

A. There is a lock at the head of the seventeen mile level.

Q. At the east end of the seventeen mile level there is a dry plane, an inclined plane down which the boats run, go with a splash into the pool below? A. Yes, sir.

By the Court.

Q. Carried up and down by turbine wheel? A. 30
Yes, sir.

Q. What becomes of the water from the seventeen mile level down into the level below this inclined plane? A. Well, whenever these mills are privileged to use the necessary feed water when they are not running it passes down on the other side of the plane.

By the Court.

Q. You have a water flow, a water passage, from 40

the head of the plane to the foot of the plane? A. Yes.

By the Court.

Q. And the turbine wheel or water wheel that draws the boats up and down don't use all the water, particularly when you are not using the boats? A. The necessities of the canal are more than what is used to pass the boats.

Q. There is a surplus of water? A. It isn't a surplus of water; it is the water necessary for the maintenance of the canal east of Bloomfield that passes around that way.

By the Court.

Q. That is called—I call it surplus water; it isn't needed to keep the level above up to its level, but it is needed to keep the level below, the ordinary leakage, swish over the side and all that sort of thing.

Q. Now, that goes around this plane into the level below; what is the name of that level? A. That is what we call the Bloomfield level.

Q. Now, then, have you a map that will show it; it will help us all.

THE COURT—Map or profile?

Q. This is a map, not profile; that shows the surroundings, doesn't it? A. Yes, sir.

Q. Here is the Morris Canal Basin, here is the plane (indicating). A. No; this is the canal (indicating).

Q. Then there is the basin there at the end of it? A. This is the rubber mill here (indicating).

Q. This, generally speaking, shows the situation? A. Yes, sir.

Q. Now, there is here marked "Combination Roll and Rubber Company?" A. Yes, sir.

Q. That is a factory that uses the water, what do you call it?

THE COURT—Feed water.

A. Feed water; we use it instead of passing it around this side of the canal; we allow them to use it.

10

THE COURT—That is all unintelligible; it is of no use whatever, that you are doing now; the stenographer can't get it down because you are pointing.

By the Court.

Q. How many mills are there to use the head water between the seventeen mile level and the Bloomfield level? A. Two.

20

By the Court.

Q. Give them? A. The Combination Roll and Rubber Company and the Diamond Paper Mill Company.

Q. And those are shown on this map, those two works? A. They are.

Q. And the Combination Roll and Rubber Company gets the water first? A. Yes, sir.

Q. And then the Diamond Paper Mill Company? 30

THE COURT—Is the water used twice over, first by one company and then by the other?

A. Yes, sir.

By the Court.

Q. How much is the head and fall of the plane there? A. It is about sixty feet.

40

By the Court.

Q. You divide it between them, or something like that? A. I think they each have about twenty feet.

THE COURT—Yes, clear.

10 Q. Then after the Diamond Mills Paper Company uses the water where does it go? A. It discharges into the canal at the bottom of the incline.

Q. Is there a pit there?

THE COURT—There is a wheel pit, of course?

A. There is a wheel pit which is deeper than the bottom of the canal.

20 Q. After the water has got into the Bloomfield level how is the canal carried from there eastward?

THE COURT—Carried across the Third river, is it?

A. Carried through an aqueduct across the Third river.

By the Court.

30 Q. Is it a wooden aqueduct? A. Yes, sir; wooden; built two years ago, new.

Q. And it replaced one of a similar character?

A. Yes.

THE COURT—Of course it has to be rebuilt every once in a while.

Q. Now, then, the Third river then is, of course, on a lower level at that point than the canal? A. Yes.

40 Q. And the canal crosses over in this aqueduct? A. Yes.

By the Court.

Q. Then that is called the Bloomfield level. Where is the next lock brake plane? A. Situate about, I think, a little over a mile below the inclined plane.

By the Court.

Q. What is the lock? A. Lift lock. 10

By the Court.

Q. Ordinary lock? A. Yes, sir.

By the Court.

Q. Then there is no inclined plane from there until you get to the Newark plane? A. No, sir.

By the Court.

Q. Is it about level from that lock, Bloomfield lock, to the head of the Newark inclined plane? A. Until you reach the lock in Newark. 20

By the Court.

Q. Is there a lock here in Newark? A. Yes, sir; five mile level, we call it.

By the Court.

Q. Where is the Newark lock? A. It is about an eighth of a mile above the inclined plane; High street plane. 30

By the Court.

Q. Near the inclined plane? A. Yes.

By the Court.

Q. They are on the north side of the canal; the Diamond Mills Paper Company? A. South side, 40

By the Court.

Q. Oh, yes, south side. I am mistaken. These broken lines, outlines of the water basins; there is a broken line here. The broken line shows where the water is taken out of the upper basin. That shows the water that comes out and runs into the Combination Roll Company. Is that square building the building of the Combination Roll Company? A. Up there (indicating).

By the Court.

Q. Way up here, right close to the basin? A. Yes, sir.

By the Court.

Q. Then the broken line shows their tail race? A. Yes, sir.

By the Court.

Q. And little point above the Diamond Mills Paper Company? A. Yes, sir.

By the Court.

Q. And overflow running under the canal; there is a broken line showing a raceway, or something of that kind, from the head of the Diamond Mills Paper Company, right across the plane. What is that? A. I said, your Honor, that one dotted line shows where they take the water from the other raceway when the upper mill is not running. This line (indicating) should not be there, if you will allow me to point; but the other point shows where the water comes in under the inclined plane track, which they use when the upper mill is not running.

By the Court.

Q. Then the overflow from feed water of the

canal is taken out some distance above the head of the inclined plane and carried all the way around below? A. Yes, sir.

By the Court.

Q. Shown by lines? A. Yes.

By the Court.

10

Q. And they can draw water by an aqueduct leading under the plane to the level? A. Stop-gate put in the raceway and turns the water in there.

By the Court.

Q. Third river runs right down alongside of the Diamond Mills Paper Company? A. Yes, sir.

By the Court.

20

Q. Down near the estate of Aaron S. Baldwin is where the canal crosses Third river by an aqueduct. Now what is the effect, necessary effect, of taking the canal over the Third river in an aqueduct as to the spilling of the water or the other necessary discharges of water from the canal aqueduct into the Third river? A. The aqueduct is used as an overflow for safety valve.

By the Court.

30

Q. The side of the aqueduct as an overflow? A. Yes, sir; it is built so that the water overflows when it gets too high, and there are flood gates in the aqueduct which are raised during times of storm.

By the Court.

Q. One end of the aqueduct; one side of it? A. Yes; lower side.

Q. Is that a necessary construction?

40

THE COURT—That is a question.

A. Yes, sir; it has always been used as such.

10 THE COURT—It has always been used that way; very convenient thing, undoubtedly. Whether that would be an answer to a suit by Mr. Oakes against the Canal Company is quite another question. He could say, "Take care of your own dirt."

Q. Well, as a matter of fact it does overflow, and also you have to open flood gates for what purpose?

A. Beg pardon.

By the Court.

20 Q. For what purpose do you have to open flood gates? A. To take care of the storm water that falls in that vicinity.

By the Court.

30 Q. You mean to say that it is a necessary appurtenance to a canal to have places where the canal may overflow from surplus of water from any cause, from storm water or from other causes, to where the water can get into some running stream, is that what you mean? A. Yes, sir.

40 THE COURT—I believe if you will ask this gentleman, or some hydraulic engineer, he will tell you that the old theory that a canal could be run in such a way that a certain quantity of water would pass all the time, and one thing would balance the other, is an impossible problem; that there will be deficiencies and surplus, depending on the feeders of the

canal, depending on the amount of its use; there might come a flood of boats down altogether, and the use of the locks, letting them through, or letting them through the planes, would let down an unusual quantity of water, and drain, so to speak, lower the natural level, the proper level of a level 10 above, and overflow temporarily the level below. It is impossible to balance it exactly.

Q. Does your experience coincide with that statement? A. Yes.

THE COURT—I suppose that is what he was trying to say.

Q. That coincides with your experience? A. 20
Yes, sir.

Q. This is not the only contrivance of this kind; they are frequently along the canal, are they? A. They are.

By the Court.

Q. The canal is provided with them all the way along, as it always has been? A. Always has been.

Q. What amount of water goes into this Third 30 river from this overflow in the open flood gates, from this aqueduct by reason of the overflow and opening the flood gates, considerable? A. Yes; it varies; it varies at times; it swells; when you pass a boat over the canal it swells; caused by the boat entering into the foot of the plane.

THE COURT—Waves rise, when the boat comes splashing down in waves rise?

A. The facts are, we have to frequently stop 40

these mills, frequently, to keep them from overflowing that level.

Q. Have to stop their use of the water so as to prevent the overflowing? A. Yes, sir.

Q. But as a matter of fact a great deal of water does go into the Third River from this aqueduct?

A. Yes, sir.

10

By the Court.

Q. And necessarily, with the apparatus as you now have it, the canal could not be run as it is now arranged without overflowing more or less water into the river? That is a fact, is it? A. That is a fact.

Q. Does it vary at different times of the year, more sometimes than others? A. No. The quantity necessary to take out of there?

20 Q. No; the quantity that runs into the Third River from the aqueduct? A. Well, I think during the summer season there is more; during the season of navigation there is more passes over, when the boats are moving.

By the Court.

30 Q. Yes; when you have any; I understand you don't have many? A. There are some.

By the Court.

Q. Well, during the winter now, do you keep water running on that seventeen mile level in order to keep the Diamond Mills Paper Company and this other thing going? A. No, sir.

By the Court.

40 Q. They have to stand still, eh? A. They only have what is necessary to keep the canal up.

By the Court.

Q. In the winter time when you are not navigating? A. We limit them to the needs of the canal.

By the Court.

Q. You do have water running through the seventeen mile level? A. There is some. 10

By the Court.

Q. Do you stop the mills in winter. A. Yes, we frequently stop them.

Q. How often do they have to stop the mills in the winter? A. I think there are other witnesses will be able to tell you better than I can.

Q. Do you have to draw the water off from this pit at the bottom of the plane? A. Yes. 20

Q. Why? A. To remove the sediment that gets into the canal from this mill, and to examine the wheel pit and make necessary repairs to the wheel pit track.

Q. When the water is drawn off where does it run? A. It goes in the Third River.

By the Court.

Q. Now, let me ask you a question there which I suppose counsel will ask on cross-examination. You don't mean that any sediment don't come around by your regular raceway from the head of the canal down to there, do you? A. I do. 30

By the Court.

Q. No sediment at all? A. No.

THE COURT—That is an incredible statement.

A. The water is perfectly clear and pure up there.

THE COURT—It may seem so to you, but the fact is otherwise.

10 Q. When you draw this off—A. Pardon me; I don't mean to say nothing comes in there, because there is water comes in from another source, from the land there, and washes some sand in there.

Q. Not from the level above? A. Not from the water in the canal.

Q. When do you draw this off, this water? A. In the spring of the year; March or April.

Q. Have you done it this year? A. Not as yet.

Q. Now, Mr. Powers, what does the rubber mill use the water for? A. For power.

20 Q. Do they in any way contaminate it? A. Not to my knowledge.

Q. Run clear from there? A. I so understand it.

Q. What do the Diamond Paper Mills Company use the water for? A. For power and washing their fabric, as I understand.

Q. Fabric that they make paper of you mean, the paper stock?

THE COURT—Washing the stock is the word.

30 Q. What is the effect of their use of the water?
A. The effect of their use? There is a good deal of sediment and discolored matter comes into the canal at the foot of the incline.

Q. Runs in at the foot of the incline? A. Yes, sir.

Q. Tell us what you have observed about that? What have you observed? Take the year 1905? What did you observe with respect to the effect of the use of the water by the Diamond Paper Mills
40 Company upon the water as they discharged it then

into the artificial stream that run into the basin at the foot of the incline? A. Well, I am not there very frequently, but there were at least three or four times that I saw it coming in there very much discolored and a great deal of sediment into it.

Q. What kind of color? A. It was dark, milky color. 10

Q. How does it smell? A. Well, you get an odor from it by standing where it discharges into the canal; sort of a pungent odor; I don't know what you would call it.

THE COURT—I will tell you what the expert called it in one case. He said it smelled like a washerwoman's place where she used a good deal of chlorine.

Q. How thick was that sediment in the spring of 1905 in your pit at the foot of the incline; how large a deposit? A. Well, I don't know that I saw it; there are persons here who did, and cleaned it out. I couldn't say as to that. 20

Q. What have you seen? A. I have seen it at times.

By Mr. Johnson.

Q. When? A. As I said before, during the summer months the incline, or the car running in there, keeps it stirred up, and it floats on down to the level; but during the winter months it settles in there, and it varies; that is, the top of it will be thin. There is about three feet of water in there when the level is drawn off as well as it can be drawn from the gates, and when that is drawn out there is a great deal of this that passes out with the water, leaving probably a foot of hard sediment in there, which we take out and take away. 30 40

Q. Have you seen that yourself? A. I have seen that frequently.

Q. When? A. Oh, almost every year.

Q. What does it look like? A. Well, it has a light color, stringy, good deal of fibre into it—lime I should think; appears to be lime.

Q. What does it smell like? A. Well, it has a
10 bad odor.

THE COURT—There is no such thing as describing an odor, you know, except by comparison.

By the Court.

Q. Well, does this map that you put in indicate the amount of space in what is called the Morris Basin, marked here Morris Basin; does that indicate the amount of space at the foot of the incline
20 plane? A. No, sir; that isn't all deep water; I couldn't explain to you without pointing.

By the Court.

Q. Well, as I understand it, this map doesn't show where the turbine wheel is which lifts your gates up and down, but the pair of broken lines running from the Diamond Mills Paper Company's building down to the canal indicates where it is?
30 That is, they empty in; that empties in right at the foot? A. Of their water line.

By the Court.

Q. Yes, right at the water line. Now, there is the deep spot, is it, just there? A. Not there; no, sir; that is right on the incline, but you go further down.

By the Court.

Q. There is a bridge across, wagon bridge? A.
40 Well, it is right under the bridge.

By the Court.

Q. You mean to say that is a deep spot? A. There and little below that.

By the Court.

Q. Then it is between that and what is marked here Morris Basin, is it? A. Yes, sir.

10

By the Court.

Q. And that is a little deeper than the other is, so that when you dry it out at the bottom of the aqueduct, side of the aqueduct— A. You don't dry it out of the aqueduct; we have a gate in the deep part of that pit, rather a trunk with a gate into it, which we take out, and it runs out into Third River at that point.

By the Court.

20

Q. And you have got a separate aqueduct then? A. Yes, sir.

By the Court.

Q. From this deep point, well, I will say it is right opposite the house marked Frank Wilcox; is that right? A. That is about right.

By the Court.

30

Q. Now, then, you have got a submerged trunk buried in the earth leading from there down to Third River somewhere running under your canal? A. Through the embankment of the canal into Third River, which runs right alongside.

By the Court.

Q. That is where you get this stuff into Third River, is it? A. In the spring of the year.

40

By the Court.

Q. When you clean out all this dirt, filth you say, you call it, that comes from the Diamond Paper Mills Company, you stir it up as far as you can stir it up so it will run, and run it down into the Third River? A. That is just in a liquid state, runs out when we draw the water out; the hard part is taken
10 out and put up on the embankment and taken away.

By the Court.

Q. It has all been liquid at some time or it couldn't get there; it all must have been liquid at some time; been thin enough to run or it wouldn't get there? A. Yes; must have been.

By the Court.

20 Q. Yes, because it is some distance below the point where it reaches the water; but you let the water out of that deep place by an underground trunk? A. Yes, sir.

By the Court.

Q. With it goes so much of this filth, I will call it, as will run? A. Yes, sir.

Q. So much as is floating, I suppose, in suspense?

30 THE COURT—You understand it gets thicker as it goes down.

Q. The part of it that is in suspense runs down?

THE COURT—In suspense, and of course it is all capable of being stirred up some time.

Q. You don't stir it up, but you just let the water off? A. That which is hard is taken out.

40 Q. How do you take it out? A. Wheel it out or throw it out.

Q. I mean with shovels? A. Yes.

Q. About how much of the quantity is there?
A. I couldn't tell as to that.

Q. Would it come to tons? A. I would say there were tons, yes, sir.

By the Court.

Q. What do you do with it when you you get it 10
on the canal bank? A. Boat it away.

By the Court.

Q. Boat it away? A. Take it outside, yes.

By the Court.

Q. Where do you dump it? A. On the embankment somewhere on the top of the tow-path, or elsewhere.

20

By the Court.

Q. He means eventually, in the end, where do you take it? A. We remove it on the scow.

Q. Where to? A. Oh, we take it out wherever it is convenient.

THE COURT—On the banks of the canal he says he puts it somewhere.

30

Q. That doesn't go into the river? A. Oh, no.

Q. Is that a source of annual expense to you?
A. It is.

Q. Considerable? A. Yes.

Q. How much? A. I couldn't say just how much.

Q. Approximately? A. It would be hard; on the immediate work in the spring of the year between \$35 and \$50 a year, but you see the greater part of that floats on down to the level, and it set 40

bles gradually and mixes up with the mud the other part of the level.

Q. Is this trunk with which you let the water off part of the original construction of the canal?

A. Always has been there ever since I had any knowledge of it, and used.

Q. What effect has this discharge from the Diamond Mills Paper Company on fish? A. Well, I
10 couldn't say, but I have never noticed many fish around there.

Q. Well, how is it above? A. There are a great many fish in the seventeen mile level.

Q. And below there are none? A. I can't say there are none.

Q. What do you say?

20 THE COURT—I will tell you right here; had this very thing threshed out in the Morris County Courts, and showed it didn't affect the fish at all, if you want to know what my experience is. Some people got the Diamond Mills Paper Company indicted at Whippany for killing the fish in the Whippany River, and when it come to the point they
30 couldn't prove their case; there wasn't anything in it. I don't say it is so here, but you ought to know what the feeling of the Court is about it.

Q. Is there anything like the number of fish below that there is above? A. I couldn't say anything about that.

40 THE COURT—It stands this way. The seventeen mile level is partially populated, and from there down it is thickly populated and the industrious boys fishing

all the while. Then again, the fish have got to go through two sets of water wheels, and the conditions are not favorable to the propagation of fish below, but you can go in it if you want to.

A. I understand there were very few fish below the plane in the level.

10

By the Court.

Q. And, more than that, you understand the level below, as I understand, is made dry in winter; it used to be when I crossed it on the D., L. & W. up here at the head; that is, kept dry; but they keep the upper level open and water running through it to supply these mills in the winter time?

A. We keep water in all the levels in the winter.

THE COURT—My dear sir, if you say that I will take it; but it isn't true. You keep a little?

20

A. About three feet.

THE COURT—Never mind; we won't get into that; want to keep on something that is credible. I have seen it myself up here crossing over and over again, and come in contact with the canal at other places.

30

A. It was out last winter up here at the Lackawanna crossing on account of the Lackawanna Railroad Company doing work up there.

THE COURT—My dear sir, it has been so for years. I don't want to get into that from any personal knowledge. They have to draw it off in the spring; of

40

10 course, there is a little water standing there, but they don't keep their canal full of water in the winter time, or anything like it. I said the reason why there would be fish above rather than below would be because there is more place for it; they are protected by ice; the water must run under the ice; the fish would live there better; breed there better.

Q. How recently have you seen this discoloration and sediment coming from the Diamond Mills Paper Company below where their outlet is; how recently? A. Oh, I have seen it within two months.

Q. And did you serve notice on them? A. I
20 served notice on them some time in 1905.

By the Court.

Q. This is letterpress copy, April, 1905, letterpress copy of the notice? A. Yes, sir.

THE COURT—Have they got it here?

JUDGE COLLINS—Have you got the original?

30 MR. JOHNSON—I haven't got it here; no, sir.

JUDGE COLLINS—I offer the map in evidence.

Marked Exhibit C 1.

Q. While we are on this subject, show with the letter O, about where the Oakes factory is; it isn't shown on it, and you might indicate where it is so the Judge would know; make a letter O about where it is. A. I should think about there (indicating
40 and marking location with letter O.

JUDGE COLLINS—Now, I offer that map and offer this notice.

Notice marked Exhibit C-2r
(Letter read.)

A I would say that I sent that letter upon receiving one from Mr. Oakes complaining.

Q. Did you ever get any reply? A. No, sir.

10

Cross-examination by Mr. Johnson.

Q. You say you have been superintendent of the canal company up there near this Bloomfield mill for a good many years? A. Yes.

Q. And you know how this mill has been operated?

THE COURT—You mean the Diamond Paper Mill?

Q. The mill now used by the Diamond Mills Paper Company? A. Yes. 20

Q. For all these years?

THE COURT—How many years have you known that as being operated there?

A. Oh, more than twenty five years.

Q. It has been used as a paper mill all that time, hasn't it? A. I think so; not all of the time; it has been idle some of the time. 30

Q. All the time that it has been used it has been used as a paper mill? A. I so understand it.

Q. And during all that time there has been sediment coming from this mill, has there not? A. At times.

By the Court.

Q. What do you mean "at times"? Do you mean it has ever been operated year in and year out without your finding any sediment there from 40

it? A. Sediment there every year, but there are only certain times of the day that they run it in.

By the Court.

Q. That is what you mean by at times? A. Yes.

Q. Do you remember when Mr. Fulton had it?

10 A. Well, about what time was that?

Q. Oh, in 1880 or 1882? A. I wasn't in charge of that part of the canal at that time.

JUDGE COLLINS—1885 he began; 1888 he began to be superintendent.

By the Court.

Q. But he was in the employ of the canal company for forty-three years? A. Yes, sir.

20

THE COURT—I understood him to say he had been thirty-five years—maybe he meant twenty five—in supervising this part of the canal.

JUDGE COLLINS—Since 1885 supervisor, and since 1888 superintendent of the whole.

30 Q. Soon after 1885 did you or not notice this limey, thick limey deposit, as you call it? A. I did.

Objected to as not cross-examination.

THE COURT—I think the objection is not well taken. Proceed.

Q. And then you saw that yourself at that time?

A. Yes, sir.

Q. And when was the last time that you saw this deposit of hard, limey substance? A. Saw it

40 last year.

Q. Are you sure about that? A. I think so.

Q. You think so.

THE COURT—That is what he says. Go on, Mr. Johnson.

Q. And just show me where you saw it, on the map, so I will know?

THE COURT—Let him tell you, and he don't want him to show on the map; you can have the map before you. 10

Q. I saw it in the canal where the wheel pit is located?

By the Court.

Q. Where the raceway, tail-race from the Diamond Mills Paper Company—I prefer to call it Colonel Thompson's Mill—tail-race entered into the water below; is that what you mean? A. Yes, sir. 20

Q. Do you mean that you saw it right at the tail-race; at the foot of the tail-race? A. I saw it in the deep part of the wheel pit.

By the Court.

Q. The deep part of the wheel pit, is that a few feet below that? A. Yes, sir.

Q. How many feet? A. I have also seen fibrous matter. 30

Q. Don't go into that. How many feet below the tail-race?

JUDGE COLLINS—Let him finish.

THE COURT—The witness has a right to finish his answer, and I must impress on counsel on both sides—it is very annoying—all counsel do it, and I want to call attention to it once for all. The wit- 40

ness must be permitted to finish his answer, and new question must not be put until it is finished.

A. I was saying I also have seen fibrous, slimey—

By the Court.

10 Q. You were not asked that; that is the trouble with your answer; you were not asked that. He asked you about hard matter. I observed the question at the time.

Q. I asked you how far below the tail-race—how many feet below the tail-race did you observe this thick deposit, lime, or substance that looked like lime? A. Well, I should say that, if I am allowed to, I see evidence of it all the way from where it discharges into the canal down into the wheel pit.

20 *By the Court.*

Q. All the way from where? A. From where it empties into the canal.

By the Court.

Q. I know, but that is the wheel pit. Now, then, you said something about seeing it further along? A. Down into the level.

30 *By the Court.*

Q. Yes, Bloomfield level? A. Well, I have seen fibrous matter down a considerable distance; I have seen the discolored water all the way down to the lock.

By the Court.

40 Q. All the way clear down to Newark, eh? A. And it would be hard to distinguish that from the mud; the boats stir it up and keep it mixed up with other matter; you couldn't distinguish the dis-

charge from the mill with other material into the canal.

MR. JOHNSON—If the Court please, the witness has not answered my question at all. He has evaded it. I am speaking and have been speaking all along of this deposit which you said you took out which was a foot thick, lime or substance that looked like lime, which was hard. Now, where did you see that? 10

A. At the foot of the plane, at the wheel pit.

Q. And how far below is that from the tail-race; how many feet, about? A. I can't say; not over about three or four hundred feet.

Q. Where the water is still? A. Yes.

Q. And when did you see that last? A. I think I saw it last March or April. 20

Q. Now, are you sure of that? A. I think so.

Q. It was when the canal was being cleaned? A. I think so.

Q. The canal has not been cleaned for a year, has it? A. Not at that point.

Q. Then there ought to be some there now? A. Yes.

THE COURT—Didn't clean it there this spring; I understand it. 30

MR. JOHNSON—No.

Q. Were you present when that canal was cleaned last year? A. I think I was there during the time they were cleaning it.

Q. Can you be sure you saw this limey substance taken out?

THE COURT—You have asked him that and he says he is sure of it. 40

Q. Now, as to the discoloration of the water, where did you observe that, in the tail-race? A. From where it empties into the canal all the way down for five—yes, half way down that level; half a mile.

Q. Did you ever take any of the water out in a bottle to see whether it was discolored? A.

10 No.

Q. There was a sediment in the water, you say?

A. Discolored water.

Q. In the discolored water there was a sediment in it?

THE COURT—He don't know that from looking at it.

MR. JOHNSON—He said there was sediment in it.

20

THE COURT—He said he found it in the spring when he cleaned it out and found sediment; ordinary sediment, mud in the bottom of the canal mixed with what he thought was hard material that he found at the foot of the plane, and that is the substance of what the witness swears to.

30 Q. Well, I will ask you whether you did see a sediment in the water?

JUDGE COLLINS—You mean in the running water?

MR. JOHNSON—Yes, in the running water.

A. I said I saw the water very much discolored.

Q. But you didn't see the sediment?

40

THE COURT—Except from pure coloring, water which may be conceived to be—I don't know whether I am right in that

or not—may be conceived to be not a sediment. The fact that water is discolored generally carries the idea that there is something in the shape of sediment ready to settle when it gets a chance. Sediment is that, I suppose, which will settle in time.

Q. Go back for a moment to this solid matter. You said that you saw tons of it. How much did you see of it last spring? A. Well, I couldn't say how much; a great part of it goes out with the water when you draw it off. 10

Q. Did you see tons of it then? A. Well, I couldn't say last spring that I did see tons of it, but I have seen tons of it in there different times.

Q. How long ago? A. Well, five years ago; ten years ago; three years ago. 20

By the Court.

Q. It was always there since the paper mill has run, hasn't it been? A. Yes, sir; always sediment there.

Q. Now, isn't there a lock; I think you have stated there is a lock about a mile below this aqueduct? A. There is.

Q. Could you not draw the water out of that lock for the purpose of cleaning your canal? A. Did we not? 30

Q. Could you not? A. I think we generally do draw most of it from there.

By the Court.

Q. What does that empty into? He is speaking about a lock; a lock doesn't naturally at all have an overflow, except around from the top to the bottom, that is, overflow into adjoining country; is there any stream crossing the canal between Bloomfield 40

and the head of the canal; head of the plane here in Newark; any other stream crossing it? A. Third River.

By the Court.

Q. Well, below that isn't there another? A. Well, we have a place where we draw water through a sewer out, within the city limits.

By the Court.

Q. That is the only place, eh? A. That is the only place.

By the Court.

Q. You have overflow? A. There is overflow here (indicating); Silver Lake.

By the Court.

Q. What does that empty into? A. I don't know.

By the Court.

Q. Eh? A. I really don't know.

By the Court.

Q. There must be some stream running away from there; you don't empty it out on the farmers' land. A. There is an outlet to that lake.

JUDGE COLLINS—There is Second River; where is Second River? A. Well, I may be a little mixed; Mr. Oakes is on the Second River, is he not?

JUDGE COLLINS—Third River. A. Then it is Second River; one drawing place.

Q. Place where you can draw out the water from the canal? A. Yes; on the five mile level.

Q. On the Bloomfield level? A. Yes.

Q. So that you need not use this aqueduct over the Third River at all? A. We are obliged to use it in time of storm; we can't take care of it at Second.

THE COURT—Cannot carry water from there down to the next overflow.

10

Q. For the purposes of cleaning you could use the other one exclusively, couldn't you? A. We can't draw off the foot of the wheel pit; are obliged to draw that from the Third River.

THE COURT—It has an underground trunk or passageway there for water which they open or shut at their pleasure, draw out the water from this wheel pit. You see as the boat goes down, the car 20 that carries the boat runs down into the water and it has to run down deep enough below the surface of the water to float the boat off. Now, the depth of the car itself under the water is considerable, three or four feet; and that I suppose is the place Mr. Powers has been talking about; he didn't say it in that way, but I inferred it, because I have seen it my- 30 self, got car with wheels under it; the bottom of the boat is two or three feet—I don't know how much—above the level of the wheels; it is set on a car. Well, now, the water must be deep enough under that car terminus to allow the boat to float off; as it does, in fact.

JUDGE COLLINS—That is right, Mr. Powers?

A. That is correct.

40

THE COURT—Yes; and there the water is two or three feet deep, necessarily. I forget how much Mr. Powers said it was?

A. About three feet.

10 THE COURT—And I don't know how much higher the bottom of the boat is; I have forgotten; I have seen it often, than the rails of the railroad,—runs down on a rail-
road. Whatever it is, they have to have that water there, and it is lower than the general bottom of the canal, and that is the pool which they have to clear out; to clear that pool out, as I understand it, they have this underground trunk
20 leading down to Third River, and that is the way they clear it out.

Q. Let me change the subject. Do I understand you to say that you stopped these mills in winter? I understood you to say that. What do you mean by that? A. I mean that we limit them in the use of the water.

30 Q. But still they always have some water all through the winter?

THE COURT—They don't have to stop their mills and shut up their business and discharge their hands, do they?

A. They have to stop their mills at times.

By the Court.

40 Q. For how long, a week, a fortnight, or one day or what? A. I couldn't say. Those that have charge of the water will be able to say. I know

they are instructed to limit it to the necessary use of the canal.

By the Court.

Q. Unless you have it clear at the seventeen mile level; put men out all over and shovel the dirt out and stones that fall in every spring; but you don't give the Diamond Mills Company people notice that they must stop using that water and then cut the water off? A. We give the Rubber Company notice, who hold the first use of the water. 10

By the Court.

Q. If there is any water running through there the Diamond Mills Paper Company can get it when the Rubber Company can't, I suppose? That is a fact, I suppose, because they tap the side wash, got an independent mode of getting it without getting it from the Rubber Company, according to the map, and as Mr. Powers explained to me. 20

Re-direct examination by Judge Collins.

Q. Mr. Powers, the raceway from the Diamond Mills to the canal, is that covered, or can you see it?

THE COURT—Tail-race. 30

Q. The tail-race? A. What part of it?

By the Court.

Q. Any part of it? A. I think most part of it is open, where it crosses the tow path.

Q. How long is that tail-race? A. The closed tail-race?

Q. No, no, the whole tail-race? A. It is shown on this map. 40

THE COURT—Let me have that map.

A. I think that scale is a hundred feet to the inch.

THE COURT—Yes; I can tell you how long it is. If this map is anywhere near right it is 350 feet.

10 Q. Now, can you see the discoloration in that tail-race? A. Yes, sir.

Q. Mr. Powers, the mill originally where the Diamond Mill now is was a grist mill, wasn't it?

A. I so understand.

MR. JOHNSON—I object to that.

A. I know it was a grist mill.

20 Q. Now, when did it become a paper mill? A. I couldn't say; the paper mill was never a grist mill as I know of; I mean the rubber mill took the place of grist mill.

Q. You don't know when the paper mill was started? A. I couldn't say.

By the Court.

30 Q. Before your time? A. Before my time; before my knowledge of that part of the canal.

Q. Now, it had different owners, of course, different times long time? A. Yes, sir.

Q. Can you tell me whether there was a time for a year or two, two years I think, that it was idle entirely? A. I know there was a time, but I couldn't say when.

Q. You can't give us the time, about when? A. No.

Q. About how long? A. Oh, a year or two years; I don't know just how long.

40

JUDGE COLLINS—I will fix it actually, your Honor, by other witnesses. I might at this stage—should have done it before,—put in evidence the charter of the canal. It is all admitted, but we will consider the charter and supplements in evidence for convenience, and I will put in this Unangst agreement. I will read it. 10

Marked Exhibit C 3.

Q. I will have you tell us about the written notice you sent in 1895. Did you give verbal notifications? A. I did.

Q. When? A. After the Diamond Paper Mill commenced operating; sometime after 1892.

By the Court.

Q. 1892; that is fourteen years ago? A. After that; I couldn't give the date. 20

Q. Did you give more than one notification? A. I think I went to Mr. Boyne, their superintendent, two or three times; went all through the mill with him one time.

Q. When was it? A. I think it was about 1894 or 1895; I couldn't give the date.

Q. What was it that you said, and what did he say? A. Well, I objected to their running that solid matter into the canal, and he said they didn't want to do it, didn't intend to do it, that they had methods of taking care of it, and that it was on account of the carelessness of employees that the solid matter went into the canal. 30

Q. Did you complain again? A. I think I did two or three times. I couldn't give the date, but I gave instructions to the supervisor of that part of the canal to notify them frequently, and he did, which he will testify to. 40

Q. He is here, is he? A. He is here, yes, sir.

By Mr. Johnson.

Q. Let me ask you one question. Boyne is dead now, is he not? A. I think he is.

THOMAS HEATON, sworn.

10

Direct examination by Judge Collins.

Q. How old are you? A. Fifty-nine.

Q. What is your business? A. I am supervisor of the canal; three sections, Dover, Boonton and Montville sections.

Q. Does that include the seventeen mile level and the Bloomfield level? A. A portion of it.

Q. How long have you been supervisor? A. 1895.

20

Q. And did your section include—formerly include—1885 you mean, don't you? A. I was foreman in 1885; I was supervisor in 1895.

By the Court.

Q. How long have you been in the employ of the canal? A. 27 years.

30 *By the Court.*

Q. When did that commence? A. 1879.

By the Court.

Q. And where was your work? A. From 1879 until 1884 I was at Stanhope.

By the Court.

Q. And when did you first come down at this end of the canal? A. In 1885.

40 Q. And when were you supervisor over the part

that would include this inclined plane that has been spoken of? A. I was foreman at that point from 1885; supervisor from 1895.

Q. From 1895? A. Yes, sir.

Q. Did you get instructions from Mr. Powers, the superintendent, with respect to complaining of pollution or discoloration or the flowing of sediment from the Diamond Mills Paper mills through their raceway into the canal basin? A. I did. 10

Q. When? A. At all times when they were running the paper mill; whenever it was in operation. They were undergoing repairs there some of the time; but whenever the mill was in operation I had that instruction from Mr. Powers, to notify them whenever this pollution went in, and I noticed it.

By the Court.

Q. Your instruction was this: Whenever you saw any pollution running from the paper mill into the canal you were to notify them? A. Yes, sir. 20

Q. And that was after you became supervisor, in 1895? A. When I was foreman, from 1885.

THE COURT—Commenced in 1885.

Q. But there was a supervisor over you then, wasn't there? A. Yes, sir. 30

By the Court.

Q. Who was that? A. Mr. Powers.

Q. Oh, Mr. Powers himself? A. Yes.

Q. Well, now, have you notified the superintendent of the mills? A. Of the Diamond Paper Mills?

Q. Yes. A. Yes, sir.

Q. When? A. Whenever that mill was in operation. Whenever I saw any sediment coming 40

in I used to mention the matter to Mr. Boyne, and tell him it was my instructions to forbid it.

Q. When did the Diamond Paper Mills itself take over that mill, do you know? A. I am not positive, but I think it was in 1892, as near as I can remember.

10 Q. Now, then, it must have been of course after that that you spoke to Boyne? A. Yes, sir.

Q. What did you tell him? A. I told him that they objected to that matter coming in the canal, and they wanted him to stop it.

Q. What did he say? A. He said it wasn't their wish that that should go in there. He said that this soft fibre that went in was a loss to them, and that most of it was caused by the employees dumping it in against his orders. He said through carelessness the greater part of it went in.

20 Q. And after these notifications did you see any difference? A. Yes, sir.

Q. There wasn't as much come in? A. Their water would be discolored, but there wouldn't be that amount of sediment into it for a time.

Q. Did you hear the superintendent, Boyne, say anything to the employees? A. Yes, sir.

Q. What? A. He told them that they wanted to be more careful not to dump that in the canal.

30 Q. Well, how you say there wouldn't be for a while? A. It would cease for a time; the water would be discolored, but there wasn't that amount of sediment in it; when they would dump it out it would float over the water or would come down, but the water whenever there was a discharge from there, not from their water wheel, but from the mill, it would be discolored; sort of white, milky looking color.

Q. How often did you speak to him? A. Well, I should say his attention was called to it nearly

every month during the boating season while they were running.

Q. Was there any pollution of that water prior to the Diamond Paper Mills coming there in 1892?

A. Yes, sir.

Q. What kind was that? A. Well, it was a thick, muddy color, the same, a great deal like paper pulp when it is mixed up in their beaters. 10

Q. Was it different from what came in in 1892?

A. It wasn't as light; it was darker color.

Q. Different in character? A. Yes, sir.

By the Court.

Q. Well, didn't have so much chloride of lime in it, I suppose? A. It wasn't so white; it was more brown; more like paste-board fibre.

Q. Did you make complaint during that period?

A. Yes, sir. 20

Q. To whom? A. A man by the name of McCarrick, that ran the mill; I think that was his name; I never knew his first name, but I think Mr. McCarrick; that was his name, that ran the mill before Mr. Boyne came there.

Q. With what result; what talk? A. He would promise to stop it, and they did to a certain amount; they carried it away; they took it out and carried it up in the field and dumped it, and again they would continue to let it come again. 30

Q. Did you protest? A. Yes.

Q. Have you always protested ever since you have been there? A. Yes, sir.

Q. Where is your present work? A. Boonton, New Jersey.

Q. And what have you to do with that place down there now? A. Nothing.

Q. When did you cease to have anything to do with it? A. 1900.

Q. In 1900? A. Yes, sir.

Q. Well, up to 1900 when you left there did you give notifications? A. Every year that their mill was running I notified them to stop the pollution while it was in operation.

Q. That was Mr. Boyne? A. That was Mr. James Boyne; as I understand, he was superintendent of the mill.

Q. Do you recall the time when the mill was shut down altogether for a year or two? A. No, sir; I don't.

Q. You can fix the time? A. No; I can't fix the time.

By the Court.

Q. Well, was it? A. I am not positive.

20 *By the Court.*

Q. Was it idle at all? A. I am not positive; when they first took the mill it was idle for repairs, but Mr. Boyne was there all the time.

Q. I don't mean since 1892; I mean before 1892? A. Before 1892?

Q. Yes? A. I don't think that the mill was idle until it was sold out after Mr. McCarrick went away.

30 Q. That is the time I am talking about? A. I wouldn't be positive of that, but to the best of my recollection I don't think it was idle.

Q. Until it was sold out? A. Until it was sold out?

By the Court.

Q. How long was it idle then before it started again? A. I can't say.

40 Q. But there was a time after it was sold out before it was started again? A. Yes; there were

general repairs going on; the mill was very much out of repair and when it was sold they repaired it and it took quite a time to do it.

Q. Now, say in 1900, when the matter ran down there that you complained of, what was its effect?

A. To the canal?

Q. Yes. A. Well, it filled up the basin below, at the foot of the plane, and gave us extra work to take it out. 10

Q. What sort of material did you have to take out? A. Well, it was a little mixture of everything; it was old rags and paper pulp and lime, and a little of everything in general that would come out of a paper mill.

Q. Well, did this discoloration you speak of; was that apparent in the raceway, the discoloration? A. When they discharged it in the raceway it would be. 20

Q. Did they discharge it in any other place than the raceway? A. No, sir; but the water from the wheel would; that would come through; it would come through clear, but when they discharged it in this race that would discolor the water.

By the Court.

Q. They made two uses of the water, one to wash their stock and the other for power, and the result of washing their stock was to discolor it? A. That was it. 30

Q. It only runs through the raceway after washing stock? A. The wheel, that is clear.

Q. And when they empty out after washing stock it runs through this raceway discolored. A. Yes, sir.

Q. And then goes into the canal? A. Yes.

Q. And does the discoloration continue down below? A. Yes, sir.

Q. And across the aqueduct over the Third River?
A. Yes, sir.

Cross-examination by Mr. Johnson.

Q. I understand that you made these objections to this sediment from time to time to the persons in charge of this mill? A. Yes, sir.

10 Q. And they promised to do better, and did better for a little while, and when they would go on and do as they did before? A. Just the same.

Q. And then you would go back and make some more objections? A. Yes, sir.

Q. And they would make more promises? A. That is it.

Q. And then they would come back to the old way again, discharging sediment? A. That is it exactly.

20 Q. You did not object then to the discoloration, I understand it, only to the sediment? A. We objected to the sediment.

Q. And your objection was made when the Diamond Mills Paper Company began its operations there, to Mr. Boyne? A. Mr. James Boyne; yes, sir.

Q. Did you ever make any objections after 1901, when Mr. Boyne died? A. No, sir; I wasn't there;
30 I left there in 1900, in July.

Q. Let me understand a little more clearly what happened in 1900, when you say you saw rags and paper and pulp and lime?

THE COURT—Before that, he said

A. I said before that, before 1900, when Mr. McCarrick ran the mill.

By the Court.

40 Q. Before 1892, when Colonel Thompson took it.

Q. And what did you see then? A. Saw old bags, rags, and this sediment; sort of a brown dirty-like paste-board.

By the Court.

Q. They didn't manufacture such paper as the Diamond Mills Paper Company? They manufactured what, paste-board? A. No, sir; it wasn't 10
paste-board, but it was different paper from what the Diamond Mill Paper Company manufactured.

By the Court.

Q. It wasn't bleached paper? A. I think some of it was a bleached paper, yes, but was coarser, heavier paper.

Q. Then I understand you saw lime taken out when the canal was being cleaned, in large quantities; is that so? A. This sediment and lime alto- 20
gether; it wasn't all lime, but it was sediment that all settled together.

Q. Was any of it hard? A. So you could handle it on a shovel; throw it out with a shovel.

Q. How thick was it? A. Well, in the bottom of the canal in some places—below the pit there is a little basin there, there it was at the tops of the rubber boots of the men that cleaned it out; there is a slush and sediment at the foot of the plane 30
above the wheel pit; after we drew the water off it was above the tracks, I should say from eight to ten inches of it.

By the Court.

Q. That wasn't solid matter or else the wheels couldn't run? A. That wasn't solid matter.

Q. It was slush? A. It was slush; it was what you could shovel on a shovel after the water was taken out of it; after it settled down; when the water was taken away. 40

By Judge Collins.

Q. That had accumulated during the winter when the wheel didn't run? A. Yes.

Q. But it wasn't hard? A. It was solid; you could shovel it in wheel barrows and take it out.

Q. Didn't have to take a pick to it? A. No, sir; not by any means.

10 Q. After January 1894 did you notice anything like that when the canal was being cleaned? A. I couldn't give you any dates; I was there in 1894, but I couldn't give you the dates, but whenever this mill was running the condition was the same.

Q. Even as to this thick sediment when the canal was being cleaned? A. Every spring after the mill was operated we found the same conditions in drawing the water.

20 *Re-direct examination by Judge Collins.*

Q. Did the Board of Health complain? A. Not to me.

Q. Newark Board of Health? A. They complained to me, yes, about the condition of the water, repeatedly.

Q. From this mill I mean? A. From the general pollution of the water.

RICHARD SHEARS, sworn.

30

Direct examination by Judge Collins.

Q. You live at Bloomfield? A. Yes, sir.

Q. And are plane tender on this plane in question?
A. Yes, sir.

Q. No. 11, isn't it? A. No. 11.

Q. How long have you been there? A. 18 years.

Q. Did you make observations last autumn from day to day of the water issuing from the Diamond Paper Mills raceway? A. Yes, sir.

40

Q. Now, describe what you saw? A. Well, sometimes it was light and sometimes muddy; sort of a muddy color; sometimes light.

By the Court.

Q. What do you mean by light? A. Lime sort of—

Q. Did you keep a little memorandum of it? A. 10
Yes, sir.

Q. Is this it? A. Yes, that is it.

Q. That is your writing? A. Yes, sir.

Q. Made at the time? A. Yes, sir.

By the Court.

Q. Truly made? A. Yes, sir.

Q. Refreshing your memory from that, was Mr. Rugg with you? A. Yes, sir.

Q. And signed it? A. Yes. 20

Q. It shows the dates that you found the water discolored and the hour that you took the observation? A. Yes, sir.

By the Court.

Q. And this was taken from the 31st of August to the 11th of September?

JUDGE COLLINS—Yes.

Q. I find an earlier one, beginning from May 30
26 down to the 17th of July, signed by you? A.
Yes; that is right.

By the Court.

Q. How many have you got of them?

JUDGE COLLINS—Only two.

By the Court.

Q. This one now shown is from May 26th to 40

July 17th. You went there every day, though?
A. I was right there every day.

By the Court.

Q. How many times a day did you look? A. Well, we could meet most any time of day; we were right there all the time.

10

By the Court.

Q. And you noted it when it ran discolored? A. When it ran in; yes, sir.

By the Court.

Q. So that you got it pretty nearly every time it did run discolored? A. Very nearly every day.

By the Court.

20 Q. But you made a note whenever you noted it run discolored? A. Yes.

Marked Exhibit C 4.

Q. And at other times the water ran clear, did it? A. Yes, sir.

Q. You noted it when it ran discolored? A. Yes, sir.

30 Q. As the water goes into the Diamond Mills property does it go in clear? A. Oh, yes; at the head of the plane it is clear.

Q. Have you ever seen the employees in the spring taking out the deposit that was there at the foot of plane in the pit? A. Yes, sir.

Q. What did it look like? A. Well, it was mixed with fibre, parts of bags, bagging and different things; rags.

Q. Did you help yourself to dig it out? A. Yes, sir.

40 Q. How deep would it be? A. I should think

about a foot, 12 or 15 inches, with the sand and fibre and everything all mixed up.

Q. How would it smell? A. Well, I didn't notice much smell.

Q. Is this discoloration noticeable below this pit? Does it run on down? A. It runs down; yes, sir.

Q. And past the Third River in that aqueduct? A. Yes, sir.

10

Q. When it runs discolored it runs discolored below that? A. Right down the one mile level; Bloomfield level.

Cross-examination by Mr. Johnson.

Q. You made these observations yourself, you say? A. Yes, sir.

Q. And what color was the water when you say it was discolored? Well, it was white at times, and sometimes—

20

THE COURT—Milky?

A. Milky and sometimes dark; kind of a reddish, muddy color.

Q. Generally whitish? A. Most generally white.

Q. Any green tinge to it. A. I didn't notice that.

Q. And at other times you say it ran clear? A. Very clear.

30

By the Court.

Q. For how long a time—how many minutes on each occasion that you have noted that on your memoranda did this discoloration continue? A. Well, couldn't tell; it would be that way for quite awhile, maybe an hour or so.

By Judge Collins.

Q. You would note the time it began? A. Well, we wouldn't always say just the time it would start

40

in; at that time was the time we marked it down.

Q. Did you ever stay there all day for the purpose of seeing its condition, all day long? A. No, sir.

THE COURT—He said he was standing so he could see it any time; his post in attending the plane, letting on—what you did was to turn on the power?

10

A. Yes, sir.

By the Court.

Q. And take it off, taking up and down boats, he said he would see the water running from the paper mill all the time, and whenever he observed it running discolored he called the attention of the other men to it, and then he put it down. And where was it that it was discolored; where? A. Right at the tail-race at the foot of the plane.

20

Q. Now, you say you have seen the employees of the canal company in the spring taking out, when the canal was being cleaned, taking out a deposit at the foot of the pit, bags and bagging, fibrous matter. How long ago was that? A. Every spring.

Q. Well, when did you first notice it? A. 1888, spring of 1889; I came there in 1888, in the summer, then the next spring, 1889.

Q. Now, when did you last notice it? A. Last spring.

30

Q. Are you sure about that? A. Last spring is when we cleaned it out.

Q. Did you see any bagging then? A. We saw that in the summer time; it comes up on the ropes on the plane; comes up around the drum; gets tangled up in the rope.

Q. Can you tell that that bagging comes from the Diamond Mills Paper Company mills? A. I never saw it come out of the race, but there is no other place there for it to come from.

40

By the Court.

Q. What he was talking to you about is whether you saw the sediment taken out a year ago now?

A. Oh, yes.

By the Court.

Q. Saw them taking out sediment? A. Yes, sir.

10

By the Court.

Q. The same character? A. It seems to be about the same every spring.

Q. What was the nature of it; just describe it?

A. Well, it is a white fibre.

Q. Well, what else? A. Mixed with sand.

Q. Is that all? A. That is all I can see.

By the Court.

Q. Didn't see anything that looked like lime? ²⁰

A. Well, it is whitish; yes.

Q. But you couldn't say it was lime? A. No, sir.

By the Court.

Q. Don't any sand come down from the paper mill? A. Well, it comes down; washes off the road down through in the race.

30

By the Court.

Q. That cones in naturally through your raceway road wash? A. Comes down with the storm, likely.

JUDGE COLLINS—We don't charge you with the sand.

A. Runs in with the other discolored water at the time of storm.

40

By the Court.

Q. And mixes in with it? A. Mixes in with it altogether.

Q. Now, I am not sure that the stenographer got your answer. I understood you to say you couldn't see any lime in it last spring when it was cleaned out, in the sediment? A. Well, I couldn't say it
10 was lime. Fibre seems to be a light fibrous—

Q. And during all the time that the Diamond Mills Paper Company used this mill when the canal was cleaned out you can't say that you saw any lime there, can you? A. Well, there was coloring every spring; it seems to me the same about every spring that we clean it out—have it cleaned out.

By the Court.

Q. Something whitish like? A. Yes, sir.

20 Q. Well, isn't it a lot of fibrous sediment? A. Yes; that is what it is; yes.

Q. Which is not hard or compacted at all? A. Well, there is part of that fibre, seems to be part of the discoloring; then sometimes it is muddy; darker; kind of a muddy color.

Q. Well, your canal bed is full of mud, isn't it? A. Well, it isn't that; it comes out of the race that way and colors the water.

30 THE COURT—He says there is mud and sand goes out of the raceway; washes in from the road.

A. The sand, when there is a heavy storm, that runs in with the rest, I suppose.

By the Court.

Q. Mud other times? A. Yes, sir.

By the Court.

40 Q. How much roadway washes into that race-

way, the side wash; I call it side wash where the feed water of the canal runs around on the other side of the paper mill; how many roads wash into that? A. There is one; well, there is two there; one the paper mill, and one that comes up past the plane.

By the Court.

Q. And how much of the wash of that road is there? A. The extent; length of the plane. 10

By the Court.

Q. Isn't there more than that gets into it? A. There is other roads off on the other side.

By the Court.

Q. That is what I am speaking of, and they all wash in there? A. Yes; some of them does. 20

By the Court.

Q. And then the tow path of the canal washes in there, too, don't it; where the horses and mules go up and down? A. Yes, sir; that is the same road the wagons go up.

By the Court.

Q. Then there is the wagon road goes right down; does it go down between the paper mill and the plane? A. Yes. 30

By the Court.

Q. Goes right down there? A. Right between.

By the Court.

Q. And between the rubber works and plane, what? A. The tow path does.

By the Court.

Q. Wagon road too? A. This road goes up to 40

the rubber mill; branches off to the rubber mill.

By the Court.

Q. Then it goes on up further west? A. That is the end of that; to accommodate the rubber mill; wagons to cart their goods up and down.

By the Court.

10 Q. There is a road on the other side? A. Yes, sir.

By the Court.

Q. There is a bridge right below the plane; wagon road goes across it? A. Yes, sir; that is just two houses that uses that—farm; it isn't a public road.

By the Court.

20 Q. It isn't a public road, eh? A. No.

By the Court.

Q. There is a bridge there? A. Bridge there.

By the Court.

Q. That washes in too, don't it? A. That road washes in there; yes.

30 *By Judge Collins.*

Q. Most of the sand comes from that other road, don't it; from the road on the other side? A. Yes.

By the Court.

Q. Don't come out of the raceway? A. Some of it comes down, yes, and runs right in the race and then down with the water.

By Judge Collins.

40 Q. And most of the sand which comes in there comes from the road on the other side?

THE COURT—What do you mean, “the other side;” opposite side?

JUDGE COLLINS—Yes.

THE COURT—That is what I am asking him about.

JUDGE COLLINS—There is raceway there.

THE COURT—That is what I mean; that it is 10
sidewash that carries the feed water
from the upper part of the canal down
past the race from the seventeen mile
level to the Bloomfield level.

A. Both ways.

By Judge Collins.

Q. Don't most of that sand lodge up on the tracks
and not get down to the pit at all, where it is shall- 20
low on the track? A. Yes; we have to shovel it
away from the tracks sometimes to keep them
clear.

Re-direct examination by Judge Collins.

Q. One thing I want to get right about this bag-
ging; you are referring to bagging; to an earlier
time, aren't you? A. We have some of that every
summer.

Q. Do you, even yet? A. Yes; on the ropes. 30

Q. Most trouble with that was a good while ago,
wasn't it, prior to 1892, before the Diamond people
came there? A. Yes, sir.

Examined by the Court.

Q. You know what kind of stuff goes to the Dia-
mond Mill Paper Company—what kind of stock
they use, don't you? Don't you see the stock that
is carried there? A. White rags and twine, I
think; ropes; pieces of rope. 40

Q. Do they use the same kind of stock that the man did who was there before them? A. I don't know; I didn't see them.

Re-cross examination by Mr. Johnson.

Q. Are you sure about the ropes and the twine; that they are using those? A. Well, they have it; 10 it is in the mill there that they grind up.

Q. How do you know? A. I have seen it.

Q. When? A. Well, last summer.

Q. Were you in the mill there? A. Yes, sir.

Q. And you saw them using rope and twine?

THE COURT—Rope; he means by that tarred rope, I think, for making the manila paper.

20 A. No; I don't think it means tarred rope.

By the Court.

Q. Ordinary rope; old rope. A. Yes, sir.

Q. And twine? A. I think they use that; it is in the mill there; I thought they used it.

Q. You only guessed at that, now, didn't you?

THE COURT—He saw it there and supposed they used it.

30 A. Of course I didn't watch it.

THE COURT—Of course, we all know there is a great lot of waste in a paper mill, and it don't go through the—I forget what they are called now.

JUDGE COLLINS—Mixers.

THE COURT—Grinders; I don't know what the name is. 40

Further re-direct.

Q. Take this that they dig out; there is a loose lot that floats off with the water, isn't there, when they open the trunk? A. Yes, sir.

Q. Great deal that floats, and all they dig out is what is left, that it don't float that? A. Yes, sir.

Q. Good deal floats out? A. Quite some floats out; yes, sir. 10

Q. Of what is left that you dig out, what proportion is sand? A. Well, I should think it was two-thirds.

By the Court.

Q. Two-thirds sand? A. Two-thirds pulp.

Q. Two-thirds of it pulp? A. Yes; I should think so.

CHARLES RUGG, sworn. 20

Direct examination by Judge Collins.

Q. Are you the Mr. Rugg referred to by the last witness? A. Yes, sir.

Q. And on these papers I see the signature "Charles Rugg;" that is yourself? A. Yes, sir; that is mine.

Q. Are those correct? A. Yes, sir.

Q. You kept the watch with him then? A. Yes, 30
sir.

By the Court.

Q. You saw the discolored water every time you signed your name there to it, eh? A. Every time.

Q. What was your business there? A. Brake-man.

Q. How long had you been there? A. Three years.

Q. Now, during those three years what have you 40

seen in the way of discoloration of the water from the washing of paper by the Diamond Mills Paper Company and the sediment that comes from that mill? What have you seen there? A. Regular milky color, thick; quite thick; sometimes thicker than others, and reddish, dark, muddy color sometimes.

10 Q. When would you see the water running discolored and make a note of it; how long would it run discolored? A. You couldn't just exactly tell how long; sometimes it would be there half an hour before we would notice it, and maybe we could see it an hour; and maybe we would have to go and put boats over, and be still running; maybe stop running while we would be running those boats down.

20 Q. Did the discoloration run on down through the one-mile level? A. On through the one-mile level you could see it.

Q. Over this aqueduct over the Third River? A. Yes, sir.

Q. Do you know anything about cleaning out in the spring, last spring and spring before? A. Worked in there.

30 Q. What did you get out? A. Well, this regular thick, slimey stuff mixed in with this sand; it isn't sand exactly; it is more of ashes, what they fix the road with.

Q. Some of the stuff that was there float off with the water when they ran the water off; this fibrous stuff? A. This fibrous stuff mixed in with it; this here would go down with the rain, this ashes.

Q. Would that sand—would the fibrous material run off with the water? A. Some of it.

Q. Then what was left that wouldn't run off you dug up? A. Some of it.

40 Q. How much, how large? A. Well, I should

judge pretty near the top of your rubber boots.

Q. How did it smell? A. I couldn't just exactly tell you what the smell is; there is a smell there to it.

Q. Anything like lime, slaked lime? A. Well, something similar to that.

Q. Well, good or bad? A. Well, it didn't smell very good. 10

Q. How was the water before the Diamond Paper Mills got it, clear or not? A. Clear, unless in a heavy rain; the rain washed off the hills down.

By the Court.

Q. How long have you been there? A. Three years.

THE COURT—What does he know before the Diamond Mills Paper— 20

JUDGE COLLINS—I didn't say before. I said before the water got there.

Cross-examination by Mr. Johnson.

Q. What is the nature of this sediment that you say was taken out when it was cleaned last year?

A. What is the nature?

Q. Yes?

THE COURT—This last time now; it was cleaned a year ago now. 30

A. Well, it is a thick slimey white, kind of a lightish color.

Q. It wasn't hard, was it? A. It wasn't what you may say hard; as soon as the water would drain off it would pack down and get stiffer.

Q. You say it came up to the top of your rubber boots, didn't you? A. Very near to the top of your rubber boots, sometimes over. 40

Q. You would sink down into it? A. Yes.

Q. It was soft? A. Naturally a little soft, yes.

Q. What was the fibrous substance? A. I couldn't tell you what it was, I don't know.

10 THE COURT—The witness stated a matter that perhaps counsel didn't pay much attention to, that this was not all sand, but that it was the ashes off of the roads that washed in. I suppose he means coal ashes?

A. Yes, sir.

20 THE COURT—That would naturally wash in, and that was part of this substance so made up. We all know what coal ashes is—won't dissolve.

Q. Is that all it was, the ashes?

THE COURT—No; he said some of the stuff came from the roads, wasn't sand, but some of it was ashes. He didn't say that was what the other material was made of.

30 JUDGE COLLINS—About a third of it was ashes and sand.

Q. How much did the ashes and sand—what proportion did they bear to the rest of it? A. Oh, there wasn't so much of that go down that far; that would go along by the tracks; wouldn't get down in that wheel pit much; very little.

Q. And the other substance, you don't know what it was? A. The other substance, I couldn't tell what it was; no; outside of it was thick, slimey, milky color.

40 Q. What is the size of that wheel pit? A. I

couldn't just exactly tell you; it must be forty feet in diameter.

By the Court.

Q. How many feet? A. Forty, I should judge; thirty, or something like that; I don't know exactly.

THE COURT—Wheel pit is a small matter.

10

A. It is pretty big.

Q. Now, where is this pit situated? A. At the foot of the plane.

By the Court.

Q. And on the side next to the paper mill, is it? A. The plane.

By the Court.

20

Q. The wheel pit is on one side; it isn't in the middle of the plane? A. It is down below the paper mill at the foot of the plane.

JUDGE COLLINS—He means which side of the canal is the wheel pit, toward the paper mill side or the other side?

A. It is on the other side; it is down at the foot of the hill.

30

Q. About the middle of the canal? A. Yes.

THE COURT—Couldn't be in the middle of the canal, because the boats couldn't pass off; boats must pass one side or the other. The winding power of the wheel is on one side; it runs around the wheel, but the power where it winds up and makes the turn around is one side.

JUDGE COLLINS—He shakes his head.

40

Q. Is this sediment confined entirely to the wheel pit, sediment to it, is it confined to the wheel pit where you find it so thick? A. Well, it is a little deeper this side of the wheel pit, and it all settles in there, works in around through the wheel.

Q. Then the sediment mainly collects in the wheel pit? A. Yes, sir.

10

RICHARD SHEARS, recalled.

Direct examination by Judge Collins.

Q. Were you instructed by Mr. Powers to notify the Diamond people about that discoloration? A. Yes, sir.

Q. Did you do it? A. Yes, sir.

Q. Who did you inform? A. Mr. Ward.

Q. And what is he? A. Supervisor of the paper mill.

20

Q. Superintendent? A. Superintendent.

Q. You did tell him? A. Mr. Powers wanted me to tell him to stop discoloring the water.

Q. What did he say? A. He said they didn't have any colors in the mill—no colors.

Q. When was this? A. I think that was last spring.

Q. You say he said he didn't have any colors; did you call his attention to what was running out of there? A. It was this fall I think when they put this water pipe under the canal.

30

By the Court.

Q. Who put the water pipes under the canal?

A. The city, I guess; the town; Bloomfield.

Q. You say he said he didn't use any colors?

A. He said they didn't use any coloring in the mill.

Q. Any coloring, no, but this discoloration, this milky water; what did he say about that? A.

40

Well, he said they would stop that in a few minutes.

THE COURT—Who was this he told this to?

JUDGE COLLINS—Ward, the successor to Boyne.

By Mr. Johnson.

Q. Do you know that Mr. Ward was superintendent of that mill? A. I am not sure of it; no, sir. 10

By Mr. Johnson.

Q. Did you speak to Ralph Thompson about it? A. No, sir.

THOMAS OAKES, sworn.

Direct examination by Judge Collins.

Q. You are the Thomas Oakes that has been made a party to this suit? A. I am. 20

Q. And your firm consists of whom? A. Myself and my two sons.

Q. What is your age? A. Sixty-seven.

Q. Did some one before you carry on a woolen mill at the place where you carry it on? A. Yes, my father.

Q. How long since that was established there? A. 1830. 30

Q. When did you first come to know of a woolen mill at the place Thomas Oakes & Sons now have theirs—Thomas Oakes & Company? A. What do you mean.

Q. How old were you? A. When I was connected with it?

Q. Yes; when did you first come to know about it? A. Well, ever since I was a child.

Q. You lived near there? A. Lived there all my life; born there. 40

Q. How long have you yourself carried on the manufacture of woolens there? A. In connection with my father since 1859.

Q. When did he die? A. Died in 1878.

By the Court.

Q. As long ago as that? A. Yes.

10 Q. And then you, and afterwards your sons with you, have carried on the business since? A. Yes, sir.

Q. What kind of woolens do you manufacture? A. Mens' wear woolens, heavy weights and suitable for mens' wear.

Q. Different colors? A. Different colors.

Q. What colors? A. All colors from light, from light colored, very light shades, to black.

20 Q. You dye it? A. Yes, we dye the wool, and also dye the cloth in the piece.

Q. Is it necessary for you to have pure water for that purpose? A. It is necessary to have water that is comparatively free from lime; the purer the better the results.

30 Q. What effect has lime in water on your dyeing? A. The effect of lime in water, when it is excessive is to create what they call a lime soap in the washing of the cloth, and that is an insoluble material; matter that cannot be removed, and when that takes place it interferes with the dyeing of the wool or the cloth; we can't get an even color, or the clear color.

Q. Can't dye anything but what then? A. Well, black is the easiest, most successful color under such circumstances. The lighter the color the more difficult.

Q. Have you had trouble with the water at the Third River—you use the water of the Third River, don't you? A. Yes.

40 Q. Have you had trouble in the use of the water

of the Third River from that cause you speak of—
too much lime in it? A. We have.

By the Court.

Q. From the use of lime, the presence of lime, in
the water? A. From the presence of lime in the
water.

Q. So as seriously to affect you? A. Oh, yes.

Q. Describe how seriously? A. Well, when the 10
water is heavily charged with lime it affects the
wool, the cloths, so we cannot get perfect colors,
and at times when the water has been very heavily
charged with lime we have not been able to color
any colors except black, and even the blacks were
not satisfactory.

Q. Have you been able to detect the source from
which this deleterious matter came? A. Yes.

Q. What was it? A. We found it to be the Dia- 20
mond Paper Company.

Q. How did you find that out? A. By following
up the stream and noticing the color of the water
above the paper company mill, and also below, and
also the color of the water in the canal.

Q. Is there a practical test that you apply that
shows there is lime in the water? A. Yes, sir.

Q. What is it? A. It is what is known as the
Clark test; it is not an analysis, but simply a test
to determine proportionately the amount of lime.

Q. How is it applied? A. Simply by taking this 30
Clark mixture and adding water to it that is taken
from the stream and noticing how many, how much
water it takes to produce a lather; a foam.

Q. And by applying that test you have found on
these occasions when you couldn't get good results
that there was excessive lime in this water? A. That
is the way we have tested it.

By the Court.

Q. You determine whether the water has too 40

much lime in for your use by applying this test?
A. Yes, sir.

By the Court.

Q. When it gets to a certain point, then there is too much lime? A. Yes; it isn't an analysis; it is simply a quick way of determining the presence
10 of lime, and the quantity.

Q. How does this lime polluted water get into the Third River? A. From the canal.

Q. In what ways? A. Well, the canal passes over the Third River on an aqueduct very near the foot of the inclined plane, probably six hundred feet below the inclined plane, and the water, the excess of water in the canal, flows over the sides of the aqueduct, and in times of heavy rains they lift the gates there in the side of the aqueduct and allow the
20 water to flow from the canal into our stream.

Q. Now, when that has happened, following that and the water flowing into the river, have you found this condition of excess of lime? A. Very frequently; yes, sir.

Q. What other trouble have you experienced at certain seasons of the year? A. Well, the most serious trouble we have had has been in the spring of the year when they have been called upon to clean out the basin at the foot of the planes; there
30 is a basin at the foot of the plane where the large wheel that carries the cable revolves, and that is some—I don't know—two or three feet perhaps below the level of the canal.

By the Court.

Q. Level of the bottom of the canal? A. Level of the bottom of the canal, and from the bottom of that basin, that depression, there is a sluiceway from that point into our stream, into the Third
40 River; in order to clean out the canal, get it ready

for operation in the spring, they open that sluiceway and allow the thick sediment and mud and lime and whatever may be there around that wheel to run into our stream, and it is very thick and very strongly charged with lime; and the result is that sometimes, last year, last year I think it was, April or May, there was so much lime in it that we couldn't color anything for six weeks, except black. 10

By the Court.

Q. That is a year ago now? A. Yes.

Q. Runs into your mill pond? A. Runs right into our mill pond; and I think that for six weeks we couldn't color blues; we could color black; we could color any dark, heavy color, but we couldn't color a light shade or a clear blue; get it perfect; it was a very serious loss to us last year, and it is every year about the same time. 20

Q. Have you made complaint to the Lehigh Valley Railroad Company? A. Yes, sir.

Q. Told them where it came from? A. Yes.

Q. Requested them to take proceedings to stop it? A. I did; I don't know as I requested them to take proceedings; I asked them to take measures to prevent this contaminating of our stream.

Cross-examination by Mr. Johnson. 30

Q. Does chloride of lime in the water do you any injury? Q. Yes, sir; lime of all kinds.

THE COURT—Any shape of lime he says.

A. Lime of all kinds is injurious for dyeing purposes.

Q. Have you ever made an experiment with chloride of lime; have you ever mixed chloride of lime in water and put your test to it? A. Well, I 40

can't say as to that; my son has looked after that more than I have; that can be asked of him.

Q. Take what is called hard water, is that good for your purposes? A. No, it isn't; it is very bad.

By the Court.

Q. If it is made hard by lime, what is called lime-
10 stone water? A. Yes, sir.

Q. Well, suppose it is hard water without being made hard by lime being deposited in it, isn't it equally bad for you? A. Well, if it is lime water there is lime in it, that is all there is about it; the more lime there is the more injurious it is.

THE COURT—There is hard water that doesn't have lime in it.

A. I didn't know it

20

By the Court.

Q. I think there is; I don't want to speak with certainty about that, but my impression is that there is a hardness in water that is not due exclusively or wholly or mainly to lime; I may be mistaken; when you speak of hard water you mean lime water? A. Yes; the presence of lime in water
30 when it is used for washing; it produces what is called a lime soap; it is insoluble, it cannot be taken out except by destroying the wool.

By the Court.

Q. Lime water deposits the lime under certain circumstances? A. Yes, but we have to use soap in order to wash the cloth; now, when we put the soap in the lime, that is in the water, unites with certain parts of the soap and forms what is usually termed lime soap.

40

THE COURT—I never heard of that before.

A. And it is just about impossible, you cannot get it out without destroying the cloth, the wool.

By the Court.

Q. You can get the lime out of the water though by using sufficient chemical to destroy it? A. Yes, sir; of course; it wouldn't be practicable though.

10

THE COURT—It is a common thing to soften hard water by use of excess of soap; I don't like it myself; I don't use that kind of water.

Q. Mr. Oakes, when did you make this Clark test? A. Oh, we have made it—we make it almost continuously.

Q. And where did you get the water from on which you made the test? A. Why, we took it from different points, in order to determine certain facts that we may be looking for.

20

Q. Take it from the Third River? A. Oh, yes.

Q. Is that all, any other place? A. Take it from the canal.

Q. You have taken it from the canal? A. Yes.

Q. At what point? A. From the one mile level and seventeen mile level.

Q. From the one mile level and seventeen mile level? A. Yes, sir.

30

Q. Ever take it below the plane, No. 11? A. Well, the one mile level is the foot of the plane.

Q. Oh, yes, that is the foot of the plane. Well, now, what is that test; can you tell me? A. What is the test?

Q. Yes? A. It is not an analysis of the water; it is simply a test to determine the quantity of lime in the water.

Q. What do you do? Tell us what you do to get it? A. Why, this Clark liquid, it is recognized

40

by chemists, I think, as a very reliable test; and that liquid is put in a glass, and any water that you wish to test is poured into it, and the quantity of water that is poured in determines the degree of lime that may be in the water.

Q. Well, how many degrees of lime in the water in a test like that do you find injurious to you? A.
 10 Well, we can get along very well with eight degrees. but when it goes up to eleven or twelve, or sometimes up to eighteen or nineteen, as it has done, why, we can't use it.

By the Court.

Q. Mr. Oakes, I haven't been hearing what you said just now, so I will ask you: have you ever tested the water, the natural stream, Third River, when the canal was not slopping over into it, to
 20 know what amount of lime there is in it? A. Yes.

By the Court.

Q. Did you state that here? What is it? A. Well, it runs from—of course it varies.

By the Court.

Q. The dryer the weather the higher? A. The higher it is.

30 *By the Court.*

Q. The higher the lime is? A. Yes; the more rain there is and higher the stream the less lime usually, and it runs from about eight up to eleven.

By the Court.

Q. Naturally? A. Naturally.

By the Court.

Q. But you can't use it above ten? A. Yes,
 40 sir.

By the Court.

Q. What degrees did you say you could get along with it? A. I said we could get along with it up to 10 and 11, but when it got above that it was troublesome.

By the Court.

Q. Do you know whether you have ever made 10
any experiment to see whether by subjecting the water for coloring purposes to some chemical treatment you could eliminate this lime without any expense? A. Oh, no, not without expense; I know it can be eliminated, but it is a very expensive thing to eliminate lime from water.

By the Court.

Q. I suppose it is; that is the reason I ask you.
A. It is impracticable in a large way; we really 20
can't do it for the water we use in our boilers, in that limited amount, or, at least, it is very expensive when you go into a large quantity.

Q. How long has this trouble been going on? A. Ever since that paper mill was built.

Q. Ever since it was built? A. Yes, sir.

Q. And when was it built? A. Well, that is more than I can say; I should say way back in 1870, I should think, and maybe beyond that.

Q. Perhaps 1865? A. I don't know when it 30
was; I can't say.

By the Court.

Q. You had it every year, more or less? A. Yes, sir.

Q. And it used to be worse than it is now, did it not? A. I have known it when Mr. Fulton was there, it was worse than it is now.

Q. And was it going on all the time while the 40

Diamond Mills Paper Company had it? A. Diamond Paper Mill Company?

Q. Yes? A. Yes, sir.

Q. And when did they get it, do you remember?

THE COURT—You know; don't bother with that.

10 A. When the Diamond Paper Company got it.

Q. The Diamond Mills? A. When they took it from whom?

Q. When they went into the mill there? I don't know who they took it from?

20 THE COURT—He said it has been going on from the start, and I never have heard of a paper mill, except those that made board alone, that didn't use chloride of lime, and if that made his water hard he has been having it hard, as he says, ever since the first paper mill went there. I thought maybe it was a board mill, and I don't know that the ordinary brown paper, for wrapping paper, that they use chloride of lime; but wherever they make light colored paper they use chloride of lime.

30 A. I think the Diamond Paper Company took it over.

THE COURT—Don't spend time on it, Mr. Johnson; you have no business to ask the question.

JUDGE COLLINS—There is an important point of view in which this arose.

40 THE COURT—You may, but he can't, because he is the Diamond Mill Paper Mill Com-

pany. His side knows when it was. He has no right to go around fishing from you for evidence he has got in his hands.

Q. As a matter of fact, this mill, ever since it started as a paper mill, has always been used as a paper mill, has it not? 10

THE COURT—Never been used for anything else?

A. No; always been used for a paper mill.

Q. And all the time when it was—

THE COURT—He has sworn to it that all the time he has been troubled with it.

Q. All the the time you have been troubled with 20
it? A. When it has been running.

Q. Well, it has been generally running, hasn't it?

A. No; oh, no; generally, but it hasn't been running continuously.

By the Court.

Q. What do you mean by continuously? Hasn't been run every year? A. No, sir; I think for about two years and a half it stopped altogether.

Q. How long ago was that? 30

THE COURT—Who owned it then?

A. I should say that was way back in 1888 or 1889; 1889, I guess.

By Judge Collins.

Q. Who owned it then, you are asked?

THE COURT—It don't matter now. 40

JUDGE COLLINS—It was before the Diamond Mills.

Q. Now, you have your most trouble, I understand, when this canal is cleaned in the spring of the year? A. We do?

10 Q. And as a matter of fact you don't have much trouble any other time, do you? A. Yes, quite frequently, whenever they draw those gates out of that aqueduct.

By the Court.

Q. Out of the side? A. Out of the side of the aqueduct; then we have trouble, and we don't know anything about it until we see it in our pond; I have seen the pond sometimes one-half of it be white and the other the natural color, simply because they have lifted the canal gates and the water
20 would flow right down, unknown to us, of course; we don't know it until the trouble is all made.

Re-direct.

Q. And they can't tell beforehand? They have to open them? A. I suppose so.

Q. This time about 1888, that couple of years, that was before the Diamond Paper Mills had it? A. Yes, sir.

30 Q. When do you think they had it?

THE COURT—They must prove it.

Q. Do you find the natural flow of the Third River all right for your purposes? A. Yes, sir.

Q. And have you made test from the seventeen mile run of the canal; that is all right too? A. That is all right; that is better water than the stream of water—freer of lime.

40 Q. And the canal water below the plane, when

there is no lime thrown into it from the Diamond Mills; that is all right? A. I suppose it would be, but I haven't seen it in so many years, I can't testify as to that.

Q. Now, leaving out of the question this spring trouble, when they clean the canal, take the things that come from the overflow, opening of the flood gates at the aqueduct, how has it been, increasing 10 trouble to you lately, or not? A. No; I don't think it has been increasing; no; I think the canal company have done all they could to avoid allowing the contaminated water into our stream; into Third River; but, of course, they can't be absolute; if any emergency occurs, they have got to draw those gates.

Q. But you can't tell whether the pollution—call it by that name—by the Diamond Mills Company, has been increasing or not? A. That I can't say, 20 but from the looks of the canal I should say it was increasing.

Q. Increasing? A. It is very bad to-day; the whole canal; that level, that one mile level is discolored and the bottom is sediment on the bottom from one end to the other to-day.

By the Court.

Q. How can you see the sediment on the bottom if it is discolored? A. See right on the side, you 30 know; no trouble about that.

Re-cross.

Q. Do you remember a conversation with Mr. Ralph Thompson here, after this suit was commenced, about this suit? A. Yes; I do.

THE COURT—His admissions; you can put them in now, Mr. Johnson. Before you couldn't, but you can now. He is a party.

MR. JOHNSON—Very well. I was thinking of the other condition of affairs.

GEORGE OAKES SWORN.

Direct examination by Judge Collins.

Q. You are a son of the last witness? A. Yes,
10 sir.

Q. How old are you? A. Thirty-three.

Q. And how long have you been connected with the business of Thomas Oakes, or Thomas Oakes & Company? A. I went in the factory in 1892, in the fall.

Q. Can you tell us anything about the condition of affairs with regard to the Third River in its natural state when there is nothing thrown into it by the Diamond Paper Mills Company and the seven-
20 teen mile level of the canal with regard to the uses in your business and how it is affected by this lime that is cast into it? Tell us about it? A. Well, the water is soft enough for our purposes; when we don't get the lime from the canal, we don't have any trouble with the coloring and finishing of our goods.

Q. And when you did get it, what trouble do you have? A. We have trouble in coloring our blues; we don't get the full color, and we can't color them
30 evenly.

Q. The water on the seventeen mile level is a little better than Third River, your father says? A. Yes, sir.

By the Court.

Q. Have you ever tested the seventeen mile level, A. With our Clark scale.

Q. Well, what percentage of lime renders the water so you can't use it? A. Well, we begin to
40 have trouble when it is about 14 on the scale.

Q. And do you find you have had it so? A. Oh? yes; we have had it higher than that.

Q. How does it come? A. How does it come where? Where does it come from? A. It comes from the canal.

Q. And how does it get into the mill pond? A. We have followed up stream and watched the discoloration in the water and found it come over the spillway in the aqueduct, and also in the spring of the year when the canal is out it comes through this sluice or trunkway. 10

Q. And how does it get into the canal? A. Comes out of the tail race.

Q. At the Diamond Mill race you can see it, can you, plainly? A. Yes, sir.

Q. And that same discoloration continues down in the aqueduct? A. Continues down in the aqueduct, and below that. 20

Q. Has it been a serious matter with you? A. It has.

Q. How serious? A. Well, we have been at times when we couldn't color blues at all, and our blacks were very inferior; it has lasted as long as five or six weeks at a time in the spring of the year; that is the worst time we have it, the longest time.

Cross examination by Mr. Johnson.

Q. How long has that condition of things existed? A. As long as I can remember. 30

Q. And how far back can you remember? A. Well, the first trouble I can remember were the pieces in 1896.

Q. 1896? A. Yes, sir; when I first went in.

Q. When you first went in the mill? A. I went in in 1892, but I don't remember trouble with the pieces until 1896, because I didn't have anything to do with it.

Q. Trouble with the pieces; what do you mean by that? A. The coloring of the cloth.

Q. And it has continued right on down from 1896 to the present time? A. Yes, sir; intermittently.

Q. Now, hasn't it decreased rather than increased the trouble? A. I can't say that; it has this last
10 winter; yes.

Q. It has decreased this last winter? A. Decreased.

Q. Since what time? A. Well, I should think since the fall, since last fall, and the canal company have kept the water from coming in.

Q. They have kept the water from coming in? A. Yes, sir.

Q. How have they done that? A. I don't know,

Q. Repaired their aqueduct? A. No; it hasn't
20 been overflowing, the aqueduct, during the winter.

Q. But in some way or other they have kept the water from coming in?

THE COURT—Has the canal been filled this spring?

A. Practically full.

By the Court

30 Q. Has it been used this spring? A. Not for boating; no.

By the Court.

Q. Boating has been much less, anyway, of late years, hasn't it? A. Yes; very much less.

Q. For how long has it been less? A. Oh, been getting less and less every year; I don't know just how long it is.

Q. Ever since 1892 when you went in there?

A. Since I can remember there have been fewer
40 boats coming down the canal each year.

Q. Do you know whether that had any effect on your annoyance? A. No, I don't.

Q. The only decrease that you have noticed, then, is the decrease that has occurred since last fall? A. Yes, sir.

Q. In the lime that comes in your water? A. Yes, sir.

Re-direct examination.

10

Q. The reason they have been able to help you this last fall and winter has been there have been no heavy rains, and haven't had to open the gates? A. They haven't opened them.

MR. JOHNSON—I object to it. It is pretty leading, too.

Q. Isn't it a fact that it has not been necessary to open the gates? A. They have not opened the gates. 20

THE COURT—Been no occasion; there have been no boats passing—no business there to have any water go over there. They have got spillways on the canal, the seventeen mile level; they can keep it up above. It is carrying the boats through that lets the water in. They don't have to have any water there except to supply the mills unless they want to. Everybody knows that no boats have passed there since the railroad commenced its improvements here on the hill. They haven't got an inclined plane yet built, as I suppose, to take the boats over the railroad, have you? 30

MR. POWERS—No, sir; they are at work on it now.

40

Q. There has been no overflow? A. There has been no overflow.

THE COURT—And they haven't cleaned the wheel pit out this spring?

By Mr. Johnson.

Q. Do you remember when they built the new
10 spillway there over Third River, the new aqueduct?

A. Yes, sir.

By Mr. Johnson.

Q. How long ago was that—two or three years?

A. I think it was two winters ago—two years ago.

By Mr. Johnson.

Q. And isn't that much tighter than the old one was? A. I couldn't say.

20 FRANK V. OAKES, sworn.

Direct examination by Judge Collins.

Q. You are a son of Mr. Thomas Oakes? A. No, sir; cousin.

Q. And how long have you been connected with the business there? A. Since 1884.

Q. And what is your age? A. Forty.

Q. What do you know about the effect of the
30 chloride of lime that comes from the Diamond Mills Paper Company upon the water that gets into the Morris Canal, and then in some way into Third River?

THE COURT—The question is not objected to.

MR. JOHNSON—I don't think he is qualified.

Q. What do you know about the effect of it? A. Why, it is impossible for us to color any goods excepting black with water that has an excess of lime

40 in it.

By the Court.

Q. And what do you call an excess? A. Why, we find it is impossible to color anything with over fourteen per cent., excepting black.

By the Court.

Q. Fourteen per cent. is a test raised by this machine? A. By this Clark scale. 10

Q. Are you familiar with that, applying it? A. No; I don't do that: Mr. George Oakes.

Q. Have seen it done? A. Yes; I have.

Q. And what is the normal percent. in the Third River of lime? A. About ten per cent., as near as I remember.

Q. And what in the canal at the seventeen mile level? A. Why, I think from six to eight, although I am not positive.

20

By the Court.

Q. You haven't seen that tested? A. I have not.

Q. How does the water impregnated with lime get into the Third River? A. Why, as near as we can tell, we followed it from the overflow from the aqueduct or from the opening of the gates; and in the spring of the year, when they clean the wheel pit from the sluice way which runs from that pit into the Third River.

Q. And how does it get into the canal; where does it come from? A. From the Diamond Paper Mills. 30

THE COURT—As you suppose.

Q. Can you see it? A. I have seen it.

Q. In that raceway. A. In the raceway that comes in at the foot of the plane.

Q. Have you followed it down the canal and through the aqueduct? A. Followed it down the canal and past the aqueduct. 40

Q. Now, sometimes when the gates have been opened for a storm in the aqueduct, what has been the effect shortly afterward on your mill pond? A. The mill pond is contaminated with lime.

Q. What effect on the eye—what do you see? A. Well, we could see it if there wasn't too much surface water coming in from the rains, which might
10 discolor it with surface water.

Q. I refer to your cousin's statement; he said you could see part white on that. Have you seen that; you yourself, I mean. A. Yes, I have.

Q. When; after what? A. After the gates in the aqueduct have been raised.

Q. How serious has been the injury to you from the lime impregnations? A. We have been unable to color anything excepting black; for some cases six weeks at a time.

20 *Cross-examination by Mr. Johnson.*

Q. Do you mean to say, Mr. Oakes, that you can see the lime in the water? A. You can see the discoloration.

Q. Now, can you say that that comes from lime? A. Only by this test.

Q. Well, then, you tell by another test, but you don't tell it by looking at it? A. No, sir.

Q. You can't tell that? A. The discoloration—
30 the lime by the test.

Q. So when you say you see it, you mean you see the water is discolored, and that is all? A. I saw the discoloration, not the lime.

Q. How long do you say you have been there in that mill? A. Since 1884.

Q. And have you had that trouble all the time? A. From time to time.

Q. Every year? A. Not every year.

Q. Well, all the time the mill has been running

have you had that trouble? A. While the mill has been in operation, not while it was stopped.

Q. When was the mill closed down, do you remember? A. I am not positive, but I think it was about 1888, sometime the latter part of the year.

Q. If you are not positive of that, how can you be positive that you didn't have any trouble when the mill was closed down? 10

THE COURT—He says it was the latter part of the year.

A. Latter part of the year of 1888, and the reason I know that is because people who worked there came to us for work at that time.

Q. Now, that is a good while ago; can you be sure that the trouble with your water ceased at that time? A. I can. 20

By the Court.

Q. How long did that last? A. I think about two years.

Q. You are sure of that, you say? A. We had no trouble at that time.

Q. Now, has the trouble since the Diamond Mills Paper Company took this mill, has the trouble been decreasing? A. I don't know as it has.

Q. Well, it hasn't been increasing, has it? A. I don't think so. 30

Q. And you heard the preceding witness testify that—

THE COURT—Never mind. I won't have that.

Q. Since last fall then, what did you say about that? What has been the condition of the water since last fall? A. We have had very little trouble since last fall. 40

Q. You have had no trouble, have you, to speak of? A. Very little.

Q. You have been doing your blue cloth since last fall right along, haven't you? A. We have been coloring blues.

Q. The fact is you are coloring blues all the time, are you not? A. Except when we discover this
10 trouble, then we stop.

Q. For a short time? A. From five to six weeks.

Q. But you haven't had to stop since last fall?
A. No, sir.

RECESS.

GEORGE A. OAKES, recalled.

Direct examination by Judge Collins.

20 Q. It appears you are the member of the firm that is familiar with the Clark test, that has made the tests? A. Yes, sir.

Q. Did you make tests of the water of the seventeen mile level? A. Yes, sir.

Q. With what result? A. We found from six to eight on the scale; it varies.

Q. I don't know whether you tested the stream or not, the normal stream above.

30 THE COURT—He meant up in the seventeen mile level; that is what he said.

Q. I know it; I don't know whether he did make tests in the Third River above the Diamond Mills?
A. Yes, sir.

By the Court.

Q. In the Third River? What was that? A.
From ten to twelve.

By the Court.

Q. The Third River water is from ten to twelve.
On the verge of the poetical.

Cross-examination by Mr. Johnson.

Q. Seventeen mile level is lower? A. Is lower.

Q. And did you ever make it below plane No. 11?

A. Yes, sir. 10

Q. What did you find it there? A. $27\frac{1}{2}$.

By the Court.

Q. You found it as high as $27\frac{1}{2}$ in your pond,
eh? A. No; in the level below the plane.

Q. How many tests did you make, more than
one in each case? A. Yes, sir, always; never less
than two; often four and five different tests.

Q. Where did you take the water from when you
made it below plane No. 11? A. In the basin. 20

By the Court.

Q. Was that immediately after there had been a
discharge from the paper mill? A. I couldn't say.

THE COURT—Of course the evidence doesn't
show, and there is no presumption that
this is a steady stream from the paper
mill, but it only comes from it at the
times when they are discharging as the 30
result of their washing. Do you know
whether there had been a recent dis-
charge from the paper mill?

A. I don't know; no.

Q. What per centage was there below the basin?

THE COURT—Twenty-six or twenty-seven.

Q. Right at the basin, or below. A. Never went
below the aqueduct. 40

Q. Never tried it below? A. No.

Q. In the aqueduct? A. I never tried it there.

THE COURT—Tried it right below the plane.

Q. Did you test it where it goes into the canal
out of the race-way? A. No; I didn't; I have tried
10 it where it came out of the sluice-way into the
Third River when the basin has been drawn off.

By the Court.

Q. That is the time you tried it, eh? A. I have
tried it there.

Q. But you haven't tried it in the canal basin?
You tried it at the end of the sluice-way and up in
the basin both? A. Yes, sir.

Q. How were they? A. At the end of the sluice-
20 way it was 33.

By the Court.

Q. That is where it empties into the sluice-way?
A. No; that was when the basin was empty and
the water was running through the trunk of the
sluice-way.

COMPLAINANT RESTS.

JUDGE COLLINS—We have other witnesses,
30 but in rebuttal.

MR. JOHNSON—I will offer some papers in
evidence. First, some deeds. I offer in
evidence certified copy of deed from
Christopher T. Unangst to Jonathan W.
Potter, dated 6th day of December, 1861,
and acknowledged December 7th, 1861. It
is an assignment of this agreement, as I
understand it, of 1858.

40 Marked Exhibit D 1.

Also a certified copy of a deed from Jonathan W. Potter to Robert W. Southmade and Charles A. McCracken; it is endorsed as a deed; it is also called an agreement, dated the first day of December, 1865.

THE COURT—Is that anything more than just an assignment of this.

MR. JOHNSON—I think that is all, sir, but that is what I offer it for. 10

THE COURT—Unangst grant?

MR. JOHNSON—Yes.

Marked Exhibit D 2.

MR. JOHNSON—I also offer in evidence a deed from Frederick K. Day, Receiver of the United Paper Company, to Elisha M. Fulton, dated July 3d, 1894, and acknowledged the 3d day of July, 1894. 20

THE COURT—You don't show any title from Southmade and others to the corporation?

MR. JOHNSON—No, I don't; the fact is it is admitted.

JUDGE COLLINS—I was waiting for that. They are putting in evidence now a deed from somebody; receiver of some one, that is not shown to have any connection with the title. I object to it as irrelevant. 30

THE COURT—Possession is sufficient; continuous possession is sufficient.

JUDGE COLLINS—True.

MR. JOHNSON—The fact is it is admitted that we have title under the Unangst agreement. 40

THE COURT—The pleadings may admit it.

10 MR. JOHNSON—The pleadings do admit it, but our deed refers back to the deed of Southmade and McCracken. In other words, there is assigned to us by our deed to the Diamond Mills Paper Com-
pany all the rights that Southmade and McCracken had, and therefore I wanted to put that in evidence; and I have these other deeds, and I thought I would put them in too.

THE COURT—I will admit it, subject to your objection.

Marked Exhibit D 3.

20 MR. JOHNSON—Then I have the deed from Elisha M. Fulton and wife to Diamond Mills Paper Company of New York, dated third day of July, 1894.

THE COURT—Have you got anything to show how the title got out of Southmade and somebody else to that corporation?

MR. JOHNSON—I haven't the deed; no, sir.

THE COURT—Is it on the record?

30 MR. JOHNSON—It is on record, yes; we can obtain that. We have the chain of title, and we can prove it by the person who made the search.

THE COURT—If they are required you can have the deed to the corporation.

MR. JOHNSON—I don't think it will be required. It is admitted in the pleadings.

JUDGE COLLINS—You mean admitted in our bill?

40 MR. JOHNSON—In your bill; it is admitted

we have the title under the Unangst agreement.

JUDGE COLLINS—Consider it in.

THE COURT—Yes: it ought to be put in.

Marked Exhibit D 4.

MR. JOHNSON—Then I offer deed from the Diamond Mills Paper Company of New York, to the Diamond Mills Paper Company of New Jersey, dated the 28th day of September, 1894, and acknowledged first day of October, 1894. 10

THE COURT—The same company, but organized in New Jersey, I suppose?

MR. JOHNSON—Yes.

Marked Exhibit D 5.

MR. JOHNSON—And I also offer, although it may not be necessary, a certificate of organization of this Diamond Mills Paper Company of New Jersey. 20

Marked Exhibit D 6.

GEORGE W. THOMPSON, sworn.

Direct examination by Mr. Johnson. 30

Q. Colonel Thompson, you are the President of the Diamond Mills Paper Company, the defendant in this suit? A. I am.

Q. And have been ever since its incorporation? A. I have.

Q. Your business is that of a paper maker? A. It is.

Q. And you have been in that business a good many years? A. Yes.

Q. How long have you known of this mill in 40

Bloomfield, which belongs to the Diamond Mills Paper Company? A. Oh, since about 1867, I think, I first knew of it; that is, I knew more of it from that time since.

Q. Was it used as a paper mill at that time? A. It was.

Q. Have you kept track of that mill ever since?

10 A. I have known something of it most of the time since then.

Q. How has it been used ever since that time?

A. It was used first for making a cane wrapping paper out of cane brought from the West Indies, I believe; and that was broken up by a steam cone, and afterwards cooked very strongly with alkalies in boilers carrying very heavy pressure.

Q. At the time you first knew it as a paper mill, do you remember who used it—who made paper
20 there? A. I think it was Southmade & McCracken, a couple of young men whose fathers were interested in the railroad business in the West; I think that is the name of the concern.

Q. Do you know the National Paper Company—did you know it? A. I did.

Q. Did that paper company use that mill? A. They used it for a while, yes.

Q. Were you connected with that company? A. I was.

30 *By the Court.*

Q. And is that the company that went into the hands of a receiver? A. Yes, sir—oh, no; the National Paper Company didn't, no; the mill went into the hands of a receiver; though Mr. Fulton put the mill in. He bought the mill of the National Paper Company and afterward put it into the United Paper Company; then it went into the hands of a receiver.

40

By the Court.

Q. Is was the United Paper Company that went into the hands of a receiver? A. Yes, sir; it was.

Q. When did the National Paper Company use the mill? A. In what year?

Q. Yes; in what year or years, as near as you can remember? A. Oh, about 1891 or 1892, I should think, as near as I can recollect—somewhere 10 around there.

Q. Do you know whether that company used the feed waters of the canal in its business of making paper? A. They did.

Q. And how did that company use the water of the canal? A. In the same way it is used now.

Q. And what became of the water after they had used it? A. It was emptied back into the canal again through the raceway.

Q. When you say they used the water as they 20 use it now, just state exactly what you mean, colonel? A. I mean by that whenever there was sufficient water to draw up in the wheel to give them power they used it on the wheel; a certain quantity of it they always used for washing purposes, washing their stock, and for all the different purposes that water is used around a paper mill.

Q. And in the use of that water for treating the stock do you use lime or chloride of lime with it? 30

A. Use lime; that is, we use chlorine.

THE COURT—The same thing; chloride of lime.

A. Chloride of lime; it is called bleaching powders now; chloride of lime has been thrown out now; it is commercially known as chloride of lime.

By the Court.

Q. Called bleaching powders? A. Yes, sir. 40

By the Court.

Q. The same thing. A. They have changed the manufacture of it considerably; there is no lime enters into it.

By the Court.

10 Q. No lime in it? A. No, sir; that is, it is made of manganese peroxide, and common salts and sulphuric acid; those make the gas; this gas is passed into a chamber that is spread with lime, and the lime absorbs it; the lime is a carrier.

By the Court.

Q. The lime though is used; it is carried to the work in the lime? A. In the lime; the lime is the carrier of the chlorine gas.

20 THE COURT—That is all; I understood.

A. That is always so. They have changed the manufacture of it, though; they use hypo-chloric acid now; they find they can use it to better advantage.

By the Court.

Q. But the net result is the same? A. Net result is the same; lime charged highly with this chlorine; it is chlorine that we get.

30 *By the Court.*

Q. The chlorine is what bleaches? A. Yes, that is the bleach property.

Q. And did the National Paper Company—do I understand you to say that the National Paper Company manufactured paper just as you do? A. The same.

40 Q. Now, the water as discharged into the canal, in what condition is that discharged into the canal after you use it?

JUDGE COLLINS—You mean the company or the National?

MR. JOHNSON—I am talking of the National now.

A. The conditions are not very much changed; of course, in washing the stock there is more or less matter comes out of the stock. 10

By the Court.

Q. Dirt? A. Dirt, some dirt, although the stock we use in that mill is the finest that can be obtained; they are all clean shirt cuts.

Q. Do you mean now, for paper now? A. Yes.

By the Court.

Q. The paper that the Diamond Mills Paper Company makes is a finer article than the common paper? A. Yes, a little better than the paper made by the National; yes, we use a little more expensive stock; cleaner stock than the National. 20

By the Court.

Q. You use altogether shirt cuttings, eh? A. Shirt cuttings mostly; some linen with that, linen threads; linen threads; all new stock used.

By the Court.

30

Q. Don't use any stock that has been worn, anything of that kind? A. No, sir.

Q. Well, when the water which the National used of the canal, when it was again discharged into the canal, in what condition was it discharged? A. Well, in the condition that it would be naturally changed a little by the washing of the stock in the mill, that is all.

Q. Any sediment in it? A. Very little, very little 40

coming from it; they used good quality of rags, too, but not so fine quality as we do.

Q. Any lime in it? A. None, except what may be carried from the boiling; well, we don't boil the—

Q. I am talking about the National now?

10 THE COURT—Don't interrupt him; I want to get his answer.

A. There may be a little lime carried away with the water when it is emptied from the rotary bleach. They use the rotary bleach, and boil the stock in that; a little lime may be carried away with it there.

Q. Little chlorine? A. No; no chlorine.

20 THE COURT—Chlorine is a gas that is absorbed by the lime, and it is then called chloride of lime; but the lime is, as he says, a mere reservoir or holder of the gas, and gives it off. That is, I suppose, common knowledge.

A. That all settles, lime, and we take that away and empty into a pool outside.

Q. Was there any chloride of lime at that time?

30 A. Yes.

THE COURT—That is all chloride of lime that he is talking about.

By the Court.

Q. What he wants to get at is, do you know about how this mill was operated as to the use of chloride of lime, or bleaching powder, before the Diamond Mills Paper Company bought it? That is what he wants. A. Well, it is used about the
40 same now as it was at that time.

Q. Do you remember when that mill was used prior to the time the National Company used it, by Fulton or other owners? A. Yes, sir; they used jute stock.

Q. How did they use it?

THE COURT—Jute?

A. Yes; altogether jute. They made jute wrapping that they had to bleach pretty strong. 10

Q. Did they use more or less lime at that time?

A. Oh, they used more lime; to get color from jute you have got to use strong alkali.

By the Court.

Q. How long did that man run it? A. Oh, Fulton ran it, I think, for three or four years or five years.

20

By the Court.

Q. Do you know the years? A. Why, previous to the time the National took it; I think that would be about 1888; 1885 I should think; 1885 or 1886.

THE COURT—What is the date of the deed from Fulton to the National, or whoever it is?

MR. JOHNSON—Well, Fulton owned it twice, 30 so that wouldn't give any idea. The last date is 1894, but Fulton owned it before that time. That wouldn't give it.

By the Court.

Q. You have known it forty years? A. About forty years.

By the Court.

Q. At any time has it been used so that it didn't 40

use chloride of lime? A. Oh, never, I think; I never knew of any paper that was made there but what they would have to bleach with chlorine.

By the Court.

Q. And you say that the use that the Diamond Mills Paper Company has made of it has still re-
10 quired less bleaching than the others? A. Very much.

By the Court.

Q. Because you are using a whiter material? A. Yes, sir.

By the Court.

Q. Can you give an idea of the proportion? A. Oh, they don't use one-tenth; I don't know as one-
20 twentieth the quantity of bleach that they used.

By the Court.

Q. To the same amount of stock? A. To the same amount of stock.

By the Court.

Q. But do you do more business; maybe work up more stock? A. No; they made a greater quantity
30 of paper.

By the Court.

Q. Than you do, eh? A. Yes, because they made very heavy paper; our paper is very thin.

By the Court.

Q. You make tissue papers? A. Tissues, yes; they made more in bulk and weight; a good deal more than we did.

Q. Use more chloride of lime than you did? A.
40 Oh, ten times as much.

By the Court.

Q. Not only used more stock, but they used more bleaching powder to the same amount of stock? A. They did.

By the Court.

Q. They used more in proportion? A. Yes, sir. 10

By the Court.

Q. And worked up more stock? A. Yes, sir.

Q. Now, when the National Paper Company was running that mill—

THE COURT—When was that; what was that period?

Q. That was prior to 1894. Was any complaint made, to your knowledge, by the canal company²⁰ about the manner in which they used the feed water of the canal and discharged it into the canal?

A. No, sir; never heard of any.

Q. No complaint about the lime? A. No, sir.

Q. Chloride of lime.

By the Court.

Q. You were connected with this National? A. Yes, sir. 30

By the Court.

Q. Were you President? A. I was Treasurer, I think, at that time.

By the Court.

Q. General manager? A. And manager; yes, Mr. Fulton was President.

Q. In 1894 the Diamond Mills Paper Company bought this mill property, did it not? A. Yes. 40

THE COURT—Well, they didn't make tissue paper there before your time, Colonel?

A. No, sir; not before the National; the National made the first tissue paper that I know of.

By the Court.

10 Q. How many years did they run? A. They ran about two years; I think about two years; then they disposed of that mill to the United Paper Company.

Q. Were you connected with the Diamond Mills Paper Company of New York. A. I was.

Q. You were the President of that? A. I was.

Q. And that preceded this Diamond Mills Paper Company of New Jersey? A. It did.

20 Q. Has the same officers and directors? A. The same.

Q. And stockholders? A. Yes, sir.

Q. And then you sold out to the Diamond Mills Paper Company of New Jersey? A. Yes, sir.

Q. Let me ask you, Colonel, how much did the Diamond Mills Paper Company of New York pay for this property?

MR. COLLINS—I object to the question as irrelevant.

30 THE COURT—Well, perhaps your objection is well taken. I will receive the evidence subject to your objection.

A. About \$27,000 we paid for it originally to Fulton; Fulton bid it in, or I bid it in for him at the sale from the United Paper Company.

By the Court.

40 Q. Receiver's sale? A. Receiver's sale; yes, sir; then I afterwards purchased of Fulton for about \$27,000.

Q. And then, after a few months, it was turned over to the Diamond Mills Paper Company of New Jersey? A. It was.

THE COURT—The Diamond Paper Mills Company of New York wanted to have a location in New Jersey and got organized here; that is all.

10

Q. Now, you have been running that mill ever since. A. Yes, sir.

Q. In just the same way, with the use of chloride of lime? A. The same.

Q. Do you know of any complaint having been made by the Morris Canal and Banking Company, or the Lehigh Valley Railroad Company, as to the manner in which you used the feed water of the canal in this business of yours? A. Never heard of it, sir, until they brought this complaint. 20

By the Court.

Q. Your man Boyne? A. Boyne was the foreman of the mill.

By the Court.

Q. He never spoke to you about it? A. No; he never said a word about it; never heard of such a thing that we could conceive we were polluting canal water; he certainly never told me of it. 30

Q. Ever hear any complaint from Mr. Oakes, or Oakes & Company? A. Yes; I think four or five years ago Mr. Oakes wrote us that he had decided that we put something in the water up there that was injurious to his business, and concluded that it was what lime may have entered in; at that time we let the lime residue, or chlorine, the settlings, we let that into the canal, into the raceway; after we got the complaint, we took that out, let it settle 40

in large vats, and shoveled it out and carried it out and emptied it outside; carried it away afterwards; emptied it into a large pool in the lot and then afterwards carried it away; I never heard much complaint after that.

By the Court.

- 10 Q. Well, Colonel, anticipating the examination, I should suppose the trouble is that the water that you let go out did become impregnated with the lime and become very strong lime water? A. Why, no; I don't see how it could be strong; no chlorine; if it was chlorine in there; chlorine, of course, we can't allow it to escape with any degree of strength; that is all loss; we find, in pumping it back from our drainers, that we only get one degree of strength; one degree mixed with all the water,
- 20 you know, would hardly be perceptible; and if that is the trouble, if it is the trouble, I can't conceive how so little—

By the Court.

Q. It isn't chlorine; it is the lime? A. Well, the lime don't go with it.

By the Court.

- Q. I know, unless it is absorbed in the water,
- 30 like all lime water? A. It may impregnate the water a little; yes, it is quite possible.

JUDGE COLLINS—It is quite careless; these men are careless and don't do what he tells them to.

THE COURT—I am getting at it my own way; perhaps a little more efficient than yours, I don't know. The point is this, that the water which is called lime water may be perfectly clear, and the lime is

there in suspension and will—and particularly as to the heat of the water.

A. It may impregnate the water, you think?

By the Court.

Q. Impregnate the water; yes. A. This is slaked water that is used, not unslaked lime.

10

THE COURT—That is all the same.

Q. The fire is taken out of it?

THE COURT—Well, the lime is there.

A. Yes, there are some properties in that lime that may get into the water.

By the Court.

20

Q. The lime itself gets there in a slaked state, you know. The lime that is in the water, what is called limestone water, is all slaked? A. It may impregnate the water, you think?

By the Court.

Q. Yes; certainly? A. Well, it is possible that there may be something of that sort in that chlorine.

By the Court.

30

Q. It isn't the chlorine? A. Well, mixed with the chlorine; the chlorine water, you know, would make a solution; the chlorine, and let the lime settle away; now, what we use is this solution of the chlorine with the water.

THE COURT—The trouble is that there is lime in it?

A. It is possible that there may be some; I don't

40

know the chemical action of that chlorine with the lime.

By the Court.

Q. The water itself would take up the lime? A. I suppose perhaps it would take up some of it, yes, but it would be so little would hardly conceive,
10 don't see how it would affect it.

Q. Do you allow any solid lime to get in there at all? A. No, sir.

Q. How do you take care of it?

THE COURT—Unless he settles and takes it out.

A. We settle and take it out.

By the Court.

20 Q. Do you heat this chlorine, is it hot? A. No, sir.

By the Court.

Q. Just put cold water? A. Cold water; pour this chlorine powder; right into the vat.

By Judge Collins.

30 Q. This is heated afterwards? A. No, not heated at all; no, just cold water; just this solution of the chlorine and this cold water.

By the Court.

Q. Not even heated when you put it on the rags? A. No, sir.

By the Court.

Q. Don't run it out hot? A. No.

40 THE COURT—I don't know what the 10.67,

10.27 and 10.37 means at all; I don't know anything about it. That is a mere scale fixed by this gentleman, Mr. Clark, and as old Mr. Oakes very properly says, he knows nothing about the chemical combination. No 15 per cent., or 10 per cent., anything of that kind, of lime; it is absurd; water can't carry 10 anything like that. It comes down to grains. Hydraulic engineers who deal with potable water will give you what scale of hardness is in grains to the thousand gallons, something like that, in very minute quantities. That you have got to have an analytical chemist for, and they will tell. It don't carry any idea to my mind.

Q. What is the nature of the sediment that is discharged into this feed water now? A. There is fibre that will work through the wire. Of course this paper is formed on a continuous web of wire, and it is very fine wire, but a little of the fibre will work through. 20

Q. How fine wire is it? A. It is 90.

By the Court.

Q. 90 to the inch? A. Yes, sir. 30

Q. So these particles are very fine? A. Very fine.

By the Court.

Q. Very fine tissue paper, of course, is ground very fine? A. We have to grind it very fine, yes.

Q. Do you know any way of making your paper, and keeping it out of the water which you discharge from your mill this sediment, or some chlorine, or perhaps chloride of lime? A. Why, there is no way, unless we put in very expensive filters. We might 40

filter that water, I suppose, that escapes from the mill. That would filter the fibres, but whether it would filter the chlorine.

By the Court.

Q. No, the lime you mean? A. The lime, yes; I don't know whether there are filters that would
10 take out that chemical property out of water.

By the Court.

Q. Lime can be taken out of the water, but whether it is a practical thing, that I don't know.

Q. What is the nature of the water before it reaches you? A. Why, you mean the canal water?

Q. Yes. A. Oh, it is pretty bad; pretty bad; most everybody knows what the character of canal water is. We take out of our rack all sorts of dead
20 animals and offal of all kinds; it is fearful.

Q. Any vegetable matter? A. Oh, yes; in the season; along during the summer, of course. these boats throw over more or less cabbages and other vegetables. We take out from our rack a great amount of stuff; very filthy stuff, too.

By the Court.

Q. It isn't potable at all? A. Oh, no, sir; no-
30 body would dare to drink it, I think.

Q. What do you say about the statement that this stuff from your mills fills up the bed of the canal? A. The what, sir?

Q. This sediment from your mill in the water coming from your mill fills up the bed of the canal?

JUDGE COLLINS—Don't say the bed of the canal—this pit.

A. This pit; I should not suppose there would be
40 sufficient of it to hardly make any trouble at all,

and I presume this stuff that they dig out of there is the mud and other filth that gathers, some of it washing down the roadway. They talk about there being ashes.

By the Court.

Q. Rags? A. If there was any rags or any jute stock, any jute bagging, or anything of that sort, 10
it must be thrown in somewhere; somebody threw it in carelessly.

By the Court.

Q. It wouldn't get in in the ordinary course of business? A. Oh, no, sir; it couldn't pass through our mill; it would have to be thrown into the stream after it left the mill, into the raceway.

By the Court.

20

Q. Might drop out in handling; drop out in the road and wash down that way? A. Possibly that way. Of course the bagging, this stock all comes in bags—jute sacks. Those we bundle up and send them to our mills where we make the cheaper paper—don't use them at all. That, I guess, is what the gentleman referred to when he said he saw bagging and strings there. Anything of that kind we send to the cheaper mill. 30

By the Court.

Q. You save it though? A. We save them, bundle them all up, and after we get an accumulation send them over to the other mill.

Q. After you bought this mill—have you enlarged it any? A. Oh, very much, sir.

Q. And added new equipment to the machinery?

A. Yes, sir.

Q. You may state what that cost you.

40

Objected to as irrelevant.

THE COURT—I will let it in.

A. About \$80,000 or \$90,000, we have added to the original cost, so that the mill has cost us now about \$114,000 or \$115,000.

10 *By the Court.*

Q. How soon did you make those additions? A. We have been making them from time to time ever since we have had the mill; we commenced making improvements immediately.

By the Court.

Q. I understand you to say you never had any notice from anybody you were doing any harm to anybody until five or six years ago? A. That is all; 20 the first I heard may have been a little longer than that; but Mr. Oakes wrote us a letter stating that they had been looking about to find something that injured their water for coloring, and they concluded it must be something that we put in there; so we finally decided that it might be some of that lime that had settled away from the chlorine, the gas, and we then let that settle in these tanks and shoveled it out and put it in a pool outside and carried it away finally, so that none of that gets into the 30 stream.

By the Court.

Q. No lime as lime? A. No lime as lime that we are aware of.

Q. But the canal company, I understood you to say you didn't hear from them? A. I never heard a word from the canal company. Now, they may have said something to Mr. Boyne, who was simply a foreman; had no authority to make any change 40 in any way without notifying me.

Q. Nor from the railroad company either? A. No, sir.

Q. This stock that you use is what? A. Shirt cuttings.

By the Court.

Q. Shirt cuttings; new stuff that has never been worn; it is new stuff, clippings? A. Yes, sir. 10

THE COURT—Clean.

Q. What is its condition? A. Oh, clean; perfectly clean.

By the Court.

Q. But there may be some coloring in it? A. No; most of it is entirely white; we don't use that in that mill; they occasionally get a few what we know as number two shirt cuttings; they have a 20 little light stripe in them; something of that sort; it bleaches out easily.

By the Court.

Q. That is the reason why you use so little bleaching powder? A. That is it.

By the Court.

Q. Why do you use it at all? A. To fetch up 30 the color on this cloth; it isn't quite—after it has been manipulated in the beating engines it is discolored a little, and we want to bring the color back.

By the Court.

Q. You soil it a little in your beaters? A. Yes, a little; beating engines.

By the Court.

Q. And then you mix the chlorine in it after that 40

to bleach it up? A. Bleach it up, bring it to a little higher color.

By the Court.

Q. After it is cut? A. After it is cut and after it has been in the bleaching engines; beating engines.

Q. As a matter of fact, do you know whether
10 there is any chloride of lime in that water which you discharge there? A. I don't know that there is.

THE COURT—Has anybody made an analysis of that?

MR. JOHNSON—Yes; we will produce it.

Q. Now, what do you say about this water killing the fish?

20 THE COURT—You need not go into that. The Morris Canal Company is not interested in that.

JUDGE COLLINS—I didn't prove it, anyway.

THE COURT—No; he didn't prove anything. And the Colonel was indicted up in Morris County, and he got a lot of fish and put them in a rack right below just where this stuff was discharged, discharged there for days and days, and there
30 wasn't one died.

A. No; I got all the fish I could find down in Fulton Market, of the different kinds, and not one died in two weeks.

By the Court.

Q. That was the same kind of a mill up there in
4 Morris County? A. The same thing.

Cross examination by Judge Collins.

Q. You haven't been there in the spring when they have cleaned out the basin, yourself, have you?

A. I have been there at all seasons of the year, sir; not so much during the past year.

By the Court.

Q. He asked you whether you ever saw them cleaning out in the canal? A. In the canal? No, sir. 10

Q. You said you hadn't had any complaint from the canal company. Here is a letter in evidence, April 25, 1905.

THE COURT—Did you see this letter; that was written to you?

A. I think not, sir; I don't remember any letter. 20

THE COURT—You have got the original?

MR. JOHNSON—I think we have; yes. I don't think I have it here.

THE COURT—Show him that.

Q. April 25, 1905, you were notified. That is the letter we sent up to the mills. Didn't that come to your knowledge? (Showing witness Exhibit C 2.)

A. I don't remember seeing this letter; it is possible I may have seen it at the time, but I don't remember it now. 30

Q. Mr. Van Gilder is your secretary, isn't he, or was? A. Yes, sir; he is secretary and assistant manager; he may have received some such thing as that without calling my attention to it.

Q. Look at that. That is a letter to him from my firm in answer to one he sent (read letter.) A. Yes; that is Mr. Van Gilder's letter.

Q. To my firm, Collins & Corbin? A. Yes. 40

Q. Reciting a letter of complaint from them? A. Yes, sir.

Q. Well, then, Mr. Thompson, if the men, if your men there are careless and don't have the settling that they should, so that the lime itself can be settled down and shoveled off, it would run into the raceway and so into the canal, wouldn't it? A. If they
10 drew it out of the tanks without shoveling it out, drew it out, and threw it into the water, then it would run into the raceway.

THE COURT—There is no doubt about that.

A. But we have a very careful foreman there now, and I don't think anything of that kind could occur.

THE COURT—I think the Colonel's evidence is this: That up to this time he got this letter from Mr. Oakes—he isn't sure of the date—some five or six years ago, they used to let the lime wash right down, but after that—see if I am right, Colonel.
20

A. That is right.

THE COURT—After that he gave orders to let the lime settle and take it out, and carried it away, and that so far as he knows and supposed, that has been done ever since, and if it has been done, then the only way the lime could get down there would be where it was held in suspension in the water.
30

JUDGE COLLINS—If that has been done. I was just proving if by carelessness they didn't do it—

THE COURT—Yes; I don't understand though
40 now from the evidence of the Colonel,

him to claim he has a right to dump the lime in there at all, or have it stirred up in a mixture, in a slush, but that if it has been done it has been done contrary to his orders—don't claim the right to do it, as I understand it; you don't claim the right?

A. No, sir; we take special pains, as I understand. 10

JUDGE COLLINS—If it has been done through the carelessness of others we are entitled to an injunction.

THE COURT—That is a question of fact. What I want is an analysis of the water that they do empty out there, to see whether it carries lime in suspension or not. 20

Q. You are not much there? A. Not during the past year; no, sir; my son is there every day.

Q. How often do you go up? A. I haven't been there in a month.

Q. Don't go more than once a month, do you? A. Not oftener than once a month.

Q. And before that, for the last year you didn't go much more frequently? A. Previous to that I used to go every week; sometimes two or three times a week. 30

By the Court.

Q. Your headquarters are in New York City? A. Yes, sir.

Q. Where is your home? A. My home is in Brooklyn.

Q. This United Paper Company was sold out by the receivers and bought in, you say, by you for 40

Fulton? A. For Mr. Fulton; yes, sir; I bid it in for him.

Q. Then it lay idle for a considerable time, didn't it? A. Oh, I think perhaps a few months only.

Q. Well, wasn't it over a year? A. Well, I should think not as long as that; I can't remember. We went immediately, I know, to putting it in condi-
10 tion, making alterations there, and I think we completed those all within five or six months.

By the Court.

Q. Do I understand you to say that the mill ran up to the time the receiver sold it? A. Yes, sir.

By the Court.

Q. It didn't stop running until the receiver sold it? A. No, sir.
20

By the Court.

Q. Then you bought it immediately from Mr. Fulton?

By the Court.

Q. For the Diamond Mills Paper Company? A. I bought it for Mr. Fulton, and then afterwards we bought it of Mr. Fulton.
30

By the Court.

Q. How soon after? A. Immediately; immediately after the sale.

By the Court.

Q. So that there was no hiatus then; if you know what that means; no break from the time the receiver sold it until you got it? A. No interim at all.
40

By the Court.

Q. No interim? A. No.

By the Court.

Q. Then you immediately went to work to repair it? A. We went immediately to repair it; put it in condition.

Q. The receiver did run it? A. The receiver ran it for a year or more; maybe a year and a half; as long as they were in existence I think the receiver ran it; that is, not very regularly; he would run it perhaps a month when he had orders, then let up for a week or two; and it was run very irregularly during the time it was in the hands of the United Paper Company. We ran it, you know, before this deed was completed.

10

By the Court.

20

Q. You took possession? A. We took possession and started up the mill very soon after I made the arrangement and bought it in for the United Paper Company.

By the Court.

Q. Did it lie idle for any length of time before it was sold, before it came into the hands of the United Paper Company? A. No; not very long, perhaps it would run two or three months and then shut down for a month or two; run irregularly; while it was in the hands of the National Paper Company, the National Paper Company did not run it very regularly, because they were altering it at the time; making alterations there and of course that interfered.

30

JUDGE COLLINS—This was the time there was the hiatus; it was in 1888, and that

40

is what I want your Honor's attention directed to.

Q. In 1888 there was a time; in 1888, or about that, when the mill was idle for a considerable time; put your memory back to that? A. Before it went into the hands of the National Paper Company, I think it was idle for some time; they had
10 been making a coarse paper there—wrapping paper, and I think it was shut down.

THE COURT—For how long?

Q. For about two years, wasn't it? A. I don't remember that it was shut down for over eight or ten months; perhaps a year; I had an impression that Fulton ran it up to that time; I didn't know
20 anything about his business, except general knowledge that he was making wrapping paper there—jute paper; then it was shut down; then I made an arrangement with Fulton and we formed the National Paper Company, and we started it up immediately, that is, after making some repairs; as soon as we could get it in condition to start, we started it.

Q. You can't tell the length of time it was idle after Fulton stopped, before the National Paper Company bought it? A. No; I can't.
30

THE COURT—He says he thinks it was a few months.

A. I think it was over seven or eight months.

JUDGE COLLINS—We will supply that.

By the Court.

Q. Was it winter or summer? A. I think partly
40 in the winter; I think they shut down in the fall

and started up again; we started up in the spring or summer following.

RALPH H. THOMPSON, sworn.

Direct examination by Mr. Johnson.

Q. You are the son of the last witness? A. Yes, 10
sir.

Q. And you are a stockholder in the Diamond Mills Paper Company? A. I am.

Q. And also a member of the Board of Directors? A. Yes, sir.

Q. And its Treasurer? A. Yes.

Q. And do you have charge of the mill at Bloomfield? A. Yes, sir.

Q. Of the company? A. Yes.

Q. How long have you been working—employed 20
in the mill? A. Since January, 1894.

By the Court.

Q. How old are you? A. Thirty-two.

Q. During that time, do you know how the mill has been used? A. I do.

Q. How has it been used? A. For the manufacture of tissue paper.

By the Court. 30

Q. The material you use, what are they? A. White rags and linen stock of two kinds.

By the Court.

Q. Clean white rags? A. Everything that we use is new.

By the Court.

Q. You don't use anything that has been worn? A. Never. 40

Q. In treating this stock, do you use the feed water of the Morris Canal? A. Yes, sir.

Q. And in what way? A. To wash the stock.

By the Court.

Q. It is first washed and then it is mixed up with water to be beaten; you don't heat it dry; you have
10 to cut it? A. It is washed; yes; yes, that is right; we wash the stock first; then we use it to a certain degree to beat with; it is merely to hold the stock in solution.

THE COURT—I understand that.

Q. What is the condition of that water as it comes into your mill—that canal water? A. In what respect? In regard to what?

20 Q. Why, as to purity, or what is in it? What do you find in it? Is it pure, clear water? A. We find various vegetable matter; for instance, sticks, leaves, and natural dirt that would fall into a stream of any kind, and some oil comes to us floating on top of it.

Q. Anything else? A. Dead animals.

Q. How do you collect this? Is there any way that you get this?

30

THE COURT—It is strained with a rack.

Well, I want to say to counsel what I understand the effect of running this water on this seventeen mile level is, that it is not muddy in the way that a stream gets to be muddy if everything has a chance to settle; there is a very slow current, it moves very slowly, or else you can't keep it level,—the canal couldn't keep its level if the water ran
40 with any velocity; water won't run

without a fall, and I don't suppose there is an inch or two inches of fall in that whole level, except when they are drawing water out of the lower end; then the moment you draw the water out of the lower end, then there must be some fall. Now, the result is that where it is stirred up by the canal boat or some boys 10 in it, the sediment all settles, the sediment that comes in out of the Passaic or Rockaway River way up there where it takes in the water after a storm, when the stream runs muddy, has an opportunity to settle before it gets there, so that there is no sediment proper in that canal unless the bottom is stirred up by a boat going over it, and a boat will stir it up, notoriously, everybody has seen 20 a boat running along close to the bottom of the canal stirring up the dirt; it rises right up behind it, but the less boats go through the clearer the water will be; but that don't dispose of the dead dogs and cats and other matters that are thrown into it by people along the shore; banks of the canal. That is my understanding of it.

30

A. I should say you were entirely correct.

THE COURT—When the witnesses speak of its being very clear they mean simply that it had a chance to settle; no mud or gravel.

JUDGE COLLINS—No lime in it.

THE COURT—The lime wouldn't settle, never have lime enough in it to settle. They 40

might show that cats and things of that kind come in.

A. We merely show there was a certain amount of organic matter in it; we don't care about the dead cats.

10 THE COURT—Yes; certain amount of organic matter; but as I understand now the complainant, the complainant charges you with putting a certain amount of lime in, held in suspense.

MR. JOHNSON—The bill is a little broader than that.

20 THE COURT—I don't care what the bill is; that is all they have proved. I want to say here my judgment all turns on that, an analysis of the water after the lime is settled out of it will tell the story.

A. That is exactly right.

Q. Now, do you do anything else to screen it besides having these racks up there? A. Yes, we pass it through sponges and through a wire screen sixty meshes to the inch.

By the Court.

30 Q. Sponges and wire screens? A. Yes, sir.

Q. Do you have any other screens besides that sixty mesh? A. Before it does any work, first it is passed through sponges, wire screens sixty meshes to the inch, and felt strainer back; a strainer back on the spouts of the hydrants made of felt.

By the Court.

40 Q. The effect of your treatment of the water is when you begin to use it it is in as pure a state as you can make it? A. We purify it

as much as we possibly can without making it chemically.

Q. After you use this water what do you do with it, discharge it again in the canal? A. Let it go back in the canal.

Q. And in what condition is it then as to sediment? A. It contains more or less fibre.

By the Court.

Q. Fibre is fine pieces of linen or cotton cloth? A. Yes.

By the Court.

Q. That has been ground up and beaten? A. Exactly.

By the Court.

Q. But still goes through your machines? A. ²⁰ So fine they must first go through a wire eighty meshes to the inch, and the rest of it through wire 100 meshes to the inch; that is, most of it.

Q. How long have you been using the water of the canal in that way in that mill, to your knowledge? A. Twelve years.

Q. Ever since you went in there? A. Yes, sir.

Q. Well, did you go in there in 1894? A. 1894.

Q. Can you say whether that has been done continuously or not? A. Yes. ³⁰

By the Court.

Q. Well, what means have you taken to prevent the lime, as lime, getting in, going down into the tail-race? A. Some years ago, I should say about seven, the insoluble matter at the bottom of our bleach tank was allowed to go into the tail-race. Complaint was made about that and it was stopped. There is no connection now with the lime tank and ⁴⁰

the tail-race; in other words, no connection between the lime tank and the canal. That water is now emptied outside the mill into a pit, where the water drains away, or rather it goes from there into another pit, where the water goes away and leaves a sticky mass of white insoluble salts of various chemicals of lime, principally calcium probably, 10 and that is carried away and dumped from the canal.

By the Court.

Q. The water that runs away from that runs down into the canal? A. No; not at all.

By the Court.

Q. Where does it go to? A. It is nowhere near the canal; it is below the canal.

20 Q. Who made that complaint? You say complaint was made? A. I don't know who made that complaint; that was done when I had no particular authority in the mill. I was there more or less to learn for the first few years, and after Boyne died I had more authority then than while he was living.

30 THE COURT—Now, let me get in my own way, Mr. Johnson, if you will excuse me. The water, after it has been through the beaters, has not come in contact with the bleach powder yet. Is there any bleaching powder put into your beaters? A. No powder; no.

By the Court.

Q. What is put in there? A. The solution; bleaching powder after it is settled.

40 *By the Court.*

Q. You have a tank where you put bleaching powder and water? A. Yes, sir.

By the Court.

Q. And make a liquor? A. Make a liquor; exactly.

Examined by the Court.

10

Q. To put in your beaters? A. Yes, sir.

Q. When that has gone through the beaters what becomes of it? A. After it has gone through the beaters it has already been treated in the beaters with chlorine, hypo-sulphate of soda.

Q. That kills the chlorine? A. That kills the chlorine.

Q. Now, then, when it is drawn out of the beaters it is drawn out of the beaters in order to get your paper in a pulp, isn't it, in some way? A. Well, after that process the pulp is let down into drainers; that process goes on for about five hours; then the pulp is let down into drainers, from which the excess liquor drains away. 20

Q. Now, what becomes of that excess liquor? A. That at one time drained into Third River; now it drains into the ditch of the canal; I mean in the tail-race of the mill. That liquor contains chemicals so slight that we can't get any test on them; it is principally water. 30

Q. Is that all the water that runs into the tail-race that has been used by you in your mill? A. You mean aside from the water wheel of course.

Q. Yes. A. No; the water from the paper machines runs into the tail-race; that water which, after the sheet is formed, falls through the wire cloth, and the formed sheet travels on, that water, that travels on and goes through the tail-race.

Q. That is the same kind of water as the other, 40

isn't it? A. Precisely; it contains even less chemical.

Q. Then you mean to say that so far as what is comprised in the term chemical there is substantially none from your mill that goes into the tail-race? A. Comparatively little; there is more goes in there from the boiler in which stock is cooked
10 than from any other place, but that boiling process is less now than it has ever been; it used to be that one and maybe two boilers a day were let down; by let down I mean cooked and dumped. Now we have two, maybe sometimes one, sometimes three a week.

Q. Now, what becomes of that water? A. That water runs away into the tail-race, from there into the canal.

Q. That is warm? A. Yes, sir; warm.

20 Q. Has that had any chlorine in it? A. No.

Q. Has not been subject to bleaching powder?
A. No bleaching powder in that.

Q. Then it is simply the washing of the rags hot? A. That comes from the boiling of the rags.

Q. Under steam pressure? A. Yes, sir.

Q. And that takes out anything in the shape of filth from the rags? A. Exactly.

Q. And softens the rags? A. And softens the rags that they may be better bleached afterwards.

30 Q. Now, then, after they have been softened and washed in hot water, under pressure, they are then put into the beaters? A. Yes, sir.

Q. And the chlorine water put on them? A. Exactly.

Q. Then they are beaten? A. Then, well, then they are let down into the drainers after; after they have been ripened, we will say, for a certain length of time, then they are brought up, brought up in cars, put into the beating engines and beaten until

it becomes an emulsion virtually, and then run over the paper machine.

Q. But the water is drained out of them that is used when they are in the beaters, eh, before they are put on the— A. Well, let me see—

Q. Or isn't there any surplus water? A. No; that water that is in there is not drained out; the stock is pretty clean then, you know; it is merely 10 put in to be beaten then.

Q. The stock then takes all the water with it onto the—what do you call that, the movable— A. Onto the wire.

Q. Onto the movable wires, and the water drops out after it gets on the movable wires? A. Drops out through the wire; yes, sir.

Q. And that water runs into the race? A. That water runs into the race?

Q. Now, let me see what opportunity there is for 20 lime to get in, if you please. In the first place there is no chlorine, as I understand you, put in bleaching powders, as you call it, put into the hot pressure? A. There is no bleach powder put into the rotary boiler which cooks the stock.

Q. What is put in, anything more than water? A. What we call milk of lime and alkali, which is soda ash, but that has nothing to do with chlorine.

Q. Never mind the chlorine. Leave that out of 30 there. I am after lime now. I want to find out when it comes in contact with lime the chlorine is out of this except as it carries some lime with it into the stock? A. I am afraid you will get me into deep water, because I am not enough of a chemist.

Q. I am not after chemical testimony at all. I think the water that goes in there should be analyzed for lime. As I understand you, you take the rag; and you put them in a revolving cylinder?

A. Yes, sir.

Q. And you put milk of lime in? A. Exactly.

Q. And put them under heat? A. Yes, sir.

Q. Then from that they are taken out and put on drainers and the water is drained off of them? A. No; from there the stuff, after it is dumped, after the stock is dumped out of the rotary boiler, then it is washed.

10 Q. Washed with water? A. And bleached in a washing engine.

Q. But what becomes of the water that is in that boiler? A. The liquor from the boiler?

Q. Yes? A. That runs away and runs into the tail-race.

Q. That is milk of lime, soda? A. That is what it was originally; it isn't that any more, understand; it isn't that after it has been subjected to heat.

20 Q. You don't destroy the lime; you can't destroy the lime; you make it combine with other chemicals, but you can't destroy it? A. We change it.

Q. You may change it.

JUDGE COLLINS—But it is still lime.

30 Q. It is still lime; lime is calcium, as I recollect when I went to school, is an original, one of the original elements; calcium is an element, and it may come in a thousand different forms; it does come in a great many different forms, but at last it is lime. Now, how did you make that milk of lime that you use? A. By mixing ordinary paper makers' lime, as they call it, with water.

Q. Slaked lime? A. Slaked lime.

Q. And water; and you make milk of lime? A. What they call milk of lime.

40 Q. Now, then, is there much quantity of that? How much do you make of that, and what, in gallons? A. We don't use it every day by any means.

Q. How often do you use it? A. The best I can say is once or twice a week; I am not sure; it varies.

Q. In quantity, how much? A. In quantity, I don't know exactly the capacity of that tank; I should call it from 400 gallons to 500; of course most of that is water, 500 gallons of water, and to that is mixed maybe a couple of hundred pounds of lime. 10

Q. Couple of hundred pounds of lime? A. Yes, sir.

Q. Now, then, that water, after it has done its work there and the lime has been combined with soda ash, and all that sort of thing, is turned into this raceway? A. Yes, sir.

Q. Then the rags are bleached, put into a bleaching tank? A. Yes, sir.

Q. But the water, the liquid that they are there subjected to, never gets into— A. Not as lime. 20

Q. But I understand that water, you say runs down into the tank and you let it settle? A. No; we make a separate bleach liquor in another tank; that is an institution in itself. That settles from the first tank; it goes into settling tank, from the settling tank into third tank. Now, after we have cooked our stock and the stock is put into beating engines, then we draw some liquor from here and put it in the form of a liquid, a yellowish liquid, almost clear, put it in by pailfulls, couple of pails 30 full, into engine of stock, but it leaves the insoluble matter at the bottom of this bleach powder mixing tank, that is drained away from the mill and from the canal.

Q. Don't get in? A. Never.

Q. That is what I am speaking about. If I understand your evidence, the only point from which any lime gets into the tail-race is the four or five hundred gallons that you speak of in the revolving tank? A. In the rotary boiler. 40

Q. In the rotary boiler where the stuff is cooked in it? A. Yes; it takes that about twenty minutes to run away.

Q. And that is how many times a week? A. Anywhere from one to three; it depends.

Q. What difficulty is there about your running that out? A. What difficulty?

10

JUDGE COLLINS—You mean running it out on the ground?

Q. Why can't you divert that from your tailrace and run it somewhere else? What is the difficulty about your disposing of that the same as you do your bleach water and running it into that tank? A. The question has never come up.

Q. Never thought of it? A. No.

20

Q. I only suggest now that that is where the whole trouble is. You put in actual powdered water, make what you call milk of lime, and that goes in the tail-race, and the lime is held in suspension; not only that, but it has been put in under great heat.

Q. Are you considering the lime held in suspension as a solid? A. It is lime; don't make any difference; the original particle of lime is very small, you understand; it is invisible? A. But there is absolutely no solid lime; no solid chemical in this.

30

Q. There is no solid lime in lime water to the eye; ordinary lime water is just as clear as any? A. Yes, sir.

Q. Well, there is where the trouble is, my friend. The color proves nothing as to the quantity of lime. But your own statement that you put a lot of it, I forgot how many pounds you stated, into one charge of your cylindrical cooker and let that water run into the tail-race, indicates that you let lime in there that had been boiled to a high degree, and the water charged as high with lime as it will carry it? A.

40

But a chemical analysis doesn't show that though.

Q. That is just what I want. If you got a chemical analysis of each one of these products used in the tail-race, then you have got something.

JUDGE COLLINS—Ought to be taken at the right time.

A. But we have chemical analysis of the condition. 10

THE COURT—You have been probably on a false scent entirely; I should judge so.

A. And yet this has been continuing for years and years.

THE COURT—Don't argue your case. That is another matter entirely. The whole 20 complaint now is that lime—the whole complaint that is worthy of consideration here—I won't say that the Canal Company may not find fault with this fibre you put in, that is another thing, but the whole complaint as I understand it now is that at times so much lime held in absolute solution gets into the Third River there as to prevent Mr. Oakes from making colors, dyes. 30

Further direct examination by Mr. Johnson.

Q. Is all your steck boiled in this rotary boiler?

A. Not at all.

By the Court.

Q. I thought you said it was boiled in this rotary boiler? A. I don't understand the question.

Q. The question is, is it all treated in this rotary boiler? 40

THE COURT—Oh, no; he told how much; once or twice a week a few hundred gallons, five or six hundred gallons; four or five hundred.

A. That is the liquor, not the stock, you understand.

10 THE COURT—I am speaking roughly; several hundred gallons are put into this place with a large amount of lime mixed with it. You see when you are proving a negative you have to go pretty close, you have to cover every hole.

Q. I understood you to say that this lime which was put into the rotary boiler was changed?

20 THE COURT—He says it was treated with soda ash, which has a certain effect, whether just exactly as in alkali; in acid. For instance, lime mixed with sulphuric acid makes a plaster of paris, I believe, when I went to school, but it is lime all the same, it is sulphate of lime, and lime comes in all sorts of shapes. For instance, take two different cases. Hydro chloride, I think it is, of
30 soda is common salt; hydro chloride potash is a different thing entirely, a valuable fertilizer; it looks just like common salt; I buy it to put on my farm, and it looks like dirty salt. The difference between the sodium and the potash potassium makes all the difference in it, but they are both composed exactly alike, and common salt is an actual detriment because it isn't plant food, but
40 the chlorate potash is a very high fer-

tilizer because it contains potash which plants take up, but the potash is there and the sodium is there. Now, the sodium that he put there did not destroy the lime; at least I want a chemist—

MR. JOHNSON—I want to know what he says. He evidently thinks no water gets in the canal— 1)

THE COURT—He says this. He says that he puts into this digester, I will call it, those rags, the very first process a quantity of milk of lime, and that is made of powdered lime—that is, papermakers' lime, a very fine powdered slake lime mixed with water, making a milky substance, and that is there digested for a long time, but other things are put in it, other chemicals which he supposed destroyed the effect of it, and then that is washed down into the tail-race. 2)

MR. JOHNSON—I want to ask him if that is what he really said.

THE COURT—Go on and ask him.

A. Well, we suppose that this—

THE COURT—Never mind what you suppose. Just tell what you put in there. That is all you have got to do. 3)

A. Well, we put in there just what I told you.

By the Court.

Q. You put in milk of lime? A. And alkali and soda ash. Now, the result of that combination is caustic soda, with what by product I don't know. Caustic soda, as far as I know, contains no lime. 4)

By the Court.

Q. But the question is whether the lime is destroyed. Now, if you will go up there and take a specimen of that that comes out and analyze it and find out that the lime is actually destroyed, you will possibly convince me, but you will be running against a primary law of nature; now, that is all
10 there is about it, Mr. Johnson.

MR. JOHNSON—This gentleman says he is not a chemist.

THE COURT—I asked the young man whether they could not dispose of that product by itself.

JUDGE COLLINS—He hasn't answered it yet.

20 THE COURT—He said he hadn't thought of it. It may be a very serious matter for him by and by to find out whether he can. According to his story there is no other place where the lime gets in, because the bleach water is not thrown in, as I understand you, at all; thrown out into a pit by itself?

A. That is the sediment only; that is the insoluble part.

30 JUDGE COLLINS—The water goes?

THE COURT—The water from the bleaching powders; that goes into the tail race.

A. After it has been used; after we have used it to wash.

40 THE COURT—I understood him to say it went into a tank, a pit below the level of the canal entirely, so it couldn't get in there.

A. That is the settling.

By the Court.

Q. You say the water from the bleaching powder finally goes into the tail-race? A. After it has been used and treated by other chemicals, too, you must understand.

10

THE COURT—He said they got rid of the sediment; reduced the thing to a minimum.

Q. What did you say about this statement that the sediment which comes from your mill, the fibre, fills up the bed of the canal or this pit? Have you looked into that?

THE COURT—I don't think that is of much consequence here. He has made a point 20 of it to show the quantity that went in; but that is a matter that is so easily disposed of and dealt with that I don't think it is as serious as the other; but you can go on and meet it. As I understand it now to this time, the amount of stuff they get there is covered with bleached fibre, fine bleached fibre that mixes in with the mud and stuff that 30 gathers there and makes a great deal bigger show than it is.

JUDGE COLLINS—There is a good deal of lime in it.

THE COURT—If there is lime in it, that is a horse of another color. I doubt it I think, probably, the whole thing is due—I want you to see what is in my mind—probably the whole thing is due to the whitening effect of those fine fibres. 40

A. As I have said, what sediment can get in there—it is better to call it fibre—what fibre can get in there has to come through these various fine meshed wires. That is about the only way it can get in there.

Q. Does it fill up the bed of the canal? A. It does not fill up the bed of the canal.

10

By the Court.

Q. How do you know it don't? That is the question. A. By observation.

Q. And did you ever make any experiment to find out? A. I have tried to get it from the bed of the canal, but it is so impalpable that you can't get hold of it; that is, about the time you approach it with any utensils, with any vessel, for the purpose of gathering it, it dissipates.

20

JUDGE COLLINS—He is speaking about what is afloat.

A. No; I am not speaking of what is floating. I am speaking of what deposit I can see in the bed of the canal, the thickness of which may be an eighth of an inch in places.

By the Court.

30

Q. It has not been cleared out this spring, has it? A. Not yet.

Q. Did you ever try to get any from the pit where the water is still; from the basin which has been described? A. From the basin I have; yes, sir.

By the Court.

Q. How did you get out to it from the shore? A. Not from the pit; the basin. The basin, you understand, is large, open, and the pit is in the center of

40

this, as I understand. I have never seen it. I don't know that opening; I am unaware of it.

THE COURT—It hasn't been cleaned out this spring. The better way to do is to let all hands be present there at once, on both sides.

JUDGE COLLINS—And your Honor. 10

THE COURT—No; I don't want to go there.

JUDGE COLLINS—I was going to suggest at the close of the day that we all go there, and your Honor, and look at it.

THE COURT—I would be very glad to do it, but it does not have the approval of the head of the Court, I understand.

Q Could you get any of it out of the basin? 20

THE COURT—How deep was the water where you went to get it out?

A. Oh, about two feet, I should say, near the edge I don't remember quite.

By the Court.

Q. How near to the railroad tracks? A. Oh, quite a ways from the railroad tracks.

Q. What did you do there about that, and what was the result? A. Well, we took a hoe and tried to lift some mud on which we could see a small deposit of that fibre out of the canal, and by going very gently, extremely gently, we could get that hoe with about a couple of inches of mud on it, and on top of that we will say, oh, an eighth of an inch of fibre, but it had to be handled very carefully or it would have dissipated. 30

Q. Did you take a pail and try to get any? A. I don't remember whether we ever took a pail or not. 40

Q. Now, about the discoloration of that water, have you noticed that? A. I have.

Q. And can you say whether that discoloration is apparent or real?

THE COURT—Well, if it is apparent it is real. I don't understand what a non-apparent discoloration is.

10

A. I should consider the discoloration was due to the fibres held in suspension in the water.

Q. Did you ever take any sample of water from that part of the canal, the tail-race or basin, where it was discolored in a bottle? A. Yes, sir.

Q. Have you got the bottle here? A. Yes, sir; I have taken it at the worst possible time.

By the Court.

20

Q. What do you mean by the worst possible time?

A. I meant when there is no current flowing through it; when the basin has been stagnant for some time.

By the Court.

Q. How soon after you had made a discharge of your liquids was it? A. How soon?

30 *By the Court.*

Q. Yes? A. Well, I took the bottle full this morning.

By the Court.

Q. How soon after you made a discharge of chlorine water in it? A. I don't know.

By the Court.

40 Q. That is the time to take it,—the test you want to make is to make one of the actual water you dis-

charge which does not come from your water wheel.
 A. There has been no water flowing through our mill from the canal for two or three days, possibly more. I forget when the water was let out.

JUDGE COLLINS—That wouldn't help us.

By the Court.

Q. Haven't you taken any last fall or at any time shortly after discharging, didn't you ever take any sample of the water that goes from your works before it got into the tail-race at all? A. Not that I know of. 10

THE COURT—That is the time to take it.

JUDGE COLLINS—That is the thing that ought to be analyzed.

THE COURT—That is the thing that we want. 20

A. We have considered that an analysis made of the canal water showing the actual condition of the canal above and below our mill would show to all intents and purposes whether the water was polluted or not.

THE COURT—It depends altogether on when you took the analysis and where you took it, how soon after you discharged water. 30

By the Court.

Q. Now, Mr. Thompson, how often in the course of a day or week do you discharge water that has had chlorine in it, your chlorine liquid? A. Well, it should be understood that we don't generate chlorine in that mill.

By the Court.

Q. Now, my dear sir, you better answer my ques- 40

tion. I know you don't, and never did. You have chloride of lime or bleaching powders. A. That is not chloride of lime.

By the Court.

Q. Well, it is; you better not talk that way to me. I know better. Bleaching powders and chloride of
10 lime are precisely the same thing in commerce, and for present purposes it is powder with chlorine in; and you mix that with water, don't you? A. I hesitate to say anything, but if you will allow me—

By the Court.

Q. If you will answer my questions I will be obliged to you. A. We mix bleaching powder with water.

20 *By the Court.*

Q. And what do you do with that water? A. Bleach stock with it.

Examined by the Court.

Q. And what do you do with the water after stock is bleached with it? A. After it has been treated still further we let it go.

Q. What do you mean by treating still further?
30 A. I mean we use the water to kill the chlorine—not the chlorine; we use what we call anti-chlorine.

Q. After you have used anti-chlorine what do you do with the water? A. We let the water go.

Q. Have you got a sample of that? A. No.

Q. How often do you do that in the course of a year, say? A. I have made a mistake, if you will allow me. I said we allowed that water to go. We did allow that water to go. Now, we jump it back and use it over again to mix our bleaching powder with.

40

Q. You don't put any of that in? A. No, sir; we don't; I had forgotten that change.

Q. When did you make that change? A. We made that change after Mr. Oakes complained about a year ago. When complaint was made a year ago we made this change.

Q. After this letter was received? A. I suppose so. 10

Q. About a year ago? A. I should say so.

Q. Then you did not put any water with—any bleaching water—in the tail-race any more? A. Not now; that is, not from the drainers, you understand. After the stock has been washed and treated, then that water goes, but the water from the drainers—

Q. What water goes into the tail-race? A. The water after the stock has been washed and treated with anti-chlorine—I believe I have made a mistake 20 about when that water is allowed to go away—but after the stock is let down into the drainers still containing a certain amount of this bleaching water, &c., you know, that water we don't allow to go.

Q. All right; but what do you allow to go? A. As I have said, the water which we wash stock, plain water without any bleaching powder in it at all, and while the stock is being washed, and one or two pails of bleaching powder are thrown in; then 30 after that is treated with anti-chlorine it is allowed to fall into the tail-race.

Q. Now, how much is there of that? A. Oh, that is impossible for me to say.

Q. You can tell about, whether it is a hundred thousand gallons or five gallons? A. No; I can hardly say that, because it depends entirely on what stock we are treating.

Q. How often does it occur in twenty-four hours, or a week? A. Well, I could make the worst possible guess at that. I suggest that we have other 40

witnesses who can answer it a great deal better than I can.

Q. What I want to get at is, just how much water, and when, that you use for any purpose in your mill in dealing with your rags, goes into the tail-race? A. We have never estimated it.

10 Q. If I understand it, it goes in now in three shapes; first the milk of lime, after being treated with other acids, that you put in the revolving cylinder? A. Yes, sir; we have a name for that; we call it rotary liquor.

Q. That runs in? A. Yes, sir.

Q. Then you use chlorine water for some purpose, washing your rags, or some purpose, and that after being— A. That we call bleach liquor.

Q. The bleach liquor, you put that in; that goes in? A. Yes, sir.

20 Q. And that is all the liquor that does go in. That drains out? A. It drains away from the paper machine, you know.

Q. That don't go in, you say? A. Not from the paper machines. You remember we spoke of that before.

Q. From the paper machine; that water goes in? A. Yes, sir.

Q. That is three waters that go in? A. Yes, sir.

30 THE COURT—That is very frank and straightforward.

Further direct examination by Mr. Johnson.

Q. Is the water flowing from your tail-race all the time in the canal?

THE COURT—Whenever his mill is running.

A. Yes, sir.

By the Court.

Q. Whenever the mill is running, and then some gets through when the mill is not running? A. Some little gets through the wheel, you know, even on Sundays, when there is water in the canal, of course.

Q. Did you take some steps to have an analysis of this canal water made before it reaches you and after it reaches your mill? A. Yes, we have had that done. 10

Q. Just tell us what you did? A. The superintendent, Mr. Ward, and I took bottles which were sterilized and fitted for the purpose of taking samples, and we got samples from the head-gate from the tail—

Q. Just say where the head-gate is?

THE COURT—Never mind that; I know what the head-gate is; that is before the water comes to the mill at all, that is on a level with the canal. 20

Q. One sample there; now where were the others; A. The first sample was at the tail-race. I can tell you better by referring to the notes I made of it at the time. Sample No. 1 was canal water from the head-gate; No. 2 was the canal water from the basin at the foot of plane 11; No. 3 was water from Oakes Pond at the intake of Oakes Mill; No. 4 was water from the tail-race. 30

By Judge Collins.

Q. What part of the tail-race? A. As it leaves our mill.

By the Court.

Q. When were those samples taken? A. January 26th and March 8th. 40

Q. Were those bottles labeled showing the water containing them? A. I labeled them as we took them.

Q. As you took them? A. Yes, sir.

Q. What did you do with them? A. Those were sent to a chemist in Newark.

Q. What is his name? A. Mr. Axtell.

Q. Who took the samples? A. Mr. Ward and I.

10 Q. I mean who actually took them down there?
A. Our teamster, Mr. Hodgkiss.

Q. When were the other samples taken? A. March 8th.

Q. How many bottles were there of the second samples? A. Four.

By the Court.

Q. At the same points? A. Same points, numbered alike.

20 Q. And then sent to Mr. Axtell in the same way?
A. Sent to Mr. Axtell in the same way by the same man.

By the Court.

Q. Let me ask you a question. Have you got memoranda or memorandum how your mill was being used; what had you been doing with your paper just before you took that sample of the tail-race? A. The only thing I know about it is we
30 had been running under normal conditions.

By the Court.

Q. Yes, but your mill don't throw out discolored water all the time? A. Not at all, very little.

By the Court.

Q. I called that you showed here in the bottle a little while ago discolored water. Any water is
40 discolored when you hold it up if it isn't perfectly

clear, like crystal. Now, the question is, the time when that was taken from your tail-race is of the utmost importance. You might have been discharging at that time some of this discolored water, and you might not; it don't run out of your mill all the time? A. No.

By the Court.

Q. That is the trouble? A. We merely took the samples under what we consider normal conditions; that is, the mill was running along as it usually does.

10

Q. Can you say whether there was any difference in the water at those different times; the water conditions? A. The second lot of samples was taken four or five days after a storm.

Q. Rain storm? A. A rain storm.

Cross-examination by Judge Collins.

20

Q. As I understand it, all the water that you use in your manufacture, except such as is emptied into the sump where they put the sediment; lime sediment; goes into the tail-race eventually, doesn't it? A. All the water we use in our mill, you say.

Q. Yes? A. No, not that; but I suppose I understand you to mean all the water we use in our manufacturing, in our washing and beating, &c.

Q. Yes, I meant that? A. Yes, sir.

30

CHARLES E. HODGKISS, sworn.

Direct examination by Mr. Johnson.

Q. Are you in the employ of the Diamond Mills Paper Company? A. I am.

Q. And do driving; carting for them? A. Do their driving.

Q. Do you remember Mr. Ralph Thompson giving you some bottles? A. Yes, sir.

40

THE COURT—Don't spend time with that.

Q. Did you take them to Mr. Axtell? A. I did, sir.

Q. Did you take them on more than one occasion? A. I took them on two different occasions.

Q. To whom did you take them? A. I took them directly to Mr. Axtell and gave them to him
10 in person.

FRANK C. AXTELL, sworn.

Direct examination by Mr. Johnson.

Q. What is your business? A. I am a chemist.

Q. And how long have you been engaged in that business? A. Since 1880.

Q. And you know Mr. Ralph Thompson? A. I do.

20 Q. And you received some bottles from him? A. I did; I received four bottles containing samples of water on January 26th and four bottles on March 8th of the present year.

Q. And have you analyzed those bottles, the water in those bottles? A. I have.

Q. And when did you make the analysis, how soon after you received them? A. I made some determinations the same day that the samples were
30 received, and the rest within three days of that time.

Q. Take the first.

THE COURT—Have you got your written statement of it here?

A. I have.

THE COURT—Hand it up.

JUDGE COLLINS—I want to object to the
40 analysis of the water in the tail-race.

THE COURT—No. 4, taken from the tail-trace of your mill, yielded the following results:

JUDGE COLLINS—I want to object to the analysis from the tail-race, on account of not having proved the conditions.

THE COURT—It may not prove anything, but it is competent evidence. I am looking here, what he has got in here. (Court read printed report.) 10

By the Court.

Q. What are those parts in? A. Parts per million; five parts in a million.

THE COURT—I haven't read it through, but I do not yet see any test here of lime.

MR. JOHNSON—There was a test. 20

THE COURT—Not in this report. Here is February 8th and March 27th.

By the Court.

Q. Did you test at all for what these solids were composed of? A. They are composed essentially of salts of lime and traces of soda and potash and magnesia. 30

JUDGE COLLINS—I would like to understand what is meant by 101,000?

THE COURT—They are million parts.

JUDGE COLLINS—That means 101 parts in a million. Take January 26, 101. Then March 18. Does that mean 101 parts in a million parts?

A. Parts per million. 40

By Judge Collins.

Q. And the other 61 parts in a million? A. In a million; yes, sir; in the water. You can reduce that to grains per million if you want to.

By the Court.

10 Q. The witness says that principally salts of lime? A. Yes, sir.

By the Court.

Q. Now, I am taking your analysis of February 8th, and I will take the—that states the total hardness is $4\frac{1}{2}$ parts in a million, don't it? A. Yes, sir.

By the Court.

20 Q. Then the water from the foot of plane 11 contains 4 and $\frac{6}{10}$ ths parts in a million; that is substantially the same? A. Substantially the same.

By the Court.

Q. As far as hardness goes? A. Yes, sir.

By the Court.

Q. Now we get down into sample No. 3, from Mr. Oakes' mill, and the hardness is 9 and 8-10 parts in a million—much harder? A. Yes, sir.

30 *By the Court.*

Q. Then you found the Third River water much harder than that above. A. About twice as hard as that above.

By the Court.

Q. Not quite twice? A. Very nearly.

By the Court.

40 Q. Now, you come to the hardness from the tail-

race of the mill, and that is 5.2; that is harder than the canal above? A. Yes, sir.

By the Court.

Q. Little harder? A. Yes, sir.

By the Court.

Q. Now, it is not so hard as Third River; now, 10 we will take March 27th; there the hardness, being the spring of the year, is 4.13 at the head-gate of the canal; 4.36 at the foot of the plane; a trifle more; at Mr. Oakes' is 8.16 hardness and, at the same time, that from the tail-race is 5.02, being harder than it is from above; you say you have got a comparative table here too?

MR. JOHNSON—Yes, sir; there you have the results side by side.

20

THE COURT—These letters that you put in here, these statements signed by you—you swear they are true? A. I do.

MR. JOHNSON — Now, I understand, your Honor, all these statements go in evidence?

THE COURT — Go in evidence, instead of taking his evidence in detail. You can cross-examine.

30

JUDGE COLLINS—I wanted to object that the analysis at the tail-race was not of any value, because it was not taken at the time this discharge was being made.

THE COURT—Yes. The effect of turning the canal water generally in the lake is in favor of your client.

JUDGE COLLINS—Certainly it is. We would be glad to have it.

40

Q. Is there anything in this water of the canal, as you analyzed it, in the constituent parts of these samples analyzed, on these two different occasions, which is deleterious to anybody who might want to use it for manufacturing purposes?

10 Objected to on the ground that he does not know.

THE COURT—What does he know?

JUDGE COLLINS—He isn't a manufacturer or dyer.

A. I think I am competent to answer that.

THE COURT—Well, answer it. I will take your evidence.

20 Q. Just state? A. I found nothing in the water which would affect any manufacture with which I am familiar, either such as those in which dyes or coloring matters are used, or for use in paper making.

Q. Did you test it for its effect on dyes? A. I did.

30 Q. How? A. I added minute quantities of very sensitive dyes to samples of these waters and compared them with similar solutions made with distilled water and with Newark city water, and in no case did I find this water inferior to Newark city water.

By the Court.

Q. For the purpose of making colors? A. For its effect on colors; Newark city water is pretty pure.

Q. What do you mean by total solids here?

40 THE COURT—Everybody knows what that means. It is solid, whether vegetable

or mineral. Then it is burned. It burns out.

Q. Is lost by ignition?

THE COURT—By ignition.

Q. What are the fixed solids, then? A. Mineral matter. 10

THE COURT—No objection to his explaining it. I haven't read the letters through, but I understand his analysis perfectly.

Q. Did you find any chloride of lime in this water at all, and did you try to find it? A. As soon as I received these samples, I made immediate tests for the presence of chloride of lime, that is, calcium hypochloride, as it is called in chemistry, and in no sample did I find a trace of this substance, though our test for its presence is extremely delicate. 20

Q. Found chlorine, of course; you said that. A. In combination; yes, sir.

Q. How? A. In combination.

THE COURT—As you find it in all water?

A. Chloride sodium or calcium.

By the Court. 30

Q. You find the principal solids here was lime calcium, did you? A. Yes, calcium; chloride and carbonate, common chalk, in other words.

Q. And you say you found salt or salts of lime?

THE COURT—Chloride of lime and carbonate of lime.

MR. JOHNSON—He says he didn't find chloride of lime—carbonate of lime. 40

THE COURT—That is the same thing. Lime is the carbonate of calcium?

A. Lime is the oxide.

By the Court.

Q. Calcium is the chemical name for the basis?

10 A. Yes; it is the base?

Q. Under what head in your report do you state the salts of lime or any combination of lime that you find there, hardness? A. The hardness is due partly to the salts of lime.

By the Court.

Q. I understood the witness when I asked him the question to say that it was principally salts of lime? A. Yes, sir.

20 THE COURT—The mineral is principally salts of lime.

Q. Do you know whether any of this water is so hard as to make it improper to be used for manufacturing purposes?

Objected to.

30 THE COURT—Did you try down at Mr. Oakes' mill, that sample, the one that has got the most mineral in it? A. Yes, sir.

By the Court.

Q. Did you try that for coloring purposes? A. Yes, sir; I tested its action with dyes, with delicate aniline dyes; I should say sensitive aniline dyes.

By the Court.

40 Q. Have you got those samples left? Have you got them now in bottles? A. No; they are used up,

and, beside that, the sample of water is not good for anything after it has been kept a few days.

By the Court.

Q. Wouldn't change as to its mineral qualities?

A. No, not as to its mineral qualities.

By the Court.

10

Q. Do you know anything about Clark's test? A. For hardness?

JUDGE COLLINS—For lime.

A. Yes; for hardness; we no longer use Clark's test.

By the Court.

20

Q. Do you know Clark's test? A. Yes, I know it.

By the Court.

Q. Well, take this hardest that you had here, at Oakes' mill, what would that be by Clark's test? A. 8 and 8/10 parts per million, I should judge, that would be two or three degrees by Clark's test, probably in that neighborhood. This test is based on the amount of carbonate of lime in a million parts 30 of water. One degree of hardness is equal—one part per million of hardness is equal to one part of carbonate of lime in a million parts of water.

By the Court.

Q. That is the way chemists now take, and hydraulic engineers, as to degrees of hardness?

By the Court.

Q. Altogether by parts in a million? A. Yes, sir. 40

By the Court.

Q. And you don't recollect how Clark's is? A. Clark's, according to my recollection, Clark's is based on the number of grains of carbonate of lime in a gallon of water. I haven't used it in, well, at least fifteen years, so I have forgotten about the detail, more less, but I think, my recollection is the
10 number of grains of carbonate of lime in a gallon.

By the Court

Q. In an imperial gallon. Have you got a table, a book at home, from which you can determine? A. I have it all right in my laboratory. I can confirm this very easily.

THE COURT—You can give that later on.

A. Yes, I can give it exactly.
20

By the Court.

Q. Is Clark's test for practical purposes reliable?

A. Yes; it is reliable, but in the interest of uniformity they have adopted this test.

Q. I want to call your attention to something in your report of March 8, 1906. In that report you show that the total solids lost by ignition 54 parts per million? A. In the first analysis of the sample number 1.
30

Q. Yes; at the head-gate, water taken at the head-gate, 54 parts per million; that is right, is it not?

A. Yes, sir; that is right.

Q. Then in the sample taken from the tail-race the loss is 50 parts per million; sample taken on March 8th?

THE COURT—There is more vegetable matter in?

A. 57 parts per million fixed solids; sample from the tail-race.

Q. Loss by ignition taken from the tail-race; here you state it is 50 parts per million? A. 30 parts.

Q. 30? A. In the analysis of the samples of February 8th?

Q. No; March 8th? A. March 27th.

JUDGE COLLINS—You took your March 8th, 10
Mr. Johnson, but he analyzed them
March 27th.

THE COURT—Let him look them all over and see if he finds any mistake in them. What I want is analysis of the actual water that flows from the manufacturing part of your establishment—the three classes of water that young Mr. Thompson has taken—to show the quantity of 20
lime in. It is all down to that. You did not appreciate the complainant's case, and there was no evidence that would satisfy me on the part of the complainant that the continual stream of the water had that effect. The proof was not that way. It was only at times. Then the proof was they brought men here to take account when they saw this 30
water coming out from your mill—this discolored water—and it wasn't steady by any means. What I want is an analysis of the water which flows from their manufacturing part after it has been in contact with these rags and the lime, &c.

MR. JOHNSON—Here is a sample taken when the rotary boiler was being discharged.

ADJOURNED UNTIL APRIL 5, 1906.

April 5, 1906.

FRANK C. AXTELL, recalled:

Further direct examination by Mr. Johnson.

10 THE COURT—With regard to the suggestion that I should visit the ground and see what there is there, I think what you ought to do is for each party to take a good large tin box, such as they sell biscuit in, something like that, and each party fill it with the mud out of the bottom of this pit, and then treat it. Let the water be squeezed out of it, if you will, analyzed, and the stuff dried, and we will see what it is composed of—ascertain what it is actually composed of; and there will be no dispute about it if each party goes there and takes a box full; and that is better than for me to go and see it, for I could not tell anything about it by looking at it. Before the wheel pit was all drawn out I want to say I think there ought to have been a sample of the water taken. If you didn't do that I think you made a mistake. If the underground drain has been opened and the water all drawn out, why, then, there is no chance to do it now.

20

30

DR. RICHARDS—We have a bottle full taken right out of the basin recently; three days ago.

THE COURT—If you had taken it out this morning, the last that was in the bottom.

40 MR. JOHNSON—We have a bottle taken yesterday at the time the rotary boiler was

being emptied; taken right from the tail-race.

JUDGE COLLINS—I suggested that each party should go to the wheel pit and take out a tin box—groceryman's cracker box, something like that, full of the soft stuff there, and let it settle, and get what water you could out of it; analyze that, and let the other dry, and we will see what it is composed of by actual handling of it. 10

MR. JOHNSON—I want to call the witness' attention to the reports of analysis which have been before the Court, for the purpose of offering them in evidence.

Q. Did you make those reports? A. I did. 20

Q. And those are the ones referred to, and you signed both of them? A. I did.

Q. Those are true reports of the analyses you referred to yesterday? A. They are.

MR. JOHNSON—I want to offer these in evidence.

JUDGE COLLINS—I have no objection to them, except the one that was made at the time of the analysis of the water at the tail-race had not been accompanied by proof of the conditions at the time. 30

THE COURT—I understand that; that is the vice of the thing, if I can use that word; but I will let it in, subject to your objection. They are both subject to cross-examination as to detail from beginning to end, of course.

Marked Exhibit A and Exhibit B. 40

Q. Now, I call your attention to another paper which also was before the Court yesterday.

THE COURT—That is comparative statement.

Q. Comparative statement, and ask you whether that is a correct statement of this analysis. Did you compare that statement with the analyses
10 which have just been offered in evidence? A. I did, and found the figures to be correct.

Q. And also the statement of the items, the constituent parts? A. I did.

MR. JOHNSON—I offer it in evidence.

THE COURT—It is not evidence. I will receive it.

Marked Exhibit C 3.

20 Q. When we adjourned yesterday, you were being examined as to the item of loss by ignition.

THE COURT—Burning.

Q. Burning.

THE COURT—Ignition means catching fire; burning, I think, is the better word;
30 combustion is the word.

Q. In the water taken from the head-gate of the Diamond Mills—the second sample—have you got that statement?

A. I have.

Q. And that states 54 parts per million, does it not? A. It does.

Q. What is that stuff that is lost by ignition? A. It consists of organic matter.

40 THE COURT—Vegetable?

Q. Vegetable and animal, both? A. Yes, sir; vegetable and animal.

Q. And that matter would form a sediment in the water, is that true?

THE COURT—Ask him what is the difference between the matters held in suspension and matters held in absolute chemical combination; I would be very happy to hear that; that is what I am going to examine him on. 10

Q. Is that true? A. Part of that organic matter which is lost upon ignition is vegetable, part animal, and part is in suspension.

By the Court.

Q. Is in suspension? A. And another part in solution. 20

Q. Well, would it form a sediment? That is what I am getting at? A. A portion of it would.

By the Court.

Q. That is to say, then, you did not filter that water through a chemist filter of paper? A. Never; we never filter samples.

By the Court.

Q. I ask you whether you did or not? A. No, sir; I did not. 30

By the Court.

Q. Then there might have been some matters in suspension in it? A. There might have been—there were, in fact.

THE COURT—I supposed you always did filter it; I think you ought to. 40

Q. Look at the loss by ignition in the second sample, taken March, 8th, 1906, from the tail-race of the Diamond Mills, and what was that? A. Do you mean the amount?

Q. The amount? A. 55 parts per million.

Q. No; the tail-race.

10 THE COURT—Don't it show for itself?

Q. Yes; 50 parts; I have it here.

THE COURT—You need not ask him the question again.

A. 50 parts per million.

Q. And that material loss by ignition or combustion was the same as in the other case, of course?

A. Practically; yes, sir.

20 Q. Now, can you tell from that whether or not there would be less sediment in the water discharged from the tail-race than in water taken in at the head-gate? A. There was less.

By the Court.

Q. Indicating that the water had been strained?

A. Yes, sir.

30 Q. Indicating that there was less sediment in the water discharged from the mill than in the water taken into the mill? A. Exactly.

THE COURT—That has all been explained; all strained through sponges, fine screens. It counts for nothing here as I can see.

Q. Mr. Axtell, do you know anything about the business of paper making? A. Yes, sir, in a general way; I have consumed large quantities of paper in my business.

By the Court.

Q. Consumed it? A. Yes, sir, used it; we use it in my business in the past sixteen or seventeen years, and I am more or less familiar with its manufacture.

Q. When you say you consumed it, what do you mean? A. I mean that I use it and employ it in my business. 10

Q. Have you ever analyzed it or examined it? A. Yes, sir; I am constantly analyzing samples of paper.

Q. In what capacity,—how do you come to do it? A. As chemist for the concern by whom I am employed.

Q. What is that concern. A. Celluloid Company of this city.

Q. And where did the paper come from that you examined and analyzed in that way? A. From the 20 Diamond Mills Paper Company.

Q. Now, have you visited the mills of the company? A. I have.

By the Court.

Q. Which mills? A. Both the Milburn mill and the Bloomfield mill.

Q. And do you know their process of manufacture? A. I do. 30

THE COURT—I intended to ask that question of Colonel Thompson, and shall ask it if he comes here. I want to know whether there is any difference in the way in which they manufacture paper throughout the world. He knows; he is an old paper man. I supposed that the general process is the same, but should like to have evidence on that subject. 40

By the Court.

Q. Do you know how they treat the stock in the rotary boilers in this mill which have been referred to? A. Yes; the stock is heated under pressure in these boilers.

By the Court.

10 Q. In a rotary boiler? A. Yes, sir.

By the Court.

Q. What do you call that now? A. Rotary digester, they are called; heated in a rotary digester with a dilute solution of caustic soda which is made by acting upon milk of lime with soda ash or carbonate of soda.

By the Court.

20 Q. What is that composed of? A. It is made

By the Court.

Q. I want what it is composed of? A. The solution is composed of water and caustic soda.

By the Court.

30 Q. What is caustic soda made of; what are the component parts? A. Sodium, oxygen and hydrogen.

By the Court.

Q. Any lime in it? A. No, sir; not in the caustic soda.

By the Court.

Q. No, but in that solution? A. No, sir; not in that solution.

By the Court.

Q. Any lime in that digester? A. Yes, sir.

By the Court.

Q. You haven't given it to me; I asked you what it is composed of, and you left it out? A. The lime is not in solution, your Honor; it is in suspension as common precipitate; chalk. 10

By the Court.

Q. That isn't in combination? A. No, sir; it is not in combination.

By the Court.

Q. But simply as loose lime, loose chalk, loose calcium? A. Loose calcium carbonate.

Examined by the Court.

Q. Chalk is not carbonate of lime, is it? A. Yes, sir; carbonate calcium. 20

Q. I will interrupt this examination to ask you the different forms of calcium, the ordinary limestone that is quarried out of the ground, is what? A. Carbonate in the mineral or massive state.

Q. Then when you burn that and put it through a process of burning you produce oxygen of calcium, that is, quicklime? A. When it is burned the carbonic acid passes off and leaves calcium oxide and common lime; quicklime. 30

Q. And slaking that is when it takes on condition of water? A. Water combines chemically with it, forming what we call calcium hydrate.

Q. Or common slake lime? A. Yes, sir.

Q. Now, in what form is lime when it forms what is called the hardness of water? A. Usually carbonate; sulphate, sometimes.

Q. Perfectly transparent? A. Perfectly.

Q. Invisible? A. Yes, sir 40

Q. And is taken out in combination? A. In solution; taken in solution; in solution as carbonate of lime; usually as bi-carbonate.

Q. Do you mean to say that the ordinary hard water has the lime in solution and not in combination? A. Yes, in solution only, because upon evaporation we can recover the carbonate of lime.

10 Q. Yes, I understand the result is when you use the steam boiler—hard water steam boiler for a long time—the fibre don't take off the lime? A. No.

Q. Leaves surplus in solution in the boiler and that begins to precipitate on the sides of the boiler? A. Exactly.

Q. The same way with the old lady's tea kettle? A. Yes; because it is held in solution by the carbonic acid water.

20 Q. Then right here I will ask you, because it is right in the line of what I want to ask you: What is the limit in which lime can be held in solution before it begins to precipitate of its own when it is perfectly still? How much will water hold and stand without dropping any of the lime? A. About one part of carbonate of lime in a thousand parts of water.

Q. That would be a hundred parts in a million? A. Yes, thousand parts in a million.

30 Q. Thousand parts in a million? A. Yes, sir: one in a thousand would be a thousand thousand; one in a million.

Q. Thousand parts in a million, and you say it will hold that when it is standing quiet, without agitation? A. Yes, and at the ordinary temperature of the atmosphere.

Q. Depend somewhat upon the temperature? A. Yes, if it is boiled it begins to precipitate; carbonate of lime is peculiar in that it is less soluble in hot water than cold.

Further direct examination by Mr. Johnson.

By the Court.

Q. The amount that you say water will hold is quite astonishing to me, Mr. Axtell? A. Yes; that is its limit of solubility in water ordinarily charged with carbonic acid; the solubility of carbonate of lime in natural water depends on the amount of carbonic acid the water contains. 10

Q. What is the effect of this caustic soda on the lime in this rotary boiler?

THE COURT—He is going back now. You gave me the caustic soda component, and that is brought in contact with the milk of lime. Now, tell me what milk of lime is?

A. Milk of lime consists of calcium hydrate, that is, hydrated oxide of calcium. 10

By the Court.

Q. Slake lime? A. Slake lime in suspension in water.

Q. You just take slake lime, put it in water and mix it up; that is called milk of lime? A. Yes; a little dissolves, but very little; the rest is held in suspension. 10

Further direct.

Q. What is the effect of the caustic soda on the milk of lime? A. I think the soda ash on the milk of lime.

Q. I understood you to say you put caustic soda in there. A. No; caustic soda is formed by the soda ash on this milk of lime.

Q. Then do I now understand that they put soda ash into this rotary boiler with the milk of lime? A. Yes, sir. 40

By the Court.

Q. And the milk of lime lessens the acid? A. The milk of lime lessens the caustic principle which goes to the soda, and the carbonate of the soda ash goes to the lime, forming carbonate of lime.

By the Court.

10 Q. Trade? A. Yes, exchange of radicals, as we term it.

Q. Then I understand you now to say that caustic soda is produced by this mixing, and anything else? A. And carbonate of lime, or precipitate of chalk, as it is ordinarily termed.

THE COURT—The result is that to precipitate a certain amount of chalk—what is the technical name?

20 A. Precipitate chalk, or carbonate of calcium, commonly called carbonate of lime also.

Q. Now, I will ask you what is the effect of this caustic soda and chalk on water—

THE COURT—On the water?

Q. (continuing) on the water of the canal if it were discharged into it? A. If caustic soda were discharged into the water of the canal it would
30 render it slightly alkaline, or soften it, in other words.

By the Court.

Q. Soften the water? A. Yes, sir. The carbonate of lime or calcium carbonate would dissolve very slowly, but eventually would completely dissolve and produce hardness; otherwise they would be practically without action.

Q. Would either of these substances injure the
40 water for manufacturing purposes?

JUDGE COLLINS—I object, on the ground that he has not shown any capacity.

THE COURT—That is not for him to say; whether it would injure the water or not. I shall not take his opinion on that. I have got to determine that. The charge here is, and the only one I think I have got to bother my head with—I am going to have the examination directed to it before I decide this cause, very thoroughly. The charge is that the result of this operation is to discharge a lot of lime into this stream, in such a shape that the water will take it up; he says it is possible to absorb it to a thousand parts in a million. It is a very astonishing thing to me that water will take that much of any mixture in suspense. Now, you have traced lime into this digester, rotary digester, and the evidence is that that goes into—the evidence of the young gentleman is that that goes into the stream below. That is all you can prove out of that, Mr. Johnson. You can get the quantity; that is the hard thing here, is the quantity.

MR. JOHNSON—What I think I have a right to show is—

THE COURT—You have a right to show a great many things, but what is the use?

MR. JOHNSON—It isn't everybody that knows so much about chemistry as your honor.

THE COURT—I am interfering a good deal, because I want this cause tried on the real issue. That is the only issue there.

is here that I think worth bothering with, whether or not the paper mill is responsible for what the Messrs. Oakes swear was the overcharging of the waters of their pond with lime, so they could not use it for dyeing.

10 Q. In your opinion, then, Mr. Axtell, would the water discharged from this rotary boiler, after these ingredients had been put into it, the water, the caustic soda and the slake lime, contain lime. A. It contains lime in the form of carbonate, but not as caustic or quick lime.

20 THE COURT—You see, clam shells and oyster shells are lime, and so are snail shells, in some form, and I understand, I think I am right about that, I will ask the witness. Calcium in any shape is one of the original elements?

A. It is metal; yes, sir.

By the Court.

Q. That can't be destroyed. A. Yes, it is metal.

by the Court.

Q. Original atoms so small it is invisible.

30 Q. If they were to put slake lime right into that canal it would injure the water for manufacturing purposes?

THE COURT—Not for manufacturing purposes; for coloring purposes.

JUDGE COLLINS—Dyeing cloth.

THE COURT—Dyeing cloth; that is the point?

40 A. Yes; if added in large quantities it would render the water alkaline.

Q Now, when they put this water which is produced by the combination of the slaked lime and the caustic soda into the canal would that injure it?

THE COURT—There is no such combination proven. The lime is set free, the lime that they put in there, it is in combination, it is always in combination, and 10 that combination is merely changed; the calcium is there; it is merely changed from one form to another, and it goes in in a different form. That is right, isn't it?

A. But some, your honor, in manufacturing some forms of lime in water would be injurious and others would be innocuous. In this case we have merely carbonate of lime, which is innocu- 20
ous.

By the Court.

Q. How innocuous? A. Because it is practically without action on other substances, except strong acids; something of that sort.

By the Court.

Q. Exactly, but it is liable to be absorbed by the water, isn't it? A. Yes; it dissolves slowly in 30
water.

By the Court.

Q. And causes what you call hardness? A. Yes, sir.

THE COURT—Causes what is called hardness in water. That is the trouble with your case, Mr. Johnson, and the only trouble. 40

Q. You have heard these bleaching vats referred to, and you know about them, do you? A. I do.

Q. What happens in those bleaching vats?

THE COURT—Is that the second process that the young gentleman explained?

10 MR. JOHNSON—Yes, sir.

THE COURT—I thought there was another; there were three sorts what may be called foul water.

A. The fibre is subjected to the action of a dilute solution of calcium hypo-chloride; that is, bleaching powders, a solution.

By the Court.

20 Q. Can you tell what proportion the calcium is to that? A. Yes, I can tell in a moment. Does your honor mean the percentage of calcium in the calcium hypo-chloride, in the compound?

By the Court.

30 Q. Bleaching water when it runs off, or residuum; whatever gets into the tail-race? A. There is none of that run into the tail-race; that is destroyed first.

By the Court.

Q. That is what I thought. The whole of that water is pumped back and used over, is it? A. Yes, sir; they use that water over, according to the testimony of Mr. Thompson yesterday.

By the Court.

40 Q. What did you observe yourself? A. I have seen that pumped back.

By the Court.

Q. Isn't there any of that gets into the tail-race?
A. Not if the operation is properly conducted.

By Judge Collins.

Q. Eventually it does, don't it? A. No, not at all; it is destroyed first; the hypo-chloride is destroyed by treatment with anti-chloride. 10

By the Court.

Q. Yes, but there is lime in that? A. There is calcium in the residue, but it is in different form, in an innocuous form.

THE COURT—That question of innocuousness is not for you.

JUDGE COLLINS—The liquid eventually gets in it. 20

By the Court.

Q. Don't that liquid eventually get in the tail-race? A. The greater part of it is pumped back again, and what little is washed away from the fibre after process of washing gets in the tail-race after treatment with hypo-chloride.

By Judge Collins.

Q. Pumped back again for the purpose of using over and over again? A. Yes, sir; in order to save bleach. 30

THE COURT—But he says a little of it may get out with the waste fibre.

A. In washing the fibre after treatment with this bleach the pulp is treated with anti-chloride to destroy any hypo-chloride, any bleaching powder which may remain in the solution. 40

By the Court.

Q. The wash from that gets— A. Into the tail-race; yes, sir.

By the Court.

Q. The wash of the fibre? A. Yes, sir.

10 *By the Court.*

Q. That water from the wash of the fibre of course gets more or less lime in it, doesn't it? A. A little from the traces of calcium compounds which are left in the fibre after treatment.

By the Court.

20 Q. Have you ever examined that to see how highly it is charged with lime? A. Only except through these analyses of the water above and below; the effect of the water on the canal.

Q. Mr. Axtell, would hypo-chloride of calcium make the water hard, the water of the canal? A. It would after it had been in the water for say a few minutes; it is gradually decomposed into carbonate of calcium.

Q. What proportion of that material would make the water hard in proportion?

30 THE COURT—It is a question here of proportions altogether, Mr. Johnson. I asked the young gentleman if he could tell me the quantity of water he turned in there every day. He could not.

Q. When chloride of lime is discharged into water what happens to it? A. It is slowly decomposed by the carbonic acid contained in the water, forming chloride of calcium and carbonate of calcium.

40 Q. Doesn't remain chloride of lime very long?
A. No, sir.

Q. Soaked chloride of lime, it is merely soaked up, that is all; chloride of lime is not supposed at all—it is merely lime charged with chlorine as convenient way of holding it and shipping it around the country? A. Lime is only a carrier.

THE COURT—That was all explained here yesterday.

10

MR. JOHNSON—I understand the witness to say there are different kinds of calcium.

THE COURT—There is only one kind—different combinations of it.

A. Different combinations.

Q. And some of them will hold Mr. Oakes' dyeing—

THE COURT—But I don't understand there are any more than one kind the water takes up, is there?

A. Oh, yes; I am using a water in my business which contains 2,200 parts sulphate of gypsum.

By the Court.

Q. Gypsum is plaster of paris? A. Well, plaster of paris is ignited gypsum, is gypsum which has been burned. This water to which I refer contains 2,200 parts per million sulphate of calcium. 30

Q. What do you use that in? A. In the manufacture of celluloid; all our material is made with that water.

By the Court.

Q. What do you know about the effect of that upon dyes? A. We make very delicate colors, and there is no effect in that; that water contains nearly a quarter of 1 per cent. of sulphate of lime. 40

By the Court.

Q. Sulphate is gypsum? A. Yes, sir; in its crystalline state, in its natural state.

THE COURT—Follow that up, Mr. Johnson; you are on something now.

By the Court.

10 Q. You mean to say, then, that lime in the form of gypsum does not affect dyes? A. No, sir; does not. We use all kinds of very delicate aniline colors and it has never affected our colors. We use another water with about 900 parts carbonate of lime per million.

By the Court.

20 Q. Then you say you use water loaded with carbonate of lime and it had no effect? A. Yes, sir; about 900 parts per million carbonate; in other words, it is nearly saturate with carbonate. That is one of the best waters we have; that comes from a depth of about 130 feet; the sulphate is from a depth of about eight or nine hundred feet, deep well.

By the Court.

30 Q. Then your evidence is as an expert, and from actual experience, that the dyes that you use in your celluloid works are not affected by water impregnated with either carbonate or sulphate of lime? A. Exactly, and in both cases the water used, the respective waters, is practically charged with sulphate and carbonate.

By the Court.

Q. As much as it will take? A. Yes, sir.

By the Court.

40 Q. You mean to say water will take two thou-

sand parts in a million sulphate? A. 2,200; it varies very slightly, I find, from year to year, but 2,200.

By the Court.

Q. And the other will take—and yours is nearly a thousand parts in a million? A. About 900.

By the Court.

10

Q. You have made no experiments with that, though, for dyeing woolen goods? A. Not for woolen, no, sir; but we use more delicate dyes than they use on woolens, than they possibly can?

By the Court.

Q. But you don't know what effect it may have when it comes in contact with the wool? A. I haven't tried it with wool, your Honor.

20

Q. What was the condition of this water which you received for analysis when you received it, as to color? A. The samples varied. The sample from the head-gate of the Diamond Mill was fairly clear, was clear, was transparent, with some suspended matter, and had a slight yellow to it. Number 2, from the foot of plane 11, showed a trace of matter in suspension resembling a precipitate, and rendered the water slightly milky.

Q. What was this matter in suspension that you noticed? A. Fibres of cotton; I examined them under the microscope and found minute fibres of cotton which had evidently escaped the paper machine.

30

Q. Did those fibres actually discolor the water? A. They rendered it slightly opaque.

By the Court.

Q. Give it the milky appearance, if anything? A. Yes, sir.

40

Q. That doesn't mean that the water was discolored? A. No, sir; not discolored.

10 THE COURT—The word discoloration of water so far has not been confined to its proper use of the discoloration, which we speak of when we are speaking of the different colors of the rainbow, but a slightly opaque is meant?

A. Yes, sir.

THE COURT—As I understood the witness yesterday, they meant water a little opaque, milky, it may have been colored.

20 Q. Well, take the next sample, then. How does that appear? A. The sample from Oakes' mill was transparent, contained some vegetable matter in suspension, and in a general way resembled the water taken from the canal; that is, it was transparent, slightly yellow, but was free from any trace of opacity; it was perfectly transparent.

Q. That leaves one more sample, the sample taken from the basin. A. From the tail-race.

By the Court.

30 Q. One from the basin, too? A. Now, the tail-race, the water from the tail-race resembled that taken from the basin, possessed about the same amount of opacity; I could see very little difference in it, but the analysis of course showed a difference, a slight difference.

40 Q. Do you know what the average analysis of American rivers shows? I think you have stated it in your report? A. Yes, sir; I have given the figures for the standards which have been established.

JUDGE COLLINS—What, you mean the lime?
The composition of water of the American
rivers objected to as irrelevant.

MR. JOHNSON—It will be useful for purposes
of comparison.

THE COURT—I couldn't rule it out. Mr. Ax-
tell's knowledge of that must be book 10
knowledge, and we all recognize book
knowledge. The hydraulic engineers
and other engineers keep a record of all
these things, and are now recognized as
an authority on the subject.

Q. Where did you get that knowledge?

JUDGE COLLINS—My point was it didn't make
any difference. We are dealing with 20
the Third River.

THE COURT—I understand that. The Third
River is about as bad as any of them.

JUDGE COLLINS—I know it is; that is what
we are complaining of.

A. This table of standards of American rivers, as
I have termed it, show the figures which are gen-
erally accepted by chemists as indicating the stand-
ard composition of the water of various American 30
rivers taken in various parts of the country under
various conditions.

Court looked at the paper.

A. It is the last table.

By the Court.

Q. You have got from 50 to 150 parts in a mill-
ion gallons. Whereabouts is the division line on 40

chemists and hydraulic engineers between hard and soft water? A. Well, we would term a soft water, say a water about like Newark city water, about fifty parts per million of hardness.

By the Court.

Q. But you haven't got any of that kind here?

10 A. No; these are all much softer.

By the Court.

Q. You say Newark is fifty? A. In that neighborhood, I should judge.

By the Court.

Q. I didn't think it was as much as that? A. Yes, sir; fifty parts per million, would be about twenty-five parts per million by the old standard,
20 the English standard.

Q. Then how do these samples which are analyzed compare?

THE COURT—They are much less; I can see that. You don't have to ask that. The samples are very soft water. I will answer that for him.

30 MR. JOHNSON—I know, but your Honor's testimony would not be received, I am afraid.

THE COURT—If the Court of Errors and Appeals can't see the difference between five parts in a million and fifty I don't think anything that the witness will swear to will help them out.

MR. JOHNSON—The Court of Appeals likes to have things on the record.

Q. Now, Mr. Axtell, this water that you analyzed,
40 what would you call it, hard or soft water?

THE COURT—Very soft, palpably. Why do ask the question?

Q. Do you say that, Mr. Axtell? A. I do; it is unusually soft; extraordinarily soft, in fact.

By the Court.

Q. You mean the water that comes down the canal? A. All these samples. 10

Q. Did any of these samples that you analyzed emit any odor? A. No, sir.

Q. Which is the better way for manufacturing purposes?

THE COURT—Don't use the word "manufacturing" for dyeing purposes.

Q. Well, for dyeing purposes; I think I might use both words. 20

THE COURT—It don't cover the question. There is no use trying to avoid it.

Q. Well, which is the better water for dyeing purposes, the water of the canal which you analyzed, or the water of the intake to Oakes' mills?

JUDGE COLLINS—I object to the question.

THE COURT—It is a perfect waste of time, 30
Mr. Johnson. Go on; he can answer it.

JUDGE COLLINS—I object to it on the ground that he has not proven himself competent, and also that it is not shown that it was taken under proper conditions.

Q. Well, now you were going to answer the question. A. By reason of the fact that the water in the canal is softer it should yield better results for dyeing purposes. 40

Q. Do you know what makes the water of the Third River harder than the water of the canal?

THE COURT—He don't know. It is a perfect waste of time. I do object to loading up this record with things that are perfectly palpable on their face. It is already proven perfectly, appears.

10

Cross-examination by Mr. Richards.

Q. You said, Mr. Axtell, yesterday, that you had experimented with dyeing with the water which you took from this place. Have you ever had any experience in dyeing fabrics that have been washed?

A. No, sir; I have not.

Q. You mention in your report here of the canal "At head-gate of Diamond Mills, January 26, 1906, hardness 4 and 5/10? A. Yes, sir.

20

Q. Will you please explain what you mean by that? A. I mean that one million parts of that water contains the equivalent to 4 and 5/10ths parts of calcium carbonate.

THE COURT—He answered that question to me, but you can put it again. I wouldn't load the case so much.

MR. RICHARDS—I wanted to be sure that he meant parts per million.

30

A. Parts per million, yes, sir; I was surprised at the result.

MR. RICHARDS—I certainly am, very much.

Q. Will you kindly explain how you made that test? A. Certainly; I have what is called a standard soap solution; first we take one part of carbonate of calcium, chalk, dissolve it in hydrochloric acid, and dissolve that solution in one million parts

40

of water, or make it more concentrated dissolve it in a thousand parts of water; now, each unit volume of that solution contains a definite quantity of carbonate of lime or its equivalent; we make a solution of white soap in water and alcohol, and we add a certain amount of distilled water; we add a certain volume of our lime solution, then we run in the soap solution, certain quantity of it, and shake the bottle or flask in which it is contained, and note if a lather is produced, a foam, if it is not, or if the lather is formed and disappears immediately, we add more soap solution, and keep adding and shaking until a lather is produced which lasts for about three minutes; then we know that we have converted all the lime into an insoluble soap, and the water is soft; now, in these tests, in these analyses, I found by taking one million parts of water and adding this standard soap solution that the volumes, the amounts required in each case were as given in the analysis, that is, in the analysis number 1, the water contained the equivalent of 4 and 5/10 parts of calcium carbonate per million of water.

Q. You say that in treating the material put in the revolving digester that there is milk of lime put in and carbonate of soda, and that the lime converts the carbonate of soda into caustic soda; will you tell me whether or not you don't use a large excess of milk of lime to accomplish this result—more than is necessary to do the conversion into caustic? A. That would be poor practice; it would add to the expense of paper making without yielding a result. The object is to use lime enough and soda enough to form, so that they will just combine to form a definite quantity of caustic soda; simply a cheap way of making caustic soda.

Q. Do you know the proportions that are used in the Diamond Paper Mill? A. Not exactly; no, sir.

Q. Ever been there to examine? A. Yes, sir.

Q. Can you give approximately what the proportions are? A. The proportions should be about 75 of slaked lime and 105 or 106 of soda ash.

Q. Is that about what they use? A. I couldn't say; that is what they should use; that is what is used in good practice.

10 Q. But you don't know what they do do there?
A. No, sir; I can't say as to that.

THE COURT—What he does say is that he presumes they are as saving of it as they can be, because if they put in an excess of either it would be a loss, without any corresponding benefit at all; no reason why they should depart from the proper proportions.

20 A. Proper proportions.

Q. When the milk of lime is put in with the water a considerable amount of the caustic lime, the hydrated lime, is dissolved in the water, is it not?

THE COURT—He said so.

A. Not very much; slightly soluble. Lime is slightly soluble in the water.

30 Q. Will you please state how soluble it is? A.
According to my recollection, about one to five hundred; depending upon the temperature.

Q. Is it more soluble in hot water or cold water?
A. It is more soluble in cold water.

THE COURT—He swore to that distinctly.

40 Q. Do you know the proportion between hot and cold water? A. In the case of caustic lime there isn't as great difference as it is in the carbonate; but my recollection is that it varies between about

250 and 500 parts, depending upon whether the water is hot or cold.

Q. Being more soluble in the cold than the hot?

A. Yes, sir.

THE COURT—He stated that distinctly.

Q. If the solid lime is carried down the stream and lies on the bottom of the stream, would that 10 affect the water, in addition to what was already dissolved in the stream? A. Do you refer to—

THE COURT—If solid lime lies in the bed of the stream, and the water is subjected to it, would that tend to increase the quantity taken up in solution?

A. Certainly; yes, sir.

THE COURT—I knew that before. 20

MR. RICHARDS—I wanted to get it on the record.

THE COURT—I don't think there was any need of putting it on the record myself. I think it is not in this case, because the defendants declare they did not put any there, and they won't object to being put under an injunction not to put any there. 30

MR. RICHARDS—Glad to hear your Honor say that.

THE COURT—That is what they say. They say they don't. If it is done it is done by their men against their orders, to save a little trouble or something. That is what they swear to.

Q. What is meant in chemical language by the hardness of water? 40

THE COURT—He has already stated it is metallic substances held in solution.

MR. RICHARDS—There is another meaning given to that in chemical parlance.

A. Hardness in water is temporary and permanent; it is all due to the presence of salts of calcium and magnesium.

THE COURT—Isn't magnesia a separate element?

A. It is; but is usually present in natural waters. Temporary hardness can be removed by boiling, whereas the permanent hardness is due to the amount of calcium magnesia salts remaining after the water has been boiled.

Q. Will you explain a little more fully what is the difference between the temporary hardness of water and the permanent hardness of water; what causes it? A. The temporary hardness is due to the presence, we assume, of bi-carbonates of—let us see—calcium. Upon boiling, these bi-carbonates are decomposed, leaving carbonates of lime in solution, and the water before boiling is apparently harder than after boiling by reason of the presence of these bi-carbonates.

Q. What is the general cause of the permanent hardness of water? A. The presence of salts of calcium, and, in some cases, magnesium.

Q. Which salts? A. Any permanent salts, such as the carbonate, sulphate, nitrate, and many others which may be present.

THE COURT—I am listening to this with patience, but I don't see the least application to this case.

MR. RICHARDS—In a moment or two your Honor will see.

Q. Is not the difference caused by the fact that a certain amount of calcium carbonate is dissolved in water carrying carbonic acid; when you boil that you expel the carbonic acid and you—

THE COURT—He says the effect of boiling is to destroy the bi-carbonate; he has sworn to that.

Q. And after you boil you throw down the carbonate as an insoluble precipitate, but you leave all the sulphates of lime in the water, do you not? A. Yes, sir.

Q. After boiling? A. No; the carbonate does not precipitate where it is present in such minute quantities, as is the case in these waters.

Q. I am not asking you that. You made a distinction between temporary hardness and permanent hardness, and I asked you whether temporary hardness is not caused by the presence of carbonic acid in the water, and when you expel the carbonic acid by boiling you don't throw down the carbonate of lime and leave the sulphate of lime unaffected? A. Where carbonate of lime is present in such quantities and in the form of bi-carbonates your statement expresses the fact.

Q. Boiling does not remove the permanent hardness, does it? A. No, sir.

Q. Do you know anything about the effect of temporary or permanent hardness, or total hardness on soap? A. Yes, sir.

Q. What is the effect? A. The effect of a soap solution is that the acid radical of the soap combines with the calcium radical of the salt of calcium which is present in the water and forms an insoluble soap, a calcium soap.

By the Court.

Q. Floats? A. Yes; it may float; it depends on

the acid which is used. In waters which have not been boiled, that is, in water having both temporary and permanent hardness, the unboiled water will require a greater amount of soap solution than will the boiled water.

Q. Does not hardness, in chemical parlance, mean soap destroying power of the water, in general terms? A. It means soap forming power, I should say.

Q. Well, the soap that is ordinarily used for general purposes is lessened to just the extent of the hardness of the water, is it not? A. Because the soap, the acid contained in the ordinary soda soap, or soft soap, potassium soap, combines with the calcium of the carbonate of other salts to form an insoluble soap.

Q. And my question is, this insoluble lime soap is of no use for washing purposes? A. No, sir; it is not.

Q. Well, it doesn't make any difference whether it is temporary hardness or permanent hardness; they all destroy to a certain extent the use of the ordinary soap? A. They do.

Q. And the harder the water of either kind the more soap you have to use? A. Exactly.

Q. And this is true with regard to sulphates of calcium as much as it would be with regard to carbonate? A. Any permanent salts of calcium.

Q. In the bleaching powder the proportion of the chlorine salts to the total mass is about 25 per cent., is it not, that is, the combined chloride of calcium and hypo-chloride of calcium combined make about 25 per cent. of the materials? A. Yes, sir; about 25 of active chlorine.

Q. And have you ever noticed how clear the supernatant liquor is when they make the bleaching liquor, that bleaching powder, they put it in the tank and it settles, have you ever noticed in the

Diamond Paper Mills how clear the bleaching liquor is they draw off from the sediment? A. It is practically clear; in its best condition it is about like that bottle they showed here yesterday; it clarifies very perfectly; it depends on the length of time it has been left to precipitate.

Q. You have no knowledge yourself, Mr. Axtell, have you, as regards the condition of the water coming out of this mill at times when they are in active operation and drawing off their tanks? A. Except through this sample of water taken. 10

By the Court.

Q. You were not there when these samples were taken? A. No, sir.

By the Court.

Q. You don't know whether they had recently made a discharge of any of these liquids? A. Except that Mr. Thompson told me they had, and they were discharging, at the time he took that sample I understood him to say they were discharging. 20

JUDGE COLLINS—I move that be stricken out.

THE COURT—I didn't understand him to say so.

JUDGE COLLINS—He didn't say so. 30

By Judge Collins.

Q. I ask if you did what his Honor asked you to do, look at your Clark's test so as to give the percentage in Clark's figures of these results? A. Yes, sir.

THE COURT—Give us those carefully, if you will.

A. The figures for parts per million amount to about 1/20 of those given in Clark's scale. 40

By the Court.

Q. Let me see; Clark's scale is about twenty times? A. I beg your pardon; Clark's scale is one part in seventy thousand in imperial gallons; my scale is one part in a million.

By the Court.

10 Q. You have got to divide 70 into 100? A. 70,000 into a million.

JUDGE COLLINS—Seventy into a thousand.

Cross-examination by Judge Collins.

Q. Then would you divide your result by about fourteen? A. Yes, sir.

Q. You heard Mr. Oakes say that it would stand for 14; above that it would be too hard. I want to
20 know how your results of certain parts of the million would be translated into those Clark's figures?

THE COURT— $4\frac{1}{2}$ parts?

A. 4 and $\frac{5}{10}$ ths. divided by 14 and $\frac{5}{10}$ ths.

THE COURT—That won't do. You wouldn't get water soft enough to reach it.

A. Yes, I do it right there. Those samples were
30 all nearly as soft as distilled water that I received; distilled water gives about two parts by my standard in parts per million.

Q. Take it at our friend Oakes' intake? A. These results are correct as I find them. A degree of Clark is equal to one part in seventy thousand; my standard is one part in a million; so that a degree of Clark's is much greater than one of my degrees; consequently you would have to divide by 14 and $\frac{5}{10}$. I repeated the test three times; I never saw
40 natural water so soft.

By Mr Richards.

Q. What Mr. Axtell has used is practically Clark's test, only a different scale? A. Yes, sir; just the same method; his scale is a little different.

By Mr. Richards.

Q. The only difference is, he takes parts per million and in Clark's case it is parts per seventy thousand; it is a mere matter of mathematics, but the test is the same thing? A. In making an analysis we always state our standard, as I have in these; we say so many parts in a million. 10

JUDGE COLLINS—He is unable apparently to translate into Clark's figures.

A. I know Clark's figures.

THE COURT—The present argument's tendency is to show that the Messrs. Oakes' observation was erroneous; they have not given the proper result. 20

JUDGE COLLINS—No; I don't think so. I think the error is that what they call per cent.; ten per cent. is a different thing from—

THE COURT—No; he is taking it as one part in seventy thousand. They haven't given us a reading result from Clark's scale. 30

JUDGE COLLINS—They have given what in practical use Clark's scale shows.

Further cross-examination by Dr. Richards.

Q. The figures you have given here of hardness are, from a chemical standpoint, astonishing, aren't they—it is so soft? A. It is astonishing; I have 40

never seen a natural water that is as soft as these samples.

By the Court.

Q. This is only 9? A. Yes, sir.

10 DR. RICHARDS—I submit these figures, on the face of them, are exceedingly improbable.

20 THE COURT—I think both of you missed the case. When Mr. Oakes and his sons made their observations which were testified to here yesterday they should have taken samples of the water; when they said they saw this foul water coming down out of the mill they should have taken samples of it and had it analyzed, or analyzed it themselves; brought in an outside chemist that couldn't make any mistake.

JUDGE COLLINS—Hasn't Mr. Axtell made a mistake in a decimal point?

30 A. No, sir; I haven't made a mistake; I am making determinations of hardness nearly every day.

Q. If Newark is 50 isn't this naturally 45? A. No, sir; it is 4. We make allowance in our solution for hardness of distilled water; that is, two points.

DR. RICHARDS—It only goes to show that Mr. Axtell should have taken his own samples. There is a hiatus here.

40 A. That is the hardness of those samples as I received them.

JUDGE COLLINS—I thought he might be mistaken in just a point if Newark is 50.

A. No, sir.

THE COURT—Let the chemists on each side go up there and take samples of water both at once; then get another chemist outside entirely, if you want to. Then when you draw it off let each one, as I said before, get this big box full of the slush in the bottom; then let it be dried, and let us see whether there is any lime in it or not. 10

Further cross-examination by Dr. Richards.

Q. I notice, Mr. Axteli—take the canal at the head-gate of the Diamond Mills—you have got fixed solids there 54 per million. You testified yesterday they were most part lime salts? A. Yes, sir. 20

Q. Doesn't that look rather strange in conjunction with hardness only 4 and 5-10? A. Not if the water contained some substance which rendered it soft. Hardness is tested on water itself, and it might contain say an alkali in solution or an alkali in substance.

Q. Which would queer your test? A. Yes, the determination of hardness; that is what I imagine had occurred. 30

JUDGE COLLINS—What Mr. Axtell says, he imagined that what made this astonishing result of only four parts of hardness is the free alkali nullified the ordinary test. That accounts for it.

Q. Of course, if that had a lot of free alkali it rendered your tests no good at all? A. No good at 40

all, except to show the residuum hardness, that is all.

10 THE COURT—The fixed solids per million in the head-gate of the canal is 54; the fixed solids per million at the foot of plane 11 is 61; the fixed solids in Oakes' Mills is 95, and the fixed solids in the tail-race is 57. That is one sample. The fixed solids at head-gate of the mill is 63; fixed solids at the foot of the plane is 64; fixed solids in intake of Oakes Mill 76, fixed solids at the foot of the tail-race 71. Now, my friend, Mr. Axtell, how do you get at those fixed solids; the quantity?

20 A. By evaporating the known weight of the water and burning off the organic matter, which leaves the mineral in the platinum condition.

Examined by the Court.

Q. You weigh it? A. Yes, sir.

Q. By delicate scales? A. A chemical balance which shows one part in a million.

30 Q. The balance that is used by— A. Analytical chemists; yes, sir.

Q. And that is then by actual weight? A. Yes, sir; by actual weight.

Q. Actual weighing—physically weighing it? A. Yes, sir.

Q. And that is the real one way of fixing the hardness? A. Yes, sir; it is one way, if we know the composition of that mineral matter.

Q. But in getting at the amount of hardness, you go at it in a different way? A. Yes, sir.

Q. To get at the amount of lime? Yes, sir.

40 Q. And that you tried it substantially in the

same way that Mr. Oakes did? A. I presume they used the soap test.

Q. Didn't you hear it yesterday? A. I wasn't here during their testimony.

Q. Well, they had the soap test; that is the way they tried it; that is right, isn't it?

JUDGE COLLINS—Yes.

10

Q. Well, now, what you mean to say about this is the fact that all those fixed solids amounting to 50 and 60 and 70 parts in a million disappear as a hardness when you put the broad test to it? A. Yes, sir; it wasn't there.

JUDGE COLLINS—He thinks it may be due to free alkali in the water, caustic soda, &c.

20

THE COURT—It seems to be just the same below—the same change in the canal water that there was below, and the same change in the Third River water; the same thing works all the way through.

A. Exactly.

Q. The same phenomena? A. Yes, sir.

Q. Nothing peculiar to either one of the streams? 30

A. Except that the river water shows about twice as hard as that of the canal.

Q. But the proportion is the same? A. Yes; the proportion is about the same.

THE COURT—Proportion of actual hardness to fixed solids.

Re-direct examination by Mr. Johnson.

Q. That was the reason why you took two tests, 40

was it not? A. It was; it was the reason I took two series of analyses at different times; I couldn't believe the results of the first analysis that I made.

By the Court.

Q. You didn't find out what the alkali was? A. I didn't find out; the water was not alkaline; had
10 no alkaline reaction.

By the Court.

Q. Must have been something? A. There was something to vitiate the soap tests; the fixed solids consisted essentially of lime.

By the Court.

Q. You thought so, eh? A. I did; that is the reason I had another series of four samples taken
20 in March; I said in my first report the water is unusually pure for a canal and river water; one sample there, the sample containing, I think, 69 parts per million; I have analyzed rain water which contains total solids to about that amount, so I had an additional four samples taken in March.

By the Court.

Q. To test your first work? A. Yes, sir; to compare with my first work; I found the result of the
30 second series seemed to confirm those of the first.

THE COURT—I think there ought to be two chemists go up there and take the water now in that pool—each take a sample, and each work it out himself.

A. I would suggest, your Honor, that the right way to test the hardness of that water is right at the spot; I could take an apparatus there and test
40 it.

THE COURT—I don't think your method of testing the hardness—I don't think either of them are satisfactory to me.

JUDGE COLLINS—Oakes is willing to stand on that.

THE COURT—Each chemist can go there, then, and test it right on the spot. 10

JUDGE COLLINS—It ought to be taken at a time when the mill is discharging this—

THE COURT—No; I don't think so at present, but it ought to be taken at that time, too. You will find at this time all the streams unusually charged with carbonic acid gas, isn't that so?

A. Yes, sir.

20

MR. JOHNSON—Colonel Thompson asks me to state, he is here, that if there is any lime running from that rotary boiler into the canal, that can be taken care of and kept out of the canal.

THE COURT—Yes; on his own show; you have shown you have a plan for preventing any actual lime in the shape of palpable lime getting in there. 30

MR. JOHNSON—We don't know whether it does get in there. If it does, we can keep it out.

GEORGE W. THOMPSON, recalled.

Examined by the Court.

Q. Colonel, you have been engaged directly and indirectly in the manufacture of paper for how many years? A. Forty odd. 40

Q. You are familiar with the manufacture of all kinds of paper? A. I am.

Q. Is there anything peculiar in the way you manufacture your tissue paper in the use of the sulphates and other things over that of other ordinary kinds of paper? A. No; no difference between the way we manufacture and the manufacture of any
10 white, clean paper; we use a better stock.

Q. I understand that, but the mode is the same?

A. The mode is the same.

Q. And the same as it has been for thirty or forty years? A. The same.

Q. Is there any difference in the mode in which you manufacture your paper, not counting now what you have said about using less sulphates than what was used there thirty years ago? A. No, sir; only they used more than we did.

20 Q. I understand you stated that yesterday? A. Yes, sir.

Q. But the mode, no difference in the mode? A. No; the method of manufacturing is the same.

Q. Any difference in the mode of your manufacturing, for instance, than what they manufacture in Whippany? A. No, sir; the same.

Q. You know their process? A. They make very coarse paper and use very coarse stock.

30 Q. But they use the same sulphates? A. They don't use any lime or bleach in their stock, I believe they don't need it.

Q. They don't have to whiten it? A. No, sir.

Q. But in the application of the bleach, bleaching powders, is there any difference in the use now from what there was forty years ago? A. None at all; the same way.

Q. You use it in the same way? A. In the same way.

40 Q. Except you don't use so much, because you have clean stock? A. Clean stock. Vice-Chancel-

lor, let me say, if this lime from the rotary—yesterday I didn't mention that matter because we didn't suppose we used that rotary very much now, we use it mostly for white stock which we furnish directly into the engine without going into the rotary.

Q. Don't all go in there? A. No, sir; not one-third of it; I think perhaps a little less than one-third perhaps; that is only where we have light 10 shirt cutting with a little stripe or colors in it, then we put in a little lime, put it in this lime, and that starts the color.

Q. Suppose you were running that altogether, suppose you were running on that kind of stock altogether, how many times a day would you fill that rotary? A. Oh, once or twice a week.

Q. Only once or twice a week? A. That is all.

Q. Now, how often do you do it? A. Not over once or twice a week; it depends upon the stock 20 we are sending out to the mills; sometimes we buy stock with those stripes in; those we have to boil.

Q. Have to bleach? A. Bleach.

Q. But the ordinary pure white stuff you don't put in there at all? A. Throw it right in the engine and wash it there.

Q. What do you wash it with in the engine? A. With water, and then we put in a little bleaching powder.

Q. Little liquor? A. Little liquor; little of the 30 solution of the bleach.

Q. You don't put any lime in at all directly, then? A. No, sir.

Q. But you make your chlorine liquid in a vat and let the lime settle? A. Yes, sir.

Q. And then dip the top off? A. Yes, sir.

Q. You put a little of that in? A. Yes, sir.

Q. How many beaters do you run a day there? A. Perhaps have to empty half a dozen beaters.

Q. You have more than one? A. Oh, yes; we have five or six beaters.

Q. And how much do they hold? A. They run from 800 to 1,000 pounds; some 800, some a 1,000.

Q. How many gallons of stuff do you put in, or cubic feet, or what not? A. I can't tell that exactly.

10 Q. It can be told? A. Yes; measure these tubs, you know; the size of the tubs.

Q. Then your son said something, and I think you did too, about separating this stuff before it was ground; I think put on a drainer? A. That is after. It is first put onto what we call a washing engine. It is the same as a beating engine, this washing engine. The stuff is washed, then let down in the drainers there under the beating engines, and there it is drained.

20 Q. There it is drained. What is it washed in? Is there some of the liquid bleach put on it when it is washed? A. Put in when it is being washed; yes, sir; in the engine. Then it is let from that washing engine down into these drainers. There it drains; all the moisture drains away from it.

Q. After that it is put in the beater? A. After that it is put in the beater.

30 Q. Then they are beaten into a pulp? A. Beaten into a pulp.

Q. Nothing is drained out of it, is it? That pulp is put on the moving web? A. Yes, sir.

Q. And there drains? A. There it drains a little; the water runs through, whatever water there is kept with it. We have to thin it, of course. After we bring it up from the drainers it is then thick stuff. Then it is put in the beaters and beaten up fine, and sufficient water put in with it in order to make it thin.

40 Q. You put some bleach in that, too, don't you? A. No.

Q. No bleach? A. Not in the beating engine.

Q. Then there is no water with the lime in it that gets from it when it is put on the moving— what do you call those? A. On the wire, the machine wire; it is moving web wire cloth.

Q. That is just simply water? A. That is just simply water, and the pulp, the stuff that is mixed with the water. 10

Q. When you don't use your digester, when you use it straight, the only chance for any liquid bleach which has been exposed to lime to get on it is when it is put in the— A. Washing engine.

Q. Washing engine? A. Yes; that is when the liquor is put on, and that is all drained away down in the drainers.

Q. I understand; but that goes in the tail-race? A. No; pump that back again and use it over, as my son told you yesterday. We pump that back. 20 These drainers all run into a pool. What is drained from this stuff we put in a pool, and pump that back in the cisterns that contains the bleach.

Q. When it gets there it only has a little moisture left in it; it isn't dry at all? A. No, it isn't dry; some moisture in it.

Q. Little lime water moisture in it? A. Yes, sir.

Q. Then it is put in the beater? A. Yes, sir.

Q. Then the amount of moisture containing lime is reduced to a minimum before it gets into the beater and before it gets on to the form of the machine, the wire? Y. Yes; the wire where it is formed of the machine, there is no place for lime to get in, except it is when we use this rotary digester, and that we can run out in a pool if it is objectionable; I never supposed there was strength of lime enough in that to amount to anything, but we can run that entirely away so it need not go into the tail-race at all; then I don't know how a particle of lime would get in that water. 30 40

Cross-examination by Judge Collins.

Q. Where would it go to? A. Go out on the lot.

Q. Wouldn't it find its way to Third River eventually if you let it go on the lot? A. It would have to drain through about three hundred feet of soil to get there.

10 Q. Where is the lime that you get from the sump, as it is called? A. That is from the settling.

Q. Where does that drain to? A. That drains in this pool; drains through the earth, that is, they settle down into the earth.

Q. Eventually find their way in the Third River, don't they? A. That would be pretty well —

20 THE COURT—That would soak through the ground; soak through the ground eventually; that might get in the Third River.

A. Soak through the ground in all directions.

Q. Are not those lime heaps that you have there so near the Third River that the seepage from them runs into the Third River. A. Oh, no, sir; I don't see how that can get in there except through the earth.

30 Q. The water that comes out of your tail-race looks quite milky; what makes that? A. Little particles of fibre might make it look a little thick.

Q. You think that is what does it? A. Yes, sir.

THE COURT—The water after this milk of lime is put in the rotary digester, it is there changed by coming in contact with soda ash; what is the color of that fluid when it comes out?

A. It is dark.

40 Q. Dark? A. Yes, sir.

Q. It isn't white, it isn't milky? A. No, it isn't milky at all; dark, good brown color.

Q. Isn't there one of those lime heaps that is within forty feet of the bank of the Third River? A. Within forty feet? No, I should think not within a hundred feet or more; they are up back of the finishing room, is 120 feet I think, and that is within about 20 feet of the river; that would be about 140 10 feet.

THE COURT—Gentlemen, I don't think that is within the scope of your bill.

JUDGE COLLINS—Mr. Oakes was up there last night; and he thought it was about forty or fifty feet.

Q. You testified to an expenditure after you bought the mills of about how much, seventy odd 20 thousand dollars? A. Yes, sir; the whole cost was \$114,000.

Q. Now, wasn't this expenditure after you purchased very largely for machinery that is available anywhere? A. Machinery and improvements in the mill, putting in new timbers and new floors.

Q. The great bulk of the cost was the machinery? A. No; the bulk of it was in general repairs; putting in new floors and new timbers and alterations; we didn't add very much machinery; we only re- 30 paired that that was already there.

By the Court.

Q. I suppose you have put in a great deal of machinery since then? A. Oh, yes; we have been adding to it from time to time.

Q. How much machinery did you put in? A. I don't know; perhaps \$20,000; yes, we brought one machine down from Whippany, machine up there;

perhaps \$20,000 worth of machinery we put in there.

Q. How much lime and bleaching powder do you use in a day?

THE COURT—How much do you put into this digester?

10

A. About one barrel to two tons.

By the Court.

Q. How much would you put into it in one job?

A. About one barrel; they hold about three tons; we put in, perhaps, a barrel and a half; if we get three tons of stock in the rotary, then we would put in about a barrel and a half of lime, that would be about 225 pounds.

20

By the Court.

Q. Milk of lime is all pure lime? A. We use the milk only, but we slake the lime.

By the Court.

Q. But about a barrel and a half of lime to make the milk? A. Yes, sir.

Q. You can tell about how much lime you would use in a given time? A. Yes, sir.

30 Q. How much? A. I can't tell now; I would have to look at the books.

By the Court.

Q. That don't include the bleaching powder? A. No.

Q. Can't you tell the aggregate quantity in the course of a year that you use of lime? A. Perhaps we use—

40

THE COURT—Of pure lime?

A. Yes; perhaps, well, a barrel and a half in a week, or two barrels a week, 'perhaps; when we are boiling that class of stock; when we are not using that stock, when we don't have to boil it; then we don't have to use any lime at all.

Q. But you use the bleaching powder? A. Bleaching powder; we use it all the time; every day.

By the Court.

10

Q. I understand that that bleaching powder settles in the bottom of the tank, this big tank; you put in a certain amount of bleaching powder in water and stir it up— A. That is it.

By the Court.

Q. And it settles, and that water is used in the first washer, and is pumped up and used over again; of course, some little of it wastes? A. It is less 20 than one degree in strength after we pump it back.

THE COURT—It isn't that, but it is the quantity, because it is brought in close contact with the lime, understand, and it becomes charged with lime; it is the quantity you use in gallons, but you use it over again?

A. Yes; we use it all over again.

30

THE COURT—And substantially none of that gets into the—the lime itself when it gets all the chlorine soaked out of it is thrown over and into this pit instead of being thrown, as it used to be, in the tail-race; but whether their men don't at times cheat them, and instead of putting it into this pool throw it over into the tail-race, you don't know?

40

A. I don't know, but I am pretty sure they can't. It would be a difficult matter for them to get it into the tail-race now, for it runs the other way.

By the Court.

10 Q. In other words, your plan for putting the lime, the residum of the bleaching powder into your pool or pit is so, the plan of getting it there is such that it would be more difficult and trouble for the men to throw it into the tail-race than it would into the pit? A. If there is lime in that pool it must come from the rotary boiler, and cutting that out I don't see how any lime can get into that water, except what may come that drains through the wire cloth on the machine, and that is so
20 minute—

JUDGE COLLINS—I suggest we take an adjournment of a week and see if it cannot be adjusted.

30 THE COURT—I was not going to ask you to try and adjust it, but I was going to suggest you take an adjournment for a period of time for the purpose of making a thorough investigation of this thing, which has not been done.

RALPH THOMPSON, recalled.

Direct examination by Mr. Johnson.

40 Q. Mr. Thompson, at the time these samples were taken, which have been analyzed by Mr. Axtell, can you say whether or not there was any discharge from your tail-race? A. Yes; the mill was running under normal conditions.

By the Court.

Q. I know, but had you just discharged your digester, for instance? A. Oh, that I don't know, whether we had or not.

Q. Was there a discharge from the tail-race? A. Yes, sir.

Q. From what? A. From what?

Q. Yes; where did the discharge come from? A. 10
It came through the water wheel, the amount of water that is coming through the wheel normally, and the water with which the stock had already been washed, &c., and the water from the paper machines.

Q. And the beating machines? A. From the washing engines.

Q. And the washing engines and the beating engines? A. Yes, sir.

20
THE COURT—No; there is no water from the beating engines, unless there has been some false swearing here. The water from the beating engines is used over again. No, there is no lime put in the beating engines.

A. No; water may possibly come through, but very little.

By the Court.

30
Q. The water I understand that comes out of the bleach-tank is used in washing? A. In washing; yes, sir.

By the Court.

40
Q. And that you don't run down into the tail-race; you run that back; pump it up? A. From the drainers that is, and that water is run back again; revolves.

By the Court.

Q. The beaters? A. The beaters we don't put lime in.

By the Court.

Q. No bleach in them? A. No, sir.

10 *Cross-examination by Judge Collins.*

Q. What time of day did you take these samples?

A. What time of day?

Q. Yes? A. I think the first were taken in the morning, and the second lot of samples in the afternoon, although I don't remember quite.

Q. What time was it? A. Oh, approximately ten o'clock, I should say.

Q. You made no memorandum of that, have you?

20 A. I made no memorandum of the actual time; it may be on the labels; I don't remember whether I put it on the labels of the bottles or not.

Q. The other one in the afternoon, you said? A. Yes, sir; I think so.

30 Q. But you don't know the hour? A. I think I can tell you more exactly. Both samples were taken in the morning, as I remember, because we delivered them the same day, and the delivery was made in the afternoon; I am almost sure of that, but not quite.

Q. About ten, you say? A. Yes, sir.

Q. Was the mill running? A. Oh, yes.

Q. The mill was running? A. The mill was running normal conditions.

Re-direct examination by Mr. Johnson.

Q. The water was running out of the tail-race?

A. Yes, sir.

40

JUDGE COLLINS—He said that.

Q. If this water is discolored which comes from your mill can you state whether it has been discolored during all the time you have used it, or not?

A. There is generally a little color in the water coming out of the tail-race.

Q. Has that always been the case, or is it recent?

A. Oh, no, that is nothing new; it is less now than it used to be. 10

Q. Now, this spillway over the Third River, what is the condition of that, what has it been during all this period? A. All what period?

Q. All the period since you have used the mill, up to now? A. Well, that changed about two years ago; after that flood a new spillway was built, which was in much better condition, though not absolutely tight; that spillway was not absolutely tight; it used to be in very bad condition, and a great deal of leakage also. 20

Q. Is there much leakage now? A. Yes, sir.

Q. Has there been ever since the new spillway was built? A. Ever since the new spillway was built.

MR. JOHNSON—I have no other witnesses today.

JUDGE COLLINS—I have three witnesses in rebuttal, and do not want to make them come again, so with your Honor's permission I will swear them now. 30

JOHN H. CULLEN, sworn.

Direct examination by Judge Collins.

Q. Did you work at the paper mills which are now owned by the Diamond Mills Paper Company in former years? A. Yes, sir.

Q. For whom? A. Essex Paper Company, and Mr. Fulton. 40

Q. In what capacity did you work there? A. Well, as machine tender.

Q. Now, did you work until the mills were closed? A. Yes, sir.

Q. When was that? A. Well, Mr. McCarrick closed the mills in 1888.

Q. How do you fix the time? A. Well, how I
10 fix the time was, I left there, left Bloomfield and went to Reading, and they had a tornado there in 1889, and I was in that, and so I put a memorandum down; that is how I got it.

Q. It was the year before that tornado? A. Yes, sir.

Q. How long were they closed up before you left there? A. That I couldn't swear to, because I wasn't in town; I left the place.

Q. Did you leave as soon as they closed? A.
20 Well, about a week or two weeks after.

Q. What time of year? A. I think it was in July.

THOMAS DILLON, sworn.

Direct examination by Judge Collins.

Q. Did you work at the mills there, now the Diamond Paper Mill, at the time it closed down? A. Yes, sir.

30 Q. What year was that, and how do you fix it? A. It was in 1888.

Q. What is it that helps you to fix that; what happened that year? A. Well, the best I can remember about it was—I know it for a fact—it was was the year of the blizzard.

Q. And did you begin working there after they started up again? A. Yes, sir.

Q. When was that? A. Well, I couldn't tell you the year exactly; what year it was in, but they

was running, I think, maybe four or five months before I went back there.

THE COURT—Idle, you mean, four or five months.

JUDGE COLLINS—No; had begun to run again four or five months before he went back.

10

Q. And when was it that you went back? A. In July.

Q. What year? A. I couldn't exactly tell the year.

Q. What year was it that you went back?

MR. JOHNSON—He said he couldn't tell.

A. I can't tell you the year.

Q. Can you tell how long they were shut down, 20 the mill? A. They were shut down two years before there was anything done in it there after McCarrick left it; they were shut down two years before anything was done there, to the best of my opinion.

Q. Where were you living? A. Bloomfield.

Q. Were there all the time? A. Yes, sir.

Cross-examination by Mr. Johnson.

Q. Have you got anything to refresh your 30 memory on about that, as to the time they were shut down; any memorandum or anything whatever to refresh your memory about that? A. No; I know they were shut down for two years, because when I left there I went to work outside for awhile, and then I went to work in Mr. Hayden's rolling mill.

Q. Have you ever thought about that matter from that date to this? A. No; I haven't kept any memory about it.

40

By the Court.

Q. Who did you work for in the meantime?
A. I worked outside for awhile, then went to work for the Mr. Hayden Rolling Mill.

By the Court.

10 Q. How long did you work for him? A. I worked there over a year.

THOMAS MONAHAN, sworn.

Direct examination by Judge Collins.

Q. You work for Thomas Oakes & Company, don't you? A. Yes, sir.

Q. And have you been there for a good many years? A. Going on eighteen years.

20 Q. When did you go there to work? A. I think it was 1878.

Q. You mean 1878. A. I mostly forget the time I went there.

Q. You mean 1888? A. 1888; that is the time.

Q. Do you remember what month? A. I think it was in August.

Q. What had you been doing before that? A. Tending plane on the canal.

30 Q. So you were right in that neighborhood? A. Well, half a mile from it.

Q. How long did you work attending the plane?
A. I worked the biggest part of my life on the canal; I don't know how long I was tending plane; I was tending it off and on.

40 Q. What can you tell, fixing the time when you went to work for Thomas Oakes & Company, in August, 1888, you think, what can you tell with regard to the paper mill that is now occupied by Colonel Thompson's company, whether it was shut down or not? A. The only way I remember, at

the time I went to work in Mr. Oakes' mill my brother died; I left there shortly after he died, and I think from what I can remember the mill ran about two or three months after I leaving there; after I left the inclined plane.

Q. Then it stopped? Yes, sir.

Q. How long did it remain vacant? A. To the best of my recollection, a year and a half, more or 10 less.

Cross-examination by Mr. Johnson.

Q. How do you fix the length of time that it stopped? A. Well, by different things that I have heard; by one case especially.

Q. What do you mean by that? A. By a young man who was building a house, and he told me the former superintendent there wanted to rent the house of him, and he wanted the house for himself 20 at the same time, and he wanted it; he said he would sooner have the house he was building than the house he was going to live into; he was going to start this mill up; so that is as near as I can tell you about the recollection part; that was in 1891.

Q. So you rely on what this man told you? A. Yes, sir.

THE COURT—No; he is fixing a date when he started the mill.

30

By Judge Collins.

Q. You saw the mills when they did start them up? A. No, sir; not when they started them up; no, sir; I did not.

Q. You mean when they started them up you were working for Oakes? A. Yes, sir.

Q. Not far away? A. Three-quarters of a mile.

Q. I don't mean you were there when they actually started them going, but you were in the neigh- 40

borhood when they did start them going. A. Yes, sir.

Q. And you knew of the fact? A. Knew of the fact, yes, sir.

Q. And you knew of the day about when they started them up because this young man said he was going to start them up. A. Yes, sir.

10 Q. And that was in 1891? A. Yes, sir.

By the Court.

Q. The only question, how do you fix that in 1891? A. This young man was building this house.

Q. How do you fix the date as in 1891? A. Only what he told me, that is all.

Q. How do you fix it now, that what he did tell you was in 1891? A. I don't know as I can fix it.

20 Q. How is it you come to say that was in 1891? A. This young man told me he was building his house at that time.

By the Court.

Q. Told you lately? A. Yes, sir; but I have always known he build the house.

Q. You mean he lately told you he built that house in 1891? A. Yes, sir.

30 Q. Take your memory. You went to work for the Oakes in August, 1888; that was a few months, you think, before they shut down? A. Yes, sir.

Q. Now, from your memory, as an event in your past life, can you tell how long they were shut up? A. Well, as near as I can recollect, as I said before, about a year and a half, or more; might be more, might be less.

WILLIAM I. POWERS, recalled.

Examined by the Court.

40 Q. Mr. Powers, as I understand it, the last place

where the canal takes in any water on the Rockaway River is at Boonton, isn't it? A. Yes, sir.

Q. It runs from there above? A. Yes, sir.

Q. It runs from there clear to Paterson above the river? A. Yes, sir.

Q. Then it crosses the Pompton River at Lincoln Park, or somewhere there? A. Yes; through an aqueduct—Mountain View.

10

Q. It gets no water there, but it gets a feeder from Pompton? A. It gets a feeder at Mountain View, near that aqueduct.

Q. That feeder runs up to Pompton? A. Yes, sir.

Q. Takes in the River there? A. Yes.

Q. Do you use that feeder now? A. Yes, sir; always have.

Q. You don't navigate it any more; do you? A. Yes, sir.

20

Q. Don't run your boats up to Mr. Ludlum's mill, do you? A. No; the flood of October, 1903, broke out their dam and filled the channel up.

Q. But you are still using the Pompton feeder? A. Yes, sir; that is navigable.

THE COURT—I wanted to get that clear in my mind, because I was not quite sure you stated it.

30

Q. There has been a marriage, as everybody knows, between the Lehigh Valley Railroad Company and the canal— A. I don't know.

Q. You don't know about that? A. I have no knowledge of that whatever.

Q. You have no knowledge of it yourself? A. No.

THE COURT—It is a notorious fact; I suppose it is admitted in this case.

40

JUDGE COLLINS—I don't know the exact tenor of it, nor do I know the date.

Q. I understand you to say the use of the canal by boats has been diminished very much lately?

A. Yes, sir.

10 Q. How long has that been going on? A. Gradually for the last ten or twelve years.

Q. Can you give us an idea, now, without looking at your records, how much it has diminished?

A. Total tonnage?

Q. Yes; number of boats? A. In the last ten years—we have about fifty boats that are serviceable; ten years ago we probably had one hundred and twenty-five.

20 Q. You don't use the fifty—each boat as much as you did the one hundred and twenty-five years ago? A. They have been kept very busy.

Q. Do they clear to Easton? A. Yes, sir.

Q. Does anybody else own any boats running on the canal now? A. No, sir.

Q. There used to be a great many other people own boats running on the canal, didn't they? A. Not for thirty years, with one or two exceptions.

30 Q. But there used to be a great many private owners of boats on the canal? A. Well, a great many of the boatmen they leased the boats; there was a certain amount retained out of their freights, and when the amount was equal to the value of the boat, the boat was given to them by the company.

Q. Didn't there used to be more than one hundred and twenty-five boats on that canal? A. Well, some years ago there were three hundred.

Q. Three hundred in Judge Crater's (?) time, wasn't there? A. I think there was.

Q. Then it reduced down to one hundred and

twenty-five ten years ago, and now it is down to fifty? A. Yes, sir.

Q. Do they run all the way through, or do they run on this end of the canal? A. They only run through the canal, that is, from Phillipburg.

Q. There used to be a great many boats run from the center of the county there with wood down here to Newark, didn't there? A. Some; 10
yes.

Q. Do you run any of those now? A. Very few.

Q. Then there used to be more boats running over the plane No 11 at Bloomfield than ran all the way through, didn't there, in old times? A. At Bloomfield?

Q. Yes; more boats passing plane 11 at Bloomfield than passed over the whole length of the canal? A. There were more boats passed over there than passed on down through here, because there was 20
some coal delivered at Bloomfield.

Q. I know, but more than went through Easton? A. I think not; I think all boats went up as far as Easton to get cargoes.

Q. Didn't they use to load wood in Morris County? A. Few.

Q. And charcoal in Morris County? A. Many years ago.

Q. But that is all played out; can't compete with the railroads—I mean to say in Morris County is played out? A. Yes; practically all gone. 20

JUDGE COLLINS—Do I understand, Mr. Johnson, you haven't any other witnesses, unless it is the tests?

MR. JOHNSON—I don't want to say that.

THE COURT—Mr. Johnson ought to put in his witnesses if he has got them here. He don't want to rest his case under 40

the intimation of the Court. The Court will take care of that. If you have got any evidence you want to put in you can put it in now.

THOMAS OAKES, recalled.

Direct examination by Judge Collins.

10 Q. Do you recall the fact of the mill being idle?

A. I do.

Q. Can you fix the time? A. No; I can't fix the date.

Q. What is it fixes the fact in your mind? A. Well, I know it was standing a long time, because we had a great deal of trouble at our factory on account of the appearance of the water being strongly lime water, and when it stopped we had no difficulty, and it stopped for, well, I should think for
20 two years, but I am not sure as to time; and during that time I thought very seriously of buying it for the purpose of avoiding any further trouble, and after it had been sold I regretted I had not done it.

Q. Can you tell approximately when it was, as near as you can get it, somewhere near? A. The time.

Q. Yes; somewhere near? A. Oh, it was way
30 back in—I should say it was 1888 or 1889 when it stopped.

NO CROSS-EXAMINATION.

JUDGE COLLINS—I don't think I have anything more unless it is to meet what they will introduce, except I do want to have it clearly shown what that Clark test is by somebody who knows. I don't know whether George Oakes can tell us
40 or not.

THE COURT—I don't think there is any dispute as to what the Clark test is. It is a practical test of the soap, the comparison.

JUDGE COLLINS—I want to know—

THE COURT—How to turn one into the other?

JUDGE COLLINS—Yes; but that we can do later.

RECESS.

April 5, 1906.

Observations of Vice-Chancellor Pitney.

Transcript of shorthand notes of observations dictated to the stenographer by Vice-Chancellor Henry C. Pitney on the afternoon of Thursday, April 5th, 1906, on the occasion of the Court's visit, accompanied by all the counsel in the case, to the mill of the Diamond Mills Paper Company, situate at Bloomfield, New Jersey, for the purpose of making a personal inspection.

Vice-Chancellor Pitney was accompanied to the mill by Hon. Gilbert Collins and Mr. George S. Hobart, counsel representing the complainants; Mr. Frederick T. Johnson, counsel for the defendant, the Diamond Mills Paper Company, and Mr. Harry E. Richards, counsel for Thomas Oakes & Company.

Besides the counsel for all parties there were present Mr. Thomas Oakes, Mr. William I. Powers, Mr. George Oakes, Mr. Frank V. Oakes, and Mr. Frank C. Axtell, the chemist sworn in the cause on behalf of the defendant. Mr. Ralph H. Thompson, son of the owner of the Dia-

mond Mills Paper Company mill escorted the party through their mill.

10 THE COURT—Water drawn out of the pool, dark grayish color; muddy. After running awhile; running not quite so muddy, but about the same color; less muddy, and therefore not so much color; slight smell of chlorine.

The water drawn out of the pool.

Looked at the water coming out of the tail-race. Milky.

At the end of the tail-race on the rocks plain indications of fibre sticking on the rocks. Further along the tail-race plain marks of fibre right on the stones on the bottom of the tail-race. The water still milky.

20 About 250 feet from the river, north from the mill, two pits shown; full of soft lime; pretty white. There is no sign to the eye of chlorine in it. There is a slight smell of chlorine in it.

30 North side of the mill, near the mill, shute comes from the inside of the mill; used to bring out liquid, apparently lime and water, and overflows from there by an underground pipe to the pit that has just previously been mentioned.

Head-gate to turn the water on the wheel, screen one finer than the other to take out materials that float down, and stored on the bank is a part of the material caught, comprised of sticks and leaves and things of that kind; dirt.

40 (Inside the mill) Little odd pieces of black and colored rags that the sorters pick

out. Actually engaged at this time in filling the digester with rags that has some color in them.

A sample shown of a collection of covers, coarse bagging, which is used to bring the fine material to the mill; packed up to be sent away to be made into paper in another mill. 10

Sample of colored linens, unbleached linens, shown from which to make paper, but which requires to be digested.

Stone tank about six feet in diameter, about a foot deep or fourteen inches deep, with a revolving mixer mixing up water with bleaching powder; the whole about as thick as good thick cream; and there is no difficulty about determining the quantity 20 of fluid in that with approximate accuracy simply, when it is stopped, to make an accurate measurement of the depth of the water and width of the cubic contents. It can be calculated in that way to a certainty. The sediment in this tank is what is saved in the pits outside, the water being used as bleaching powder or bleach.

Going downstairs passed a square tank con- 30 taining bleach water which has been clarified by settling, of a greenish tint.

A large quantity of stock which has been through the digester, and called cooked stock; dark colored. No smell of chlorine in the cooked stock.

A washer is shown containing the stock.

Half an hour later, after going through the mill, the outlet from the wheel pit, the 40

water nearly all out, and the water running much thicker, and more like the original color; a dark gray,

10 The complainant takes out a bucketful of slush right under the bridge; upper bridge. Another sample taken at the wheel pit, exactly right over the wheel pit.

The outlet going under ground is between the tail-race and the wheel pit; pretty near the wheel pit.

20 My suggestion is that each party takes the sample of mud that has been taken out on his behalf and let it settle and get any water off the top that he can, and subject that to test for lime; then dry off a sample of the rest and ascertain if there is any actual lime that is palpable to the eye in the shape of ordinary lime; any lime in the shape of dry lime not mixed with water.

Adjourned until May 16, at Chancery Chambers, Newark, 10.15 A. M.

GEORGE A. OAKES, recalled.

30 *Direct examination by Dr. Richards.*

Q. Did you take two samples of water recently and take them to Dr. Woodman? A. I did.

Q. Chemist? A. Yes, sir.

Q. Please state where you took those samples from? A. I took one of the samples at the intake at the factory, that is, where the water runs into the head-race where the pipes go from the different machines and different parts of the factory.

40

By Judge Collins.

Q. Factory. You mean the paper mill? A. No; our factory. And the other sample I took at the stone bridge at Bay avenue, that is, above the paper mill, in Third River.

By the Court.

Q. It is where the Third River runs into Oakes' pond? A. And above the paper mill. 10

THE COURT—Whose paper mill?

DR. RICHARDS—The Diamond.

THE COURT—The Diamond Paper Mill is right below the canal.

DR. RICHARDS—The Diamond Paper Mill is right a'long side of the canal, and Third River comes in above that; Third River is the stream that runs down along side of the paper mill. 20

THE COURT—Oh, yes. Where did you take the water out of the Third River?

A. Took it out of the Third River at the bridge at Bay avenue:

By the Court.

Q. Oh, yes, opposite the plane? A. Yes, sir. 30

JUDGE COLLINS—Above the plane.

DR. RICHARDS—Above the paper mill.

THE COURT—That is the same thing.

Q. And the other sample you took out where it goes out of Oakes' pond into Oakes' mill? A. Yes; where it goes into the factory.

Q. And what did you do with those samples? A. I took them to Dr. Woodman's office. 40

Q. Did you have them labelled? A. I had them labelled.

Q. Designating them how? A. The one from the mill was marked "Water from Third River above the paper mill," and the one at our factory was marked "Water taken from the intake to the factory."

10 Q. And you delivered those to Dr. Woodman?
A. Delivered them to Dr. Woodman.

By the Court.

Q. Did not give notice to the paper mill people that you were doing this, eh? A. No.

THE COURT—I wish you had. It is more satisfactory.

DR. DURAND WOODMAN, SWORN.

20 *Direct examination by Dr. Richards.*

DR. RICHARDS—Maybe I better trace those samples to Dr. Woodman.

MR. JOHNSON—We admit it. We believe it to be all right.

Q. Dr. Woodman, what is your profession? A. Analytical and consulting chemist.

30 *By the Court.*

Q. Where? A. I am situated in New York, laboratory at 127 Pearl street.

Q. How long have you been at work in making analyses? A. I have been engaged in analytical work for seventeen or eighteen years. I graduated from the Stevens Institute of Technology and have been engaged in my profession since 1880, with practically no interruptions.

40 Q. Have you had any experience in making analyses of water? A. I have had a great deal of ex-

perience in that direction, my first work after graduation being with Professor Henry Werts on the Passaic River for the city of Paterson.

By Judge Collins.

Q. How old is he? A. I should say seventy-six or seventy-seven; he has been residing in Newark the last three or four years. 16

Q. Did you make a series of analyses of water and sludge delivered to you by Mr. George Oakes? A. I did.

By the Court.

Q. Now, give them to us; the results; if you have got them tabulated so I can have one I should be very glad to have copies of your tabulations. A. No, sir; I have one copy of each, and you have copies. 20

Q. Have you more than one copy there? A. No, sir; I have one copy of each, and you have copies.

Q. Please explain the several analyses in order.

THE COURT—You better take the one that was taken in my presence first, at the foot of the plane.

Q. You have one, Dr. Woodman, called "End of trunk shortly after gate was opened, April 5, 1906?" A. Yes, sir. 30

Q. "Analysis of water from end of trunk shortly after gate was opened, April 5, 1906." That was one of the samples you analyzed, was it not? A. Yes, sir.

THE COURT—That was the day I was there?

DR. RICHARDS—Yes, sir.

A. That is the sample I analyzed, Number 10,862: 40

“End of trunk shortly after gate was opened, April 5, 1906.”

MR. JOHNSON—Is that at the outlet of the waste pipe?

DR. RICHARDS—That is the outlet of the waste pipe.

10 THE COURT—Inlet of the waste pipe.

DR. RICHARDS—Well, inlet. You know a bucket was put under the pipe just as it came out of the stream below the bank; there were three samples taken.

THE COURT—I didn't see any samples taken there. The water was dipped right out of the pool.

20 JUDGE COLLINS—This one was taken just where the paper mill discharged.

DR. RICHARDS—Your Honor looked over the bank and commented on the color of the water as it went out of the end of the pipe in the stream.

JUDGE COLLINS—As it went into Third River?

DR. RICHARDS—Went into Third River out of that basin.

30 THE COURT—I don't recall any samples being taken there.

JUDGE COLLINS—Yes; a man went down in there with rubber boots on, and you said you smelled—you couldn't smell very well, but I smelled it.

24 Q. Please explain this analysis. A. I have the original labels here, if that should be of any service. That water was analyzed in the condition in which
40 I received it. I found organic—

THE COURT—What was it in, a jar?

A. It was in a bottle; this sample was in a large bottle. This contained organic and volatile matter by ignition 9 and 93-100 grains per gallon; or, if you prefer, 173 and 5-10 parts of a million.

By the Court.

Q. You have got them both there? A. Yes, sir. 10
Mineral solids 13 and 28-100 grains per gallon.

By the Court.

Q. What is that equal to? A. 227 and 7-10 parts per million; total solids 23 and 2-10 grains per gallon equals 401 2-10 parts per million. There was suspended matter in this water amounting to 5 and 83-100 grains per gallon, or 100 parts per million. This was included in the analysis because; as I understood it, the water would pass into the 20
woolen mill in that condition. The amount of lime as calcium oxide, 4 and 6-10 grains per gallon; the oxide of iron, 1 and 16-100 grains per gallon in 20 parts per million; magnesia, 36 hundredths grains per gallon, 6 and 2-10 parts per million. I also found in this water 83 hundredths of a grain, or 14 and 2-10 parts per million free chlorine, which I could observe by the odor when the sample was received, and which I determined almost immediately, 30
as that is subject to change by oxidization on keeping. The free chlorine—I am speaking now of free chlorine that you could smell.

By the Court.

Q. That is chlorine that would smell? A. Yes, sir; not in combination with anything. The hardness of this water I determined by Clark's method, giving nine degrees.

Q. Please explain what you mean by nine degrees? 40

THE COURT—Clark's test; that was the one we used the other day?

JUDGE COLLINS—Yes, sir; but something is to be explained about that. Used Clark's method; did not use Clark's scale. The witness will explain.

10 A. The Clark's degrees correspond to grains per gallon of calcium carbonate. The other system of expressing it would be in parts per hundred thousand of calcium carbonate.

Q. What relation do those two scales bear to each other? If it were nine degrees hardness with the genuine Clark scale, how many degrees would it be reckoned as parts per hundred thousand? A. About 15 and 9-10, from memory. I would use a table in converting those figures ordinarily, but
20 my recollection is that it would be about 15 and 9-10.

THE COURT—That doesn't agree either with Clark's, the scale that Mr. Oakes used in his experiments, his tests.

DR. RICHARDS—Mr. Oakes used a soap test, which is the Clark test, but he used his own scale, it being the same all the time. Now, Dr. Woodman is taking the
30 genuine Clark scale.

THE COURT—I want to know how that compares with the scale that Mr. Oakes used.

A. To get the scale which Mr. Oakes approximately used you would get—you would convert the nine grains per gallon into parts per hundred thousand.

40 THE COURT—That wasn't the way it was put to me.

JUDGE COLLINS—Yes, that is right. At this point there is 15 on the basis that Mr. Oakes used. Mr. Oakes said, you remember, that he could stand about 10 or 11. Now, then, using Mr. Oakes' scale, this discharge of 15—

THE COURT—I haven't heard him say so yet.
How many parts in a thousand is that?

10

JUDGE COLLINS—Hundred thousand.

A. That is about 15 and 9-10.

JUDGE COLLINS—When we find the fact that Mr. Oakes used an arbitrary scale, which is not Clark's scale, and which Mr. Woodman now tells us is on the basis used, commercial common sense business way of testing parts in a hundred thousand. Now, he is converting it into Oakes' scale, and it is what Oakes would call by his test 15. Now, he says his water will stand 11; this here is 15.

20

A. This is nearly 16.

JUDGE COLLINS—Am I right in stating that?

A. That is correct.

30

By the Court.

Q. That is the complete analysis of the water you have just spoken of, isn't it? A. I haven't mentioned the unimportant ingredients, but the entire analysis is on that sheet.

By the Court.

Q. As I understand, it is the lime you are after here? A. Yes, sir.

40

By the Court.

Q. Hardness nine degrees. What is that? A. That is nine degrees Clark.

By Judge Collins.

Q. Clark's scale? A. Clark scale.

By the Court.

10

Q. That is tested by the lime, isn't it, or is it by the lime in suspension? A. It results from the lime in solution.

By the Court.

Q. Not in combination with anything else? A. It is in combination; the lime is in combination with sulphuric acid and carbonic acid; both sulphate and carbonate; the hardness is the result of the combined effects of the lime in whatever form it may be. Of course, the lime is not in the form of a visible powder. 20

By the Court.

Q. No, I understand it is invisible. Hard water is as clear as any? A. Yes, sir.

JUDGE COLLINS—Also magnesia too, isn't it?

A. Also magnesia.

30

By the Court.

Q. Magnesia is one form of lime? A. No; magnesia is a separate element.

Q. I understand from your answer to Judge Collins' question that your nine degrees of hardness would correspond to about 15-60 degrees, according to the scale that Mr. George Oakes was using? A. Approximately.

40

10 THE COURT—What does he know about the scale George Oakes used? That is the difficulty. I don't know what scale he used; I never could understand it; didn't the other day. Mr. George Oakes' scale appears to correspond about with the parts per hundred thousand. That is evidently what he is intending to use. As we have got two chemists here now, I would rather compare the chemical combination, as was testified to the other day by Mr. Axtell; then I won't bother with the Clark scale or any other scale.

20 JUDGE COLLINS—No; it makes no difference what Oakes used as his measure, as long as it was uniform.

A. Exactly; his own experiments are comparable with each other from day to day.

Q. Turn to the analysis headed "Analysis of water from canal at foot of plane, April 5, 1906," and explain it.

MR. JOHNSON—You mean the water in the wheel pit?

DR. RICHARDS—Water in the wheel pit.

30

JUDGE COLLINS—Take that first.

THE COURT—Better put "wheel pit" there. A "Foot of wheel pit" or "foot of plane?"

THE COURT—"In wheel pit." "from wheel pit, foot of plane;" right after words "canal at foot of plane, April 5, 1906," the words "from wheel pit."

40 Q. Now proceed with that? A. This water was analyzed in the condition received, unfiltered. Or-

ganic and volatile by ignition 8 and 74-100 grains per gallon, 150 parts per million. Mineral solids 12.83 grains per gallon or 220 parts per million. Total dissolved contents 21 57-100 grains per gallon or 370.0 parts per million. Suspended matters, included in above analysis, 2 and 1-10 grains, or 36 parts per million. The oxide of iron and alumina were determined together, and amount to 23 hundredths of a grain per gallon, very small, comparatively small; the lime to 4 and 75-100 grains per gallon, 81.3 parts per million. Magnesia, 35 hundredths grains or 57 parts per million. That is an error.

By the Court.

Q. 5 and 7-10ths? A. 5 and 7-10ths. I also found free chlorine about the same as in the other sample, 82 hundredths of a grain, equal to 14 and 2-10 parts per million. The hardness I found to be 9 and 33-100 degrees Clark, equal to about 15 and a fraction parts per hundred thousand.

Paper marked Exhibit C 2, May 16, 1906, as follows:

“No. 10861. New York, May 12, 1906.

Analysis of water from canal at foot of plane from wheel pit, April 5, 1906.

Unfiltered.	No. 10861.	30
	Canal foot of plane.	
	Grains per gallon.	
Organic and volatile by ignition	8.74	150.0
Mineral solids	12.83	220.0
Total dissolved contents	21.57	370.0
Suspended matters, included above.	2.10	36.0
Analysis of the mineral contents.		
Silica and insoluble	1.05	1.05
Oxide of iron		
Oxide of alumina	0.23	0.23

40

Canal foot of plane.
Grains per gallon.

Lime ... CaO.....	4.75	81.3
Magnesia MgO	0.33	5.7
Potassium Oxide. ... K ₂ O	0.18	3.1
Sodium Oxide.... Na ₂ O	0.83	14.3
Sulphuric acid..... S ₀	1.75	30.2
10	3	
Chlorine . . . Cl combined	3.20	54.7
Chlorine, free.....	0.82	14.2
	<hr/>	
	12.32	
Hardness	9.33	

DURAND WOODMAN."

20 THE COURT—Now, you say that was water, gentlemen, that was taken up with the slush?

DR. RICHARDS—No; that is clear water on top of the slush.

A. No; beg your pardon, that is not from the top.

DR. RICHARDS—No, no; that is the water taken without any sludge in it?

A. Yes, sir.

30 *By the Court.*

Q. In the bottle? A. Yes, sir.

Q. Comparatively clear water; not a sludge sample? A. Not the sludge sample.

JUDGE COLLINS—He hasn't stated the unimportant ingredients.

THE COURT—It is all here; perfectly comprehensible.

40 Q. Please turn to the analysis headed "Analysis

of liquor from sludge collected April 5, 1906.”
 A. This sludge was received in a galvanized iron can, and was of a consistency corresponding to a thick mush. I put that sludge into a large filter so as to drain off the water in accordance with your Honor’s typewritten suggestions, and thereby obtaining the pulp; that is what I call the pulp, separate from the liquor. The present analysis is made on this liquor that I separated from the pulp— 10

By the Court.

Q. By ordinary filtration? A. By ordinary filtration.

THE COURT—Go on. I don’t see any occasion for the stenographer to write out these notes and figures. They won’t be any use to him. I think the stenographer may be instructed to leave a space and make an exact copy of those and have it pasted in his notes, if necessary. 20

JUDGE COLLINS—I think it is entirely satisfactory to us, and far more sensible.

By the Court.

Q. You have got the result there tabulated? A. 30
 Yes, sir.

By the Court.

Q. As it was in these others? A. Exactly. Organic and volatile by ignition—

THE COURT—You need not give those figures.

Marked Exhibit C 3, May 16, 1906, and is as follows: 40

“No. 10860. NEW YORK, May 12, 1906.

Analysis of liquor from sludge collected April 5, 1906:

		No. 10860.
		Sludge liquor.
		Grains per gallon.
	Organic and volatile, by ignition..	91.56 1,570.0
10	Mineral solids	114.30 1,960.0
		205.86 3,530.0

Analysis of mineral solids:

	Silica and insoluble.....	1.28 22.0
	Iron oxide.....	7.00 120.0
	Alumina oxide.approx.....	.15 2.6
	Lime.....Ca.O.....	56.12 962.4
	Magnesia.....	3.32 57.0
20	Sulphuric acid..... SO.....	0.32 5.5
		3
	Chlorine.....Cl.....	1.24 21.3
	Alkalies.....	small
	Carbonic acid....CO2....Calc....	43.20 25.1

Durand Woodman.”

By the Court.

Q. You haven't given the total hardness at all. It is way out of sight? A. It is way out of sight.

30 THE COURT—I will tell the counsel for the defendant that the carbonate of lime is 98 35-100 parts in a gallon and 1687 in a million.

A. I have a sample of that liquor here if you want to see it?

THE COURT—Never mind now.

40 JUDGE COLLINS—We were just about to do it. This, you understand, is liquid?

THE COURT—I understand what it is perfectly.

Q. Have you with you the lime that you obtained from this sample in a bottle? A. I have.

By the Court.

Q. You have the lime itself, or sample of the liquid? A. I have the lime I separated from it, and also sample of the liquid. 10

THE COURT—It may be Mr. Axtell's results are the same.

MR. JOHNSON—So far they are practically the same.

DR. RICHARDS—Your Honor said you would like to see the lime separated, so we have separated it and put it in a bottle. 20

THE COURT—I have no doubt the lime is there.

JUDGE COLLINS—This is useful in this respect. It is the proportion in a gallon, isn't it?

A. I have shown the proportion in a gallon. 30

JUDGE COLLINS—I would like to have him see it.

THE COURT—All right. I shall not dispute the analysis unless the analysts get to fighting among themselves.

A. That is a sample of the sludge liquor. I have here a sample of the lime and carbonate from one gallon, approximately one gallon of the sludge liquor. 40

THE COURT—Heavily charged, wasn't it?

JUDGE COLLINS—That is the liquor?

A. From the liquor.

JUDGE COLLINS—From the liquor; not the
sludge itself.

10

THE COURT — That is substantially the
amount of lime in a gallon?

A. Yes, sir; of this clear liquor.

THE COURT—Perfectly wonderful how much
of it can be held in solution.

Q. Now, Dr. Woodman, will you turn to the
memorandum of analysis headed "Analysis of
Dried Sludge." Please explain that. A. The
sludge which I separated from the liquor, as I be-
fore described, by ordinary filtration, was then
dried in an oven to get rid of moisture in order to
make a percentage analysis.

20

THE COURT—Let me see that.

Marked Exhibit C 4, May 16, 1906, and is as fol-
lows:

30

"No. 10860. NEW YORK, May 14, 1906.

Analysis of the dried sludge:

No. 10860.

Sludge Dried at 220 F.

Rag fibre, paper and carbonic acid 62.80

Mineral matter, clay, sand, etc. 37.20

100.00

40

Analysis showing composition of mineral portion:

Insoluble silica, etc	24.50	
Oxide of iron	1.85	
Oxide of alumina	2.74	
Lime, calcium oxide	6.70	
Magnesia	0.51	
Sulphuric acid S03	0.30	
Chlorides of the alkalies, etc	0.60	10
	<hr/>	
	37.20	
Carbonic acid (calculated)	5.86	
Rag fibre and other combustible matter	56.94	
	<hr/>	
	100.00	

DURAND WOODMAN."

THE COURT—It contains rag fibre about 60 per cent.; 56 94-100 rag fibre. That is just about what I thought it was, if you want to know. 20

DR. RICHARDS—Dr. Woodman has the bottle also showing the amount of lime in the sludge. Please produce that bottle.

A. This (indicating exhibit) represents the lime as carbonate from the dry sludge.

By the Court.

Q. From what quantity? A. Pulp from the whole of it. 30

JUDGE COLLINS—That tin pail full that your Honor saw.

A. The rag fibre takes up a great deal of bulk when it is wet, and on drying it it weighed about five ounces, and that is the lime from the five ounces of dry pulp that came from the sludge.

Q. Now, will you please turn to the analysis 40

headed "Analysis of water from stream above paper mill."

THE COURT—Which stream?

DR. RICHARDS—This is Third River, taken above the paper mill, and explain.

A. This sample was received from Mr. George
10 Oakes, as he previously testified, and contains—

THE COURT—You have got the same thing there. Mark it C 5.

"No. 10903. NEW YORK, May 14, 1906.

Analysis of water from stream above paper mill;
Third River.

		No. 10,903.	
	Stream above paper mill.		
			Grains per gallon.
20	Organic and volatile by ignition....	1.32	23.5
	Mineral solids	4.10	70.0
	Total dissolved contents.....	5.42	93.5
	Analysis of mineral solids:		
	Silica and insoluble	0.58	10.0
	Iron and alumina oxides	0.31	5.3
	Lime..... CaO.	1.39	24.0
	Magnesia..... MgO.....	0.39	6.7
30	Potassium oxide.....K ₂ O.....	0.15	2.6
	Sodium oxide.....Na ₂ O.....	0.16	2.8
	Sulphuric acid.....SO ₃	0.96	16.5
	Chlorine.....Cl.....	0.29	5.0
		4.23	72.9
	Hardness.....	3.10."	

THE COURT—I will mark that "Third River."
It says "stream above paper mill." I
will put "Third River" under that so as
40 to show what stream.

Q. Dr. Woodman, please turn to memorandum of analysis headed "Analysis of water from pond at intake May 3, 1906," and explain? A. This sample was received at the same time and date as the one previously described.

Marked Exhibit C 6, May 16, 1906, and is as follows:

"No. 10902.

NEW YORK, May 10, 1906.

10

Analysis of water from pond at intake May 3, 1906.

Unfiltered.

No. 10902.

Pond at intake 5/3/06.

Grains per gallon.

Organic and volatile by ignition....	1.75	30.0
Mineral solids	5.01	86.0
Total dissolved contents....	6.76	116.0 20
Suspended matter	Very little.	

Analysis of the mineral solids:

Silica and insoluble	0.99	17.0
Iron and (alumina) oxides	0.27	4.07
LimeCaO	1.40	24.0
Magnesia MgO	0.42	7.2
Potassium oxide K ₂ O	0.24	4.1
Sodium oxide Na ₂ O	0.27	4.7 30
Sulphuric acidSO ₃	0.96	16.5
Chloride Cl37	6.4
	—	—
	4.92	84.6
Hardness	3.67	
Hardness of Croton water	2.60."	

THE COURT—This only contains 1 and 40/100 grain of lime in a gallon, which is only one hundredth part of a grain more than the river; substantially the same? 40

A. Yes, sir; substantially the same.

THE COURT—And the hardness is a trifle more.

JUDGE COLLINS—Very little.

THE COURT—Very little more; and the hardness of Croton water is 2.60, I see.

10

A. I put that down by way of comparison.

THE COURT—Have you got copies of those all, gentlemen?

MR. JOHNSON—Yes.

Q. Dr. Woodman, I want to ask you what the effect of water like this would be.

20

THE COURT—You haven't given me sample at the Oakes mill.

DR. RICHARDS—That is the last one.

THE COURT—Where is the water that came out of the canal?

JUDGE COLLINS—We didn't have that. That was proved by Mr. Axtell last time.

30

THE COURT—Mr. Oakes swore he took a sample.

DR. RICHARDS—From the canal? No, sir; he only took two samples.

JUDGE COLLINS—To-day, you mean?

THE COURT—Yes, sir.

JUDGE COLLINS—No, sir; he took one from the intake of his own factory—Mr. Axtell proved last time the canal—we don't question that.

40

THE COURT—I thought you had taken one at

the same time up there to compare at that season of the year. Those varied with the seasons of the year, gentlemen. Now, at the time this was taken from Third River, this was this spring.

JUDGE COLLINS—May 3d.

THE COURT—I understand, recently, and the water was comparatively high. Now, the quantity of solids with lime in that is much less than it would be later in the season when the river is low. 10

MR. COLLINS—The sample that Mr. Axtell had was March, I think, about the same time—

THE COURT—I don't know as it makes any difference. I only want to call your attention to that; you cannot determine the average hardness—unless Mr. Woodman corrects me—of a stream by taking it at one particular time, because it varies with different seasons of the year, according to the drought. The dryer the weather is the harder the water is, I believe; that is right, isn't it? 20

A. That is true, sir; but in the water that is largely composed of upland surface drainage, such as the canal water, the difference is very slight. 30

By the Court.

Q. It depends on what you mean by that. There are certain seasons of the year when there isn't a bit of water running into these streams, except spring water.

JUDGE COLLINS—He was speaking of the canal. 40

THE COURT—The canal is the same way; the canal is taken out of Lake Hopatcong and Rockaway River at Rockaway; they steal it there; I have been all through it; and also from the other streams. Now, there are seasons of the year when these streams are composed mostly of spring water, and by spring water I mean, not water soaking out of a swamp, but water coming out of the earth; and the hardness of that varies with the depth of the subterranean reservoir which supplies that brook, and that the lower you get down you are drawing from, the harder, the less rain water gets mixed with it, so that the water is always harder; makes very little difference; always harder, and in a stream like this, immediately after a rain, it is nothing but rain water. In the month of July is about the best time, I think; latter part of July. However, it all depends on the weather.

Q. Dr. Woodman, have you had any experience in the matter of the effect of such substances as are shown in your analysis to be in the water which was taken from the canal, shown in your first three analyses; what effect they would have on water for washing and dyeing purposes in a woolen mill? A. I know from the work that I have done for woolen mills, and investigating the troubles that they have at various times and places, and from the chemistry of the subject in general, that lime and iron, and also magnesia, make much trouble with dyeing and bleaching, owing to the formation of the insoluble soap, which gives the name of hardness to such waters, except that we

have in dyeing and bleaching the fixation of this hard soap in the fibre and makes an unevenness in taking the dyes, and stains and spots are the result.

Q. You have shown a certain amount of chlorine, free and in combination, in this water in the first three samples. You have tested it. What is the effect of that on water used for purposes of a woolen mill? A. That would be detrimental in quite a number of ways. It is perhaps sufficient to say that the chlorine, free chlorine, increases the hardness; it destroys a certain amount of soap. 10

By the Court.

Q. Destroys what? A. Destroys the soap in it in some way that the lime or magnesia does: that is, combines with it and renders it useless for the purpose of scouring. 20

Q. It has been testified in this case, Dr. Woodman—

THE COURT—I don't want that. I don't allow questions put that way. It is a fad of mine. I don't want one witness to be told what has been testified by anybody at all.

Q. Assuming that enough of the sludge and water composing the samples that you testified here—the first three—suppose, assuming that that went into the pond from which Mr. Oakes drew his water for washing and dyeing purposes, and that it went in in sufficient quantities to make the water discolored visibly to the eye, the discoloration visible to the eye, what would you say about the water under those circumstances in the pond? A. I should consider it very detrimental for the purposes of the Oakes' use, and detrimental for any dyeing and 30 40

bleaching or scouring process. I know of no mill that would think of using water for the purposes in such a condition.

Q. Supposing that the sludge and water, such as the first three samples that you analyzed, was run into a pond, what would be the effect as regards the solid matter settling on the bottom of the pond?

10 A. Of course, water containing a large amount of suspended matter, due to violent agitation, will deposit a large part of the suspended matter as soon as it is allowed to rest quietly in a pond or tank or any other large area, and matters carried in in that way will subside to the bottom of the pond, and such as are soluble will be taken up slowly by the water in the pond.

20 THE COURT—Their mere mode of describing the old truth. We all know that dirty waters settle at the head of a pond, and generally make a mud bank there.

A. Exactly so.

THE COURT—Precisely as it sett'es where the tides meet, and make a bar at the mouth of a river.

A. Sometimes called a delta.

30 *By the Court.*

Q. Yes, sometimes called a delta.

Q. Dr. Woodman, what would be the effect on the hardness of the water in Oakes' pond from a deposit of the suspended matter of these waters analyzed by you coming from the paper mill, as the water of the pond flowed over it? A. Necessarily an increase, because the additions to the pond are rich in lime, as shown by the analysis.

40

THE COURT—Gentlemen, you are getting now as to the size of a piece of chalk. You have got to go into the calculation of the amount of water that passes through Mr. Oakes' pond say in the course of a year, and then the amount of water, defiled water, I will call it, that gets in there, if it gets in there at all, because 10 that gets in it from the overflow of the canal at times—and you have got an insoluble problem. You might as well go to work and calculate the moral forces that produced the Rebellion of 1861. The proof is, and it has not been contradicted yet, that Mr. Oakes found the water in his mill discolored, and the amount of lime found there very much heightened at a particular time, subse- 20 quent or shortly after there had been an overflow of the canal into his pond, and he traced it back to this mill. Now, can you go into the proportions?

DR. RICHARDS—I don't think we want to.

THE COURT—If you want to ask an expert now you can ask him whether those facts can be accounted for under those circumstances, but I think I have got 30 common sense enough for that.

DR. RICHARDS—I agree with your Honor. That is all we want to prove. We are satisfied with that.

Cross-examination by Mr. Johnson.

THE COURT—You have given us analysis of the water above, and the difference between the water at Mr. Oakes' mill and water at Third River at this time. After 40

10 there has been twenty years, more or less, of that settling in the bottom of his pond of this deleterious matter all the time, giving that hardness, as no doubt it does, is one hundredth of a grain, difference between 140 and 141, which the analyst very properly states is almost inappreciable; so that the increase on the day that you took the two samples, the difference was one hundredth of a grain.

DR. RICHARDS—I wish to recall Mr. Oakes to have him prove when these last samples were taken, there was no water coming in from the canal.

20 THE COURT—What I am telling you now, to get along, show you what is in my mind, is as to the permanent effect. You say, and probably I shall assume for present purposes, it is true that there is a deposit in his pond to-day, due to lime that has been put there by my friend Colonel Thompson, and the only question that I understand you want to ask the witness about, and you are asking him, about the effect of that deposit on the pond towards increasing the quantity of deleterious matters that he would draw out of his pond for washing purposes. Now, you have got a test right here, two samples taken on the same day, and the difference almost inappreciable, but slightly more in the pond than above.

30

40 DR. RICHARDS—I would like to call your attention to one thing, and that is the reason I would like to ask about this.

You remember Mr. Oakes testified after the emptying of this basin, for a certain considerable length of time afterwards they couldn't dye. Now, the fact is that this deposit—I am talking about lime deposit—is a soluble deposit, and of course water overflowing it dissolves it, and Mr. Oakes testified a certain length 10 of time after the deposit the water is all right again. We do not contend—

THE COURT—You asked the question what was the effect on the pond, the settling in the bottom of the pond, and the witness said the tendency to increase the quantity of lime normally in the water when there is any overflow.

By Dr. Richards.

20

Q. After fresh water had been flowing over this soluble salt of lime, would the lime gradually dissolve entirely? A. Exactly; otherwise there would be no effect on the water as to hardness.

Q. And presently the water would then resume its former condition when it dissolved the deposit?

JUDGE COLLINS—That is the point we are getting at.

30

THE COURT—I will give you another fact that is true. Driven wells are very fashionable, and they find a reservoir of water in what is called water-bearing gravel, down fifty or a hundred or two hundred feet, they take the hardness out when they first get it, a certain degree, but if they will pump long enough out of that they will wash the hardness out, and 40

the tendency is to decrease the longer it runs; that is right, isn't it?

A. Yes, sir, in many cases. There are cases where the lime—

10 THE COURT—Solid lime, solid limestone—a real limestone spring never gets soft?

A. No, sir.

By the Court.

Q. Never soft? A. No, sir.

By the Court.

Q. Because you are merely getting a fresh surface for the acid to eat? A. Yes, sir.

20 *By the Court.*

Q. And the carbonic acid comes down in rain, soaks in the earth, comes in contact with the face of the rock, if it is rock, and becomes carbonate; it will be so as long as the face of the rock is there; but if there are fine particles of lime and small particles spread through the gravel the water may finally get them all away? A. Exactly; and the
30 water softens also from drawing in on fresher waters that were not disturbed until you drew the water out.

THE COURT—Yes, I understand that.

Q. Dr. Woodman, you spoke of free chlorine. Did you find any free chlorine in the water at the intake at Oaks' mill? A. Which analysis do you refer to?

40 THE COURT—Intake.

Q. The analysis of the water taken at the intake of the Oakes' mill?

THE COURT—Chlorine, 37 hundredths of a grain in a thousand.

Q. (Question read.) A. In the sample taken May 3. Please let me know if that is the one you refer to. 10

THE COURT—Yes, that is the one.

MR. JOHNSON—Yes, May 3. No.

THE COURT—Yes; here it is; headed "Analysis of water from pond at intake, May 3, 1906; No. 10902."

MR. JOHNSON—That is right.

A. I found no free chlorine in that water. 20

Q. Now, you spoke of hardness in water which you analyzed, due to lime. What else might hardness be due to, and what else was the hardness in this water due to besides lime? A. The hardness is due to all the soluble salts; one might say it is combined effect of the lime, magnesia and—

Q. Iron? A. The iron salt would produce a slight hardening effect also.

Q. And aluminum? 30

THE COURT—Wasn't any aluminum.

A. There was a little aluminum, just a little; so far as they are soluble they would all effect the hardness of the water; anything soluble, except alkaline salts.

Q. So that the hardness in this water was not entirely due to lime, but was also due to iron, if it was there, and it was there, as I understand it, I understand you to say? A. Yes, sir. 40

Q. Due to iron, magnesia, aluminum; all those elements? A. Yes; but the greater degree of hardness is due to the salt which is there in the largest amount, naturally.

Q. Comparing these two examples, numbers 10902 and 10903—

10 THE COURT—Which are you talking about now?

Q. Analysis of the water taken from pond at the intake May 3d, 1906, 10902, and the analysis of the water taken from the stream above paper mill, 10903. These waters are almost identical, are they not, so far as the chemical composition is concerned?

THE COURT—Yes; he said so; I compared them; very slight difference.

20 A. The water from the stream of Third River has a total mineral solids of five grains per gallon.

THE COURT—4.10 you have got it here.

A. Yes, sir; 4.10.

THE COURT—And the intake 5?

A. That is right; a difference of a grain per gallon; it is a very small difference.

30 Q. And so in regard to the other matters which you found; there is very little difference? A. Very little.

Q. So that if the water taken from the stream above the paper mill is good water for the purposes of dyeing, the water taken at the intake of the mill is also good water for that purpose? A. When in the condition shown by this analysis.

Q. Yes, I am speaking about the water— A. When in the condition shown in the analysis and as
40 taken at that time.

Q. Is it not more than usually good water for dyeing purposes? A. No, sir; it is not unusually good; it is fairly good.

HUGO SCHWEITZER, sworn.

Direct examination by Mr. Richards

What is your profession, Dr. Schweitzer? A. I am a chemist. 10

Q. What particular branch of chemistry have you been devoting yourself to mostly? A. To coal tar chemistry and the application of coal tar colors.

Q. Do you include in that the matter of dyeing? A. Yes, sir.

Q. And the dyeing of woolen goods? A. Yes, sir.

Q. How long have you been practicing your profession, Dr. Schweitzer? A. I have been practicing my profession since 1880, and since 1886 I have devoted myself to coal-tar chemistry. 20

Q. Where did you study, Dr. Schweitzer? A. I studied in German universities, and also at the school for dyeing and weaving at Crefeld, Germany.

Q. You have examined the memoranda of analysis testified to by Dr. Woodman, have you not? A. I have.

Q. What would you say about the effect of water such as indicated by those analyses on the dyeing of woolens, and the washing? A. The analyses of the waters which were taken on April 5th, I think in the presence of his Honor, are absolutely unfit for dyeing purposes and scouring purposes. 30

Q. What about the analyses of the water taken by Mr. George Oakes on May 3d? A. Well, this water as to the experience of Mr. Oakes, could be applied in his establishment, but I don't think that that is a very good water for dyeing purposes generally, either. 40

Q. What would be the effect of pouring into Mr. Oakes' pond from which he takes the water for dyeing purposes of water such as described in the analyses of the samples taken on April 5th, in the presence of the Vice Chancellor, if it were put in sufficient quantities so as to discolor the water of the pond? A. It would be preposterous to attempt
10 to use it for dyeing purposes.

By the Court.

Q. Don't you understand that the discoloring was due principally to vegetable fibre? A. Well, partly, also to a white precipitate, which was noticed by Messrs. Oakes, according to their testimony, when the water was in the pond.

20 THE COURT—My observation was that the color from the water down there at the foot of the mill was due entirely to the white paper; white fibre. Of course, that white fibre got dark after awhile and made the gray sludge.

A. Your Honor, even according to the analysis of Mr. Woodman, that white fibre—in five ounces of the white fibre that amount of carbonate of lime was present; so with your modification my conclu-
30 sion would be right.

By the Court.

Q. That wouldn't discolor the water, would it? A. It would give the whitish appearance of the fibre as you say.

40 THE COURT—I don't understand so. The fibre itself was perfectly white and the lime was in solution. If it is in the fibre, that is a different thing. But I

don't think it would be in the fibre in such shape as to give any color.

A. It could not be dissolved to any great extent in one gallon. The solubility of a gallon of carbonate of lime is perhaps two grains in a hundred thousand.

THE COURT—The amount of fibre that was given him was a great deal more than one gallon. 10

DR. RICHARDS—About two gallons.

JUDGE COLLINS—I would like to ask the witness what amount the solubility of lime is—about.

A. Amount of solubility of carbonate of lime is about—well, less than one grain in a gallon. 20

By Judge Collins.

Q. How many grains are there? A. I don't know whether Dr. Woodman weighed them; I think he only demonstrates it.

By Judge Collins.

Q. Can you tell? A. It isn't labeled; the weight isn't given on the label. 30

Q. But the amount of lime is given in one of the memorandums of analysis; let me ask you this—

THE COURT—It was visible to me the color of the water that ran down there from his works was due to the fibr.—white fibre. Lime water—if you take lime water for drinking purposes, stir it up, as Dr. Woodman swore, it don't—water in solution, lime in solution don't color the water at all. 40

JUDGE COLLINS—No; but lime was mixed with the fibre.

THE COURT—The lime may be held up in the particles of the fibre, but it wasn't the lime that gave the color to the water, but the fibre; very fine fibre.

10 A. I would agree with your Honor's view of it.

JUDGE COLLINS—If the quantity of lime, as we found, is not soluble, then it must have been mixed with the fibre.

THE COURT—You see, it don't require any addition to the proof already given. If that is what you are trying to do, to satisfy the Court that the water may have been discolored by a large slush-out of the pool running out of the side of the canal bridge, but I don't take it that the color of the water that Mr. Oakes observed had lime, but it had white fibre; may have lime in it.

20

A. Yes; I wish to modify my answer in just exactly the sense his Honor expresses it.

Q. Let me put you this question, that if water made whitish to the eye by the white fibre in it, as shown in the samples taken on April 5th, and largely carrying lime, as shown by the analysis of Dr. Woodman, if that water, containing both the fibre which made it white and the lime along with it went down into Oakes' pond in sufficient quantity that the fibre that it carried colored the water whitish to the eye, would the lime in that amount of water act deleteriously on the water for dyeing purposes? A. It would.

30

Q. What would be the effect of the free chlorine in the water, Dr. Schweitzer? A. Well, the free

40

chlorine in the water would tend to be converted into hydrochloric acid, and the hydrochloric acid would dissolve a certain quantity of the carbonate of lime, or the carbonate of magnesia, or any other carbonate present, and it would tend to be a continuous factor of increasing the hardness of the water.

THE COURT—Makes it harder?

10

A. Increasing the percentage of chloride of calcium in the water.

By Judge Collins.

Q. That is, free chlorine gets in the pond; it helps to dissolve the precipitate? A. It helps to dissolve the precipitate of the carbonate of lime; would be, as your Honor stated before, there are two factors. 20

By the Court.

Q. Between that and the other things it increases hardness? A. Yes, sir.

JUDGE COLLINS—I just wanted to show that it disposed of the precipitate.

A. That even if the precipitate would settle, hydrochloric acid would always tend to take up some of the precipitate forming the soluble matter and increasing the hardness. 30

JUDGE COLLINS—You might tell us right at this point what the effect of—define the effect of any precipitates of lime salts in the pond as time goes on.

THE COURT—It is to be washed out. That is already proven by Dr. Woodman. 40

A. Yes; and even if it settles, as we all agree it would settle, yet the hydrochloric acid would always take a little part, little after little, by degrees.

By the Court.

Q. But hydrochloric acid, does that chemically combine with lime? A. It does, and forms a soluble chloride of calcium—hydrochloric salt of calcium.

By the Court.

Q. I didn't know there was such a salt. The ordinary chloride of lime is a mere mixture? A. Yes; the ordinary chloride of lime, which is called in commerce chloride of lime, contains hydrochloride of calcium; hydrochloride of calcium is a part of that mixture.

20 Q. Suppose as this lime gets into the pond and settles, and in course of time if no more gets in, does that disappear, and is the water restored to its original condition?

THE COURT—Washes out, he says.

A. It would; but the free chlorine—the free chlorine would always take up a little until there is no more free chlorine in it any more.

30 Q. What effect does the free chlorine in the water have on the dyeing process? A. The free chlorine in the dyeing process has only an indirect influence in so far as it is converted into hydrochloric acid; the hydrochloric acid takes up some of the carbonate of calcium, and chloride of calcium is formed; and chloride of calcium is just as bad in dyeing and scouring as carbonate.

By the Court.

40 Q. It merely adds to it; it helps it form a hard-

ness? That is what Mr. Woodman swore to; that it helps to form a hardness? A. Increases the hardness.

THE COURT—Increases hardness; but I don't understand him that as chlorine it has any effect whatever. Of course, chlorine is destructive; it destroys color—
sufficient amount of chlorine; it is used
to destroy color? 10

A. Yes, sir.

By the Court.

Q. But the amount that would get into that river, into that pond, is so slight that I should want pretty strong evidence to satisfy me, because this: I saw that water and I smelled it; and you can barely smell chlorine in it, there settling coming
right down out of the works. It was all explained
up there in the works. The quantity is so slight
that it wouldn't have any corrosive effect? A. You
are perfectly right, but— 20

THE COURT—It wouldn't counteract the power of the dyes by neutralizing them and bleaching them?

A. No, it wouldn't be—it would, as you say, it
would increase the hardness in that way. 30

By Judge Collins.

Q. One thing I will ask: Is magnesia present in chloride of lime? A. Magnesium salts are always present in chloride of lime; magnesium accompanies constantly calcium salts.

By the Court.

Q. You always find magnesia where you find 40

lime. That is what he means to say; there is a little magnesium always in lime.

JUDGE COLLINS—I want to show that—

10 THE COURT—Want to find out whether there is any magnesia in the analysis of the Third River. That is the way to get at that. Here it is: magnesia, 39-100 of a grain; very small quantity of it in the river. In the pond below it is 42-100 of a grain. Now, in the sludge liquor it isn't mentioned here hardly; and in the analysis at the foot of the plane the magnesia is less—33-100 of a grain; actually less magnesia, as far as I have examined, in the foul water than there is in the river. I may be mistaken; but
20 you had better look and see.

JUDGE COLLINS—It is the canal analysis you would have to look at; you haven't got that here.

30 THE COURT—In the sludge, No. 10903, that is the Third River water, is 39-100; in the pond it is 42-100 of a grain; in the liquor from the wheel pit it is 33-100 of a grain; in the water from the end of the trunk it is 36-100; in the sludge liquor don't find any at all.

DR. RICHARDS—Sixth item down.

THE COURT—Here it is, sludge liquor, 10860—don't see any magnesia there.

DR. RICHARDS—Fifth item down.

40 MR. WOODMAN—Your Honor, there has been a mistake made. That is the right one, sir—(handing Court paper).

THE COURT—In other words, your clerk in copying has left out something.

MR. WOODMAN—He has left out something, because there is magnesia there; it would be impossible to analyze any of of those minerals and not find it.

THE COURT—They are quite different; they 10
are not the same at all. The comparison is this: The canal at the foot of the plane on the day in question, that was after, taken I think after the whole pool was drained out as far as it would run, wasn't it, after we had been up to the mill, and when we came back we took the water.

JUDGE COLLINS—We left it running. 20

Q. Dr. Schweitzer, will you please explain how it is that this hardness of water affects the dyeing?

A. The carbonates of alkaline such as lime and magnesia have a tendency of decomposing soap and forming a soap salt of lime and of magnesia, and these soap salts of lime and magnesia are insoluble substances; they are sticky and adhere to the fibre, and wherever they adhere to the fibre they make it 30
impossible for the color to settle on the fibre.

By the Court.

Q. To grasp the fibre? A. To grasp the fibre, and in that way stains and streaks are produced; that is, of course, outside of the expense; for every degree of hardness or for every grain in a gallon of carbonate of lime and carbonate of magnesia and sulphate of lime and sulphate of magnesia so and so much soap is killed; it is an additional expense. 40

By the Court.

Q. Takes so much more soap? A. More soap; yes.

Cross-examination by Mr. Johnson.

Q. Isn't the same thing true of iron in water?
A. Yes, sir.

10 Q. Has the same effect? A. Iron has the same effect first, and iron salt.

Q. Has a worse effect, doesn't it? A. It has the same—first iron salt, and the soap salt of iron is also insoluble in water, but besides that it is more colored than the lime and the magnesium and salt and therefore it is, the iron salt is of a darker color than the other salt and therefore the trouble is a little enhanced.

Q. Greater? A. Yes.

20 A. What additional action does iron have in dyeing over that possessed of calcium and magnesium?

THE COURT—He has given that—has a color.

A. As far as the composition of the soap is concerned, I have given that, but as far as the other properties are concerned, well, iron as well as the carbonates of lime and magnesia; they decompose some of the mordants that are used in dyeing.

30 *By the Court.*

Q. The mordant is the substance that takes hold of the cloth? A. Yes, sir.

By the Court.

Q. Something that bites? A. Yes; this mordant. the textile fibre is first treated with a mordant, and that mordant—

By the Court.

40 Q. Brings them together? A. Yes, sir; brings

them together, makes it possible for the color to adhere.

By the Court.

Q. That is what is meant by making cloth tender by dyeing it? A. The biting effect.

THE COURT—The biting, yes. Colored cloth is not as strong as cloth in its natural color. 10

Q. Is it not true, doctor, that the presence of iron in the water renders it very deleterious for use in dyeing purposes and manufacturing purposes generally? A. It does; yes, sir.

Q. Now, you said that this water, to which your attention had been directed, which had been analyzed, was not good water for dyeing purposes. What water did you refer to then particularly? A. Well, the waters which were taken on April 5th. are absolutely unfit for dyeing purposes, and the water which is usually taken, the water which was taken out of the pond from the stream above the paper mill which Mr. George Oakes testified to-day, this water is good enough for Oakes' dyeing purposes because they never experienced any trouble, but at the same time I think it is just on the limit, just on the edge of being used at all for dyeing purposes, and if Oakes would dye all other shades of colors, not only black and dark brown and dark blue, I think they could not use this water. 20 30

By the Court.

Q. It could only be used for certain colors? A. Yes; only used for dark colors, where the stains and streak would not show so much; of course, the lighter the fabrics dyed the more apparent become the streaks and stains? 40

Q. When this sludge which has been spoken about, and this concentrated drainage of the canal is let off into the canal, a large body of it, or into the Third River and so gets into the mill pond; you say, it has been testified; and I think you have also said that that injures the water in the mill pond for Mr. Oakes' purposes. How long has that continued
10 is what I want to get at?

THE COURT—I can answer that. It depends on the quantity, comparative quantity entirely, and he can't tell; he would have to go into calculation, number of cubic feet of water that was let out; and condition of that, and then he would have to know how many cubic feet of water in Mr. Oakes' mill, and how much was running over the dam, and all that sort of thing. It is an insoluble question. You can ask the question, but I think it is foolish.
20

Q. What do you say? A. I say I couldn't answer that question; I don't know.

THE COURT—Very glad to hear you say that. It shows there are experts that say the truth.
30

Q. Well, it would disappear after a time? A. Well, according to the settling principle, the material would settle, and the natural tendency of that kind of water is to purify itself, and——

Q. Do you know how long it would take——

JUDGE COLLINS—Finish what you were about to say.

THE COURT—He don't know anything about it.
40

A. I only wanted to add——

THE COURT—That white fabric is very slow in settling, unless it has enough lime in it to make it more specifically heavy.

A. And it would depend on the motion of the water and wind and storm; natural conditions. 10

THE COURT—Yes; whether there has been a freshet or not. One freshet would clean it out probably.

GEORGE OAKES, recalled.

Direct examination by Judge Collins.

Q. At the time of the taking of the samples, May 3; that you took, had there been anything run into the Third River or your pond from the canal? A. No; there had not. 20

Q. For some considerable time before that? A. Quite some time since anything had gone in.

Q. What do you mean by quite some? A. I think when the gate was drawn.

Q. On the occasion of our visit up there? A. On the occasion of our being up there.

Q. On April 5, 1906, when the Vice Chancellor and counsel and parties went up to the paper mill and the foot of the plane of the canal, were you along? A. I was. 30

Q. And after we had inspected the place the gates were opened and the water was allowed to run into the Third River? A. Yes, sir.

Q. Now, as we come back, half an hour or more at the mill and we walked along the canal bank home toward Bloomfield avenue, could you see your pond? A. We cou'd. 40

Q. And could you see a mark, distinct mark? 40

THE COURT—Where that water had gone?

A. We could see the discoloration down the channel?

Q. Where it ran through the channel? A. Yes, sir.

Q. All the way around the channel of the pond?

10 A. Yes, sir.

Cross-examination by Mr. Johnson.

Q. This water that was drawn off into Third River, and which you say discolored your pond, was the concentrated drainage of the——

THE COURT — Concentrated settling, you mean.

Q. Concentrated settling in the wheel pit, was it
20 not? A. It was what came out.

Q. In other words, the water of the canal had been drawn off, with the exception of what was in the wheel pit?

THE COURT—There was no water running in the canal of any consequence?

A. No.

30 *By the Court.*

Q. But there was a lot standing in the wheel pit which is incapable of being drawn out except by opening a gate to an underground drain to let it down into Third River, so that the water you got there was settled water, so to speak? A. It was what was in the wheel pit.

By the Court.

Q. And as soon as it ran it began to run dirty
40 and it ran out into the river below dirtier than it

appeared in the pool, didn't it? A. It ran right out of the bottom of the sludge.

Q. And it was also slime and mud in the wheel pit that ran out? A. That ran out too.

THE COURT—Top of the sludge.

JUDGE COLLINS—We will offer those various samples and they will be marked; three 10 bottles.

Complainant rests.

FRANK C. AXTELL, recalled.

Direct examination by Mr. Johnson.

Q. I forgot to ask you formerly, and I should like to do so now, where you obtained your education as a chemist?

THE COURT—Oh, I am satisfied that Mr. Axtell is all right. If you want to get it for the Court of Appeals you may. 20

A. I took my degree at the University of Heidelberg.

Q. Did you study anywhere else? A. I did; in this country I studied in the University of Wisconsin.

Q. I think you have stated the number of years 30 you have been following that business? A. Yes, sir; since 1882.

Q. Since the last hearing have you made analyses of water from samples taken from the Morris Canal directed to be made by the Court? A. I have.

Q. On April 5th? A. Yes, sir.

By the Court.

Q. Were you present when we were taking those samples? A. Yes, sir. 40

Q. And the samples which you took are similar to the samples taken by the other side?

THE COURT—There was one sample—there were two samples taken at the time each time, and one was given to one party and the other to the other?

10 A. Yes, sir.

By the Court.

Q. You took those given to the defendants? A. Yes, sir.

By the Court.

Q. Had them in your own possession? A. Yes, sir.

Q. Carried them away with you and analyzed 20 them? A. Yes, sir.

By the Court.

Q. Were your previous results tabulated? Did I have them tabulated? A. They were.

By the Court.

Q. I would like to have you just letter these now. First column is what? A. Parts per million. They 30 are in the original report.

THE COURT—I know, but I want you to write there. You take your pen and write over there each column what it is. Have you got a table of your work since you have been here on the new work? A. Yes, sir.

By the Court.

Q. Copy? A. Yes, sir.

40 Q. I show you a paper signed by yourself. Just

state what that is? A. That is a report showing the results of the analyses of two samples of water, one of which was taken from the wheel pit at the foot of plane 11 in the Morris canal April 5, and the other from the Third River at the outlet of the waste pipe from that wheel pit.

By the Court.

10

Q. Taken from the river or the waste water? A. It was taken from the river at the mouth of the waste pipe.

By the Court.

Q. Was it river water? A. A mixture of the discharge from the wheel pit and river water.

DR. RICHARDS—Don't let us have any confusion about that. The bucket was held 20 right under the mouth of the pipe.

THE COURT—Was it taken the same way as the other was taken?

A. The top of the pipe was practically on the level with the surface of the river and the discharge was mixing with the river water as it was taken.

30

By Dr. Richards.

Q. It was taken just like ours. A. Just exactly; both dipped at the same time. Third, sample of slime taken from the wheel pit foot of plane 11.

JUDGE COLLINS—That the same thing we call sludge?

A. Yes, sir. Fourth, a sample of water separated by filtration from the slime; and, fifth, a 40

sample of soil taken from the cleaned bottom of Morris Canal, at the head-gate of the Diamond Mill, April 6, 1906.

By the Court.

Q. You went up there and took it out of the bottom of the canal? A. No, sir; I didn't take it myself; I had it dug; but I wished to determine to what extent the soluble matter in the water might be influenced by the character of the soil forming the bottom of the canal.

By the Court.

Q. No. 1 was from the wheel pit? A. Yes, sir.

JUDGE COLLINS—I understand they are not much different.

MR. JOHNSON—Not greatly different.

By the Court.

Q. No, Mr. Axtell, I see here—how much lime did you find in the bottom of the canal at the head of the plane? A. In the soil, your Honor?

By the Court.

Q. Yes? A. I think it was 3-10ths of 1 per cent. Yes, 3-10ths of 1 per cent. calcium carbonate.

THE COURT—I don't see it here; 300 parts in a million; that is right, isn't it?

A. No, sir; it is three hundred thousandths of ten per cent.; 3-10ths of 1 per cent.

By the Court.

Q. What part is that in a million? A. 300 parts per million.

By the Court.

Q. You found then of lime in the bottom of the canal above the mill 300 parts in a million? A. Yes, sir.

By the Court.

Q. Now, then, let us see what you found elsewhere. You found in the water at the foot of the plane 69 parts in a million. How do you account for that? The soil in the canal contained more lime than you found in the water? A. Yes, sir. 10

By the Court.

Q. That is right, eh? A. Yes, sir; in insoluble form.

By the Court

Q. Then in the water at the outlet of the waste pipe, part river and part outlet water, you found 79 per cent.; 79 parts? A. 79 parts; yes, sir. 20

By the Court.

Q. More than you did in the water at the foot of the plane? A. Yes, sir.

By the Court.

Q. I understand that; how it might be. Now, how much lime did you find; what proportion of lime did you find in the sludge? A. A 110-thousandths of 1 per cent. in the sludge, considered as a whole. 30

By the Court.

Q. That is more than the other, isn't it? A. Yes, sir.

Examined by the Court.

Q. Now, in the sludge water, where is that? A. 40

The sludge water is on the next page; yes, sir; that contained 1515 parts per million.

Q. Great deal more? A. Yes, sir; 500 of 1 per cent. more that would be; if we expressed it in percentages, it would be.

10 THE COURT—I want those in a parallel; that is the only way to do. I am not finding fault with your mode of putting it here, but I have to stop and think and compare it. I want those tabulated, which you can do easy enough.

Q. You found the soil then at the canal at that particular point very heavily charged with lime?

A. Yes; it contained quite a number of small shells of animals, one thing and another—things of that sort. The soil is impregnated, contains a great
20 many shells of—

Q. Asking you generally—you have translated your report, of course, into the report of Mr. Woodman while he was on the stand of the analysis from water taken, of the water that was taken on the 5th of April in my presence. How does yours compare with him? A. I should say roughly it compares very well, considering.

30 Q. You can tell very soon by tabulating? A. Yes, it has been tabulated; I compared my results with his as he read them off on the witness stand, and I think they compare very—

By Judge Collins.

Q. Closely? A. Closely; yes, sir.

Q. Compared as far as you expect two different operations to compare?

A. Yes, sir, and the fact that we probably did not analyze the samples in the same way.

40 JUDGE COLLINS—This paper has not yet been

offered in evidence, and I want to object to it because it is not simply results, as ours was, but his argument.

THE COURT—He will swear to all that. You can cross-examine him. Here is the paper, marked “Analyses of samples of water, slime and soil from Morris Canal and Third River, taken April 5th and 10 6th, 1906.

Further direct examination by Mr. Johnson.

MR. JOHNSON—I want to offer that paper in evidence.

THE COURT—It may go in evidence, subject to cross-examination as to what the witness will swear to. If there is anything in it that you consider incompetent it 20 can be stricken out.

Marked Exhibit D 1, May 16. 1906.

By the Court.

Q. You mean to say the paper you have just offered is what you are ready to swear to in detail?

A. Yes, sir.

Q. I show you another paper. What is that? 30

A. I was requested by you to convert the results of the analysis of the three samples of water from parts per million into grains per gallon.

Q. You have done that? A. I have done that in this sheet, and I believe the figures here given to be correct. Of course, I didn't make my determinations in grains per gallon.

THE COURT—Well, Mr. Axtell's result, water from the wheel pit is calcium 4 parts 40 and 42-1000 of a part and Mr Wood-

10 man's is 4.75. Now, from the end of the trunk Mr. Axtell's is 4.6, and Mr. Woodman's is the same. Mr. Axtell's is a little bit more. Now, the water from the sludge, the lime with Mr. Axtell is 88 grains to the gallon, and Mr. Woodman's is 56. Mr. Axtell makes more from his soluble sludge water than Mr. Woodman does.

DR. RICHARDS—It was taken from different places.

JUDGE COLLINS—You will remember, your Honor said, "let each man pick his place."

Marked Exhibit D 2, May 16, 1906.

20 Q. Just explain the difference between the analysis which you took the other day, the first two analyses, and this last one which has just been offered in evidence, in your analysis of the water for the purpose of ascertaining hardness.

30 THE COURT—He doesn't state the amount of lime in April; he only states the total hardness. The analysis to-day does give the amount of lime, but don't give the total hardness.

A. I preferred determining the lime and other bases directly.

40 THE COURT—Yes; that is right. Can you put on this analysis marked now, this statement marked Exhibit D 2, can you put on the total hardness there at once, right at the bottom of each one?

A. I can of the first two, but the other, there was such a—

THE COURT—You need not bother with that.

A. The total hardness of the water from the wheel pit, April 5, was 159 parts per million,—I will have to make calculation—and the total hardness of the sample from Third River was 162 parts 10 per million.

Q. That is the water in the Third River? A. Yes, sir.

THE COURT—You will observe, Mr. Johnson, that the water that ran out there and was caught at the foot of the outlet where it ran right into the river was the result of the stirring up of the sludge, and was naturally heavier; I may say 20 had more lime in it than that that was dipped right off the top, and the result is not astonishing to me at all. If you will take the sludge water proper, it was very high in lime; the water standing on top when we went there, and comparatively clear was not so high in lime. The water that ran out when the gate was opened was composed partly of a 30 standing water and partly of the lighter sludge that mixed in as soon as the water began to move; mixed in and came out down at the waters edge much thicker than it was seen standing in the pool, or it is a mixture; it is a half way, so to speak, between the water standing on top of that sludge in the pool and the pool itself, and the sludge itself, and the water that was drained from the sludge.

MR. JOHNSON—But what I was about to 40

say—I simply want to say what is perhaps perfectly apparent to your Honor and everybody else—that there was a difference in Mr. Axtell's methods; that his method of analyzing these first samples was different from that which he adopted in analyzing these last samples offered to-day.

10

THE COURT—You may by different analyses have different methods, and they sometimes produce slightly different results, but an analysis ought to be an analysis; the specimens of water taken substantially from the same place; they were divided; but the specimens of sludge were not; they were taken from different parts.

20

MR. JOHNSON—There is no difference between our analysis and that of the gentlemen on the other side; this last analysis.

THE COURT—But you mean to say there is a difference in the mode of stating the result?

30

MR. JOHNSON—I mean to say there is a difference between the first analysis and the report which Mr. Axtell made and this last one, because of the different method which he this last time adopted, a method which differed from that which he used before.

THE COURT—You mean to say methods in computing the result?

40

MR. JOHNSON—No; I mean to say method in ascertaining how much lime there was in that water.

THE COURT—If Mr. Axtell is going to say that you propose to prove by him that two different methods will produce two different results, why, you are getting—

JUDGE COLLINS—When you analyze potable water for that purpose it is one thing.

THE COURT—Oh, results are the same, only he didn't separate the results. 10

JUDGE COLLINS—That is all.

Q. For instance, you find no lime, you report no lime in these first reports which you made, which were offered in evidence.

THE COURT—Didn't report lime by itself?

A. No, sir; it was included in the fixed mineral matter. 20

Q. And it was also included in the hardness, I suppose? A. Yes, sir.

THE COURT—Hardness he found by special test for hardness

Q. What test did you use then? A. For hardness?

Q. Yes? A. The soap test.

Q. And now you use a different test? 30

THE COURT—No; he gives simply amount of lime by itself he found.

Q. But in making your last reports you did not use the soap test? A. I did use it, but I didn't report it, because as I made a direct determination of the lime and other mineral matters I considered it unnecessary; it is an empirical test at the best.

Q. The soap test is an empirical test? A. Yes, sir. 40

Q. What do you mean by that, it isn't always correct?

THE COURT—It isn't exact.

A. It is based on the supposition that hardness in water is due to lime, entirely to lime—carbonate of lime in solution; whereas, as a matter of fact, it
10 may be due to any one of half a dozen other bases, as has been testified this morning.

Q. What are those other bases, in your judgment? A. In the case of the waters under consideration, aluminum, iron and magnesium; the traces of manganese in one case.

Q. Comparing these different minerals which cause hardness in water, which has the worst effect on water for dyeing purposes? A. The iron, without doubt.

20 Q. Why? A. Because in addition to forming insoluble soaps—and the soaps are not only insoluble, but very insoluble—it further affects the mordanting of fabrics which are to be dyed.

Q. In some of these tables you show nearly as much iron as you do lime?

THE COURT—Oh, no.

MR. JOHNSON—Yes.

30

A. Iron and aluminum together.

Q. Iron and aluminum together? A. Yes, sir.

Q. For instance, you say here—I read from the report, the last report, page 4—the pages are not numbered, but it is the fourth page—you say:
“From these results we find the composition of the
slime, considered as a whole, to be as follows:
Water, 95.340 per cent.; organic and volatile matter,
3.224 per cent.; silica and insoluble matter,
1.174 per cent.; iron and aluminum as oxides,
40 0.108 per cent.; calcium carbonate, 0.110 per cent.”

JUDGE COLLINS—The trouble is he has got his iron and aluminum mixed together.

MR. JOHNSON—I will ask him this question then:

Q. What effect has aluminum on water for dyeing purposes? A. Aluminum, in the form of its salts, forms lakes with coloring matters. 10

Q. What do you mean by that? A. Through combinations of aluminum as a base with some coloring matters.

By Judge Collins.

Q. There are colors that are called lakes? A. Yes, sir; further, aluminum salts form insoluble soaps, just as does lime and magnesium.

Q. And iron? A. And iron.

Q. So that the aluminum is also injurious to water for dyeing purposes? 20

JUDGE COLLINS—He doesn't say so.

A. It is.

JUDGE COLLINS—You should not say it; leave it for him; you haven't been sworn.

MR. JOHNSON—That was the natural result of his testimony. 30

Q. Now, from your knowledge of the amount of iron and aluminum in that water, in the sludge of the wheel pit, in that water in the wheel pit which you analyzed, and also in the sludge, suppose there were no lime in it at all, but that it contained the amount of iron and aluminum which you find there—suppose that water and sludge were drained off into the Third River; and afterwards into the mill pond, as it was the other day, on the 5th of 40

April, would that, in your opinion, affect Mr. Oake's dyeing operations?

10 JUDGE COLLINS—I object on the ground that he hasn't shown any fitness to testify on such a subject. He said he hadn't any experience whatever in dyeing woollens, and consequently that we cannot suppose a non-supposeable case that this is the mixture that is there. Now, what difference would it make to the Court as to what would happen if there wasn't any lime in it? What is the use of giving testimony on the basis of something that is impossible? And it has the same objection that your Honor said, that it was an insoluble problem, owing to proportions and difference—

20

THE COURT—Without calling for counsel to state what he is driving at, I suppose it is this. These other matters which he would show or argue in some way that the paper mill is not responsible for are liable to settle in this pool, too, and that they tend to assist the lime in making trouble.

03 3100

30

JUDGE COLLINS—That is legitimate; we will agree on that. But this question depends on so many elements that your Honor said when we were asking it—

Q. Question read.

THE COURT—There is an aspect of the case which I do not dare to name now in which that may be evidence. I wouldn't be willing to rule it out, but I will state

40

the aspect. I want, however, to preface it by saying that I adhere to the doctrine that it is no excuse for a man who adds to a nuisance if there is one already there. If that water is ever so disagreeable to Mr. Oakes, and so near the verge of being poetical, that is no excuse for Colonel Thompson making it worse. But suppose I should enjoin Colonel Thompson from putting any lime in that water, and Mr. Oakes should still find himself at times unable to make his dyes when there was no lime there at all, put what is called the empirical soap test on, and the analysis showed there wasn't any lime there. Well, the other side then on a motion to commit Colonel Thompson for contempt, would say, "Here, I have already shown there are plenty of other materials in that water for which we are not responsible to account for that water being unfit." That is the view which it may be competent in some time hereafter. It is certainly very instructive, and while I do not think it ought to at present, at present I do not see how it ought to affect my judgment in this case; I will not rule it out.

JUDGE COLLINS—Perhaps not the vitals of it; but your Honor ruled out similar testimony on the ground, as you called it, that it was an insoluble problem, because it depended on quantities and how much the proportions were, &c.

THE COURT—That problem runs all through this thing.

JUDGE COLLINS—It is a practical question.

Mr. Oakes has sworn that he found his dyes were bad and he made this empirical soap test and he found the hardness was away above the limit. I mean, the gentleman can't tell whether the quantity of aluminum and iron that was there would affect the operations unless the proportion of it, and the quantity—

10

THE COURT—He can't tell that. All he can say is that it might have a very deleterious effect; that is all I suppose he would say. Go on; answer the question.

A. It would have an effect to the extent to which it was present.

By the Court.

Q. Depending on that entirely? A. Yes, sir; depending altogether on its proportion.

Q. What effect? A. The effect of forming insoluble soaps with the oil or natural greasy matter in the wool in scouring, and further, of combining with and affecting the coloring matters, as this is well known.

30

THE COURT—Have the same effect as the other.

MR. JOHNSON—Yes, sir.

THE COURT—If there is enough of it?

MR. JOHNSON—Yes, sir.

Q. If you take all the lime out of the water, leave none of it in it, and leave enough iron in it, or

40

aluminum or other minerals, then the water is injured for dyeing purposes? A. Certainly.

Q. And other manufacturing purposes?

A. (No answer.)

Q. Will you state how this sludge and water in the wheel pit which was allowed to run into the Third River and afterwards into the mill pond— what effect; that is, what deleterious effect does 10 that have and how does it have that effect; what is the process through which it goes?

THE COURT—Is that in your report here?

A. No, sir; I think not. The sludge or slime contained a considerable proportion of vegetable fibre, and such fibre, in contact with water containing iron, gradually absorbs such iron.

By the Court.

20

Q. The iron discolors it; is that what you mean?

A. Yes, slowly; then, when it is brought in contact with the large volume of fresh water; that is, water containing oxygen in an active state, the fibres decompose and become soluble, liberating the iron and any other substances of a mineral character which may have been absorbed by them. Therefore, when this slime is emptied from the wheel pit at the foot of plane 11 into the Third 30 River most of the iron which has accumulated in the fibre is freed and dissolved in the water.

Q. Where does the iron in this water which you analyzed come from, do you know? A. It is a normal constituent of the water; in the sections of country through which the Morris Canal and the Third River flow there is more or less iron in the soil and in the rocks in that vicinity.

Q. You have stated that you know something about—

40

THE COURT—Come out in the shape of iron rust, or bog ore?

A. Bog ore; yes, sir.

RECESS.

10 Q. Did you do as the chemist on the other side has done and extract some lime from this water, and also some iron, and the other ingredients that you found there, the other mineral substances and other substances? A. I did.

Q. Have you them here? A. I have.

Q. They are referred to in your report? A. Yes, sir.

20 Q. Just show the Court the samples of lime and corresponding samples of iron and aluminum that you found, and state where they came from?

THE COURT—Got them all labeled now?

A. Yes, sir; all labeled.

By the Court.

30 Q. Did you treat the sludge—the slime, as you call it? A. Yes, sir. That is carbonate of lime from the water taken from the wheel pit (indicating).

By the Court.

Q. What quantity? A. From one liter—little over a quart.

By the Court.

Q. Is that marked on the vial one liter? A. It is in the analysis. Next iron and aluminum as oxides from the same quantity of water.

40 Q. Show that to the Court?

THE COURT—Have you got the quantity in weight from which—

A. As much as could be transferred from the crucible to the vial; of course, there is some loss, but approximately, practically it is all that was obtained from a liter of water in each case, except in case of the water from the slime, in which I took only 500 grams. 10

By the Court.

Q. Here is iron and aluminum; that is red in color. Calcium carbonate, that is lime; magnesium, potash, sodium. You have got to go to your report to find what these were, eh? A. The proportions; yes, sir.

Q. You tried Third River, did you? A. Yes, sir.

Q. Slightly dry residium? A. Yes, that includes all the mineral and organic matter. 20

By the Court.

Q. Everything all in together. A. Yes, sir.

MR. JOHNSON—Now, we want those bottles to go in evidence, if the Court please.

THE COURT—Show them to the other side. I suppose there will be no objection to them. 30

MR. JOHNSON—They ought to be marked in some way.

THE COURT—I don't see how you can. No necessity for marking them.

MR. JOHNSON—The bottles are labeled.

THE COURT—They have got the label on them; there is no need of marking them.

Q. This dry residium that you speak of, what 40

does that consist of? A. It consists of the mineral and organic matter contained in the slime.

Q. Well, what was it? What was the organic matter, for instance? A. The organic matter consisted of vegetable fibres, decomposing leaves and other vegetable matters.

Q. Partly the fibres coming from our mill, I suppose. A. Yes, sir.

By the Court.

Q. You saw the white fibrous matter that was coming down in the water, very fine? A. Yes, sir.

By the Court.

Q. When we were at the mill. How far do you account for the sludge being composed of that white fibrous matter after it has lost its color? A.
20 Does your Honor refer to the solid residues left after evaporating the water?

By the Court.

Q. Yes. A. I should say probably of that slime probably fifty per cent. consisted—not over 50 per cent. consisted of those fine white fibres.

By the Court.

Q. What gave the color to it there? A. Giving
30 that white color to it.

By the Court.

Q. Did the lime to it give it any color? A. No, sir; the lime is in a soluble condition.

By the Court.

Q. How do you account for there being so much more lime in that sludge and in what is termed the
40 sludge water, that is, the water that is filtered out

of it, than there is in the other water? A. I think the mineral matter is held, is absorbed by these fibres to a greater extent than it is held in solution; in fact, there is a phenomena which we term absorption, that is the holding of mineral matter by a fibre. It is impossible, for instance, to wash all mineral matter out of certain fibres, even by using strong acids or alkalis.

10

By the Court.

Q. Affinity, a sort of an affinity for the fibre which does not result in chemical combination? A. Yes, sir.

By the Court.

Q. Now, you have seen the whole operation there. How do you account for so much lime in the water in the wheel pit and in the water from the sludge, &c., the increased quantity of lime over and above what is natural to the canal? A. It is undoubtedly due to the water which enters—the lime which is contained in the water entering the canal from the mill.

20

By the Court.

Q. There were two sources shown to me there on the 5th of April; one was the lime that was put in to the revolving rotary boiler and was put in to react on the—

30

JUDGE COLLINS—Bleach.

A. No; on the fibre, on the rags.

THE COURT—Yes; put in with something else, I forget now.

A. Soda ash.

40

By the Court.

Q. Soda ash; yes.

MR. COLLINS—That is one source. You were going to speak of two sources.

10 THE COURT—I am taking that source by itself which would only produce it in case that was used. Now, as I understand and observed the operation there, only a portion, fraction, we may say third, something like that, of the material, the stock, is the word—I will get it bye and
20 bye—the stock used there is subjected to any such action as that, severe bleaching action, and suppose that was eliminated, the lime, the residue of that was not allowed to get down into the outlet, what would be the result?

A. The result would be that the lime in the pond at Oakes' mill would not be increased from that source at all.

By the Court.

Q. Well, now, there is one other source, and that is the lime that is used as a carrier for the
30 chlorine? A. Yes.

By the Court.

Q. Now, I smelled chlorine in this water and found chlorine there, and that of course is what soaks out of the paper? A. Yes, sir.

By the Court.

Q. After it is in pulp? A. Yes, sir.

By the Court.

40 Q. And drips down. Well, does that chlorine

carry any lime with it? Why should that carry any? A. Because it contains—the chloride of lime has been converted to chloride of calcium, a more soluble form of lime, and the little trace which escapes from the beating engines during the bleaching is carried into the water and certainly before they reach Oakes' mill are oxidized to what is simply chlorine of lime; still, that doesn't amount to 10 anything in quantity.

By the Court.

Q. Where do you think most of that lime comes from? A. Most of that lime comes from that rotary digester.

By the Court.

Q. That, I believe, is what we thought on the ground. I don't know as anything was expressed 20 about it. The great majority of it comes from that rotary digester? A. Yes, sir; practically all of it.

Q. You saw how they did throw the lime, the refuse lime, out there in a place by itself which was used as a reservoir? A. Yes, sir; in a pit.

By the Court.

Q. In a pit; but still there would be some lime go through with the liquid chlorine that is used 30 over and over again, but it drips, from the drying of the paper some little would go through? A. Some little would go through; yes, sir.

By the Court.

Q. Have you made any estimate of the quantity that would go through—the proportion? A. No, sir; I have not; I think the foreman of the mill could tell you almost exactly the proportion which goes through, which escapes. 40

THE COURT—It seemed to me very small.

Q. It is; it is just what drips; the pulp is placed in these drainers and it is permitted to drip. I believe the drip runs back and is used over again.

By the Court.

Q. Yes; all used over again, but still the paper
10 itself is wet, you know. A. Yes, sir; it is in washing that pulp that a little of it gets out into the canal.

By the Court.

Q. Well, what is the effect? You agree with the other experts that the mere effect of that little free chlorine that you smell is simply to make the water a little harder? A. Yes, sir; naturally; we know that lime goes with that chlorine and in-
20 creases the hardness of the water slightly.

Q. In this last report that you presented to the Court this morning, and was offered in evidence, you say that the result of the analysis of the first sample—the result of the analysis of the first sample in this last report proves conclusively that the result of the former analyses were well founded.

THE COURT—You don't find any clashing
30 between your analysis before and your analysis now?

A. No, sir; this last analysis confirms the conclusions that I formed as a result of the first.

Q. I was going to ask you, why do you say that? I want an explanation of that? A. I was surprised at the results of the first analysis which I made. I thought, in view of the statements which had been made in regard to the amount of matter which the Diamond Mills Company were dumping
40 into the canal, the analysis would have shown a

very much greater quantity of solids, especially mineral matter, and they were so low that I had additional samples taken a few weeks later.

THE COURT—Yes, I recollect that.

A. (continuing) And found practically the same thing.

10

By the Court.

Q. Now, isn't that water, those samples that you took last January and February; they were taken for you; you didn't take them? A. Yes, sir.

By the Court.

Q. Don't they show much less quantity of lime than the water which we took at the foot of the plane right off the top of the pool there? A. Oh, yes; because that was the concentrated drainage from the mill.

20

JUDGE COLLINS—Yes; he is only comparing now solids as a whole; that is what he is talking about.

A. As a whole; yes, sir.

THE COURT—I haven't had any proof, except a sort of a statement before me, as to how much the water wheel had been running there within the last six months; nor have had any proof as to how much the canal has been running. Now, might as well all know what is in my mind. When that canal was running, with plenty of boats, and that wheel was turning in that wheel pit, that sludge there was mixed up every day, and the boats came on down and car-

30

40

ried it right on, and it came on down and went into the Passaic River, and never was a high solution, it was always very much diluted, because the water from the water wheel driving the mill and the water that carried the boats over the plane would dilute it very highly; and, as I say, there was no chance much for the sludge to settle in the bottom there, because it is very light stuff, and here is a great big wheel, fifteen or twenty feet over, I believe, whirling around in there every time a boat went up or down, and stirring it up, and the boats themselves came down and stirred it up; the sludge didn't accumulate. Now, the boats haven't been running and the canal hasn't been kept full, and I have not been informed judicially how much of the time the water wheel has been running. I infer from the condition of the canal it hasn't been running much, but that is a matter of proof of the defence; all those elements come into consideration to account for the present condition, the late condition. If the lime water is highly diluted, why it would be inappreciable; if there was an overflow there when the boat came down, a little water flooded over there, Mr. Oakes wouldn't feel it. In the first place, it would be diluted all the time. But now, as the canal is lying still and they are not using their water wheel much there, you see it all settles right there. All that has got to be taken into consideration.

10

20

30

40

Q. I don't think you finished your explanation. You said that the quantity of lime in the first analysis was very small of fixed solids. Now, what do you say as to the quantity of lime in the water taken from the wheel pit?

THE COURT—Having more in it? That is it.

MR. JOHNSON—Yes. 10

THE COURT—I was giving my solution of it.

A. Upon completing the analysis of the sample of water taken from the wheel pit on April 5th, the results of my first analysis made in February were explained, because I expected to find a much greater quantity of both organic solids and fixed solids than I did in that sample that consisted of the concentrated drainage from the mill.

20

By the Court.

Q. You supposed—your explanation is that last winter they were running more water through there every day? A. It was diluted; the canal was full at the time those samples were taken.

THE COURT—That is my experience.

Q. Your understanding is that the canal was full at the time the first samples were taken? A. Yes, 30
sir.

Q. And at the time the last samples were taken it was drawn off and there was nothing? A. Yes, sir.

THE COURT—They had water enough coming down there to run the paper mill, but not to give power.

Q. In other words, did you find enough lime in the water in the wheel pit and in the sludge to in- 40

jure the water for dyeing purposes if the canal had been full?

JUDGE COLLINS—I object.

10 THE COURT—At that time it was perfectly clear he did not; the standard marks was too small; it would not effect the mill people.

Q. Is that your statement? A. Yes, sir

THE COURT—But he didn't take any sample of the sludge then, or the sludge water; samples were brought to him by young Mr. Thompson.

20 MR. JOHNSON—I don't know that the Court understands—

THE COURT—Mr. Thompson was sworn on that subject and I cross-examined him about when those samples were taken. He said he took them as fair samples but did not say he took them under any particular condition. In plain English, that was the weakness of your case.

30 MR. JOHNSON—I am simply asking whether he found enough lime in that concentrated drainage of the wheel pit this last time to injure the water of the canal for dyeing purposes if the canal had been full.

40 JUDGE COLLINS—I object to that as introducing into it some element of opinion, upon which your Honor is just as well able to reach a conclusion as this gentleman—better, I would rather think. It wouldn't help you any.

THE COURT—The canal company are not bound to keep their canal full.

JUDGE COLLINS—No.

THE COURT—The only question on that subject is whether they have conducted it in a particular manner for these twenty-five or thirty years, and they stop conducting it in that particular manner, they can throw the evil results over on the defendants, the paper mill. 10

JUDGE COLLINS—And also whether the defendant can throw it over on to Mr. Oakes.

MR. JOHNSON—That is one question that I had in mind at the time.

THE COURT—Mr. Oakes is not suing the canal company here; he has joined with the canal company in suing. 20

JUDGE COLLINS—Certainly, for them to stop putting lime into his pond.

MR. JOHNSON—It seems to me that question is a fair one.

THE COURT—You may answer it, subject to the objection. Now, the question relates to the water, the condition of the water as you found it on the 5th of April. The water that was in there in that wheel pit on the 5th of April was entirely unfit for use for dyeing purposes, I suppose. 30

A. Yes, sir; it was.

By the Court.

Q. Now, the question is, how that would effect Mr. Oakes' mill if it had been dropped there? 40

MR. JOHNSON—No; that is not my question.

JUDGE COLLINS—If the canal had been full.

MR. JOHNSON—How would it have affected the water for dyeing purposes if the canal had been full.

10 THE COURT—He may answer that, but I shall not be satisfied with that answer; that is all I can say about that. If the canal was full and was not running over it would all go on to Newark, wouldn't it?

A. Yes, sir.

By the Court.

20 Q. Or somewhere else? A. If the canal had been full the water would no doubt have had approximately the composition shown by my analysis of February and March, at which time it was perfectly suitable for dyeing or other manufacturing purposes.

By the Court.

30 Q. In other words, if the canal had been in operation the amount of accumulations in the wheel pit there would not have effected it at all, that is substantially it? A. No, sir; exactly.

By the Court.

Q. In other words, you mean to say there is no inconsistency between the results of your observations last January and February and March and those of the 5th of April? A. Exactly.

By the Court.

40 Q. Simply because there was no flow of water? A. Exactly; that is all.

THE COURT—You have answered the question to suit me.

Q. You have stated that the fixed solids in the first reports that you made consisted partly of salts of lime. Are you able now to state what the fixed solids in the first reports consisted of, generally?

THE COURT—You didn't give it in the first reports. You only gave the whole of the solids; in the report of last February and March you only gave the total solids, and then gave the total hardness. 10

A. Yes, sir.

By the Court.

Q. Do you know what it was? A. As a matter of fact I don't because I didn't determine it, but having analyzed these other samples in April, I know that it must consist— 20

JUDGE COLLINS—I object to it.

THE COURT—He explains he draws an inference from proportions.

JUDGE COLLINS—I know, but it was entirely different kind of liquid that he analyzed.

THE COURT—Yes, but the difference is all in your favor, I think. The solids would be the same, wouldn't they? 30

JUDGE COLLINS—Not the proportions.

A. Not necessarily the proportions of solids in the water, but possibly or probably the proportions of solids with relation to each other.

JUDGE COLLINS—I know that is what you meant to say. Conjecture would not help your Honor. 40

A. Approximately so.

JUDGE COLLINS—I object to it as irrelevant and incompetent.

THE COURT—Go on and give the result.

A. The calcium carbonate in the sample of water
10 taken from the wheel pit amounted to—

By the Court.

Q. In February? A. No, sir; April 5th, amount-
ed to 69 parts per million, and the fixed mineral
matter amounted to 197 parts per million.

By the Court.

Q. Making the lime one-third? A. Approxi-
20 mately, one-third; and I should say that that pro-
portion would roughly hold good in the samples
taken in February and March.

By the Court.

Q. But we have got the actual amount there? A.
Here we have the actual amount.

By the Court.

Q. Have the actual amount taken by Mr. Wood-
man. Does it amount to approximately one-third?
30 A. I have forgotten what he found in his.

By the Court.

Q. You are taking your own? A. Yes, sir; I
am taking my own.

By the Court.

A. Otherwise you did not separate in last March
the fixed solids into their elements? A. No, sir; I
40 did not.

By the Court.

Q. But took the total hardness by the soap test?

A. Yes, sir; by the soap test.

By the Court.

Q. This time you did separate the total solids into their elements? A. Exactly.

10

By the Court.

Q. And you found the lime to be one-third? A. Approximately one-third in that sample.

By the Court.

Q. But now, you judge from that they were approximately one-third last— A. February and March.

By the Court.

20

Q. February and March? A. Yes, sir.

By the Court.

Q. What would that make the lime last February and March? A. I haven't copy of those; I think your Honor has copy of the analysis in February and March; I think it amounted to 54 to 70 parts per million of fixed solids.

30

By the Court.

Q. Here you are. Just look and see whether that is the proportion? A. That would make the calcium carbonate in the samples of January 26 amount to about twenty parts per million, 1 2-10 grains per gallon, something like that.

Q. And how much iron? A. About 1-12 of that would be iron in this sample, amounted to about 1-12 of the fixed mineral matter, about approximately six to eight parts per million.

40

Q. I have a memorandum here. How many standards of hardness are there of water? A. There are four or five in common use.

Q. What are they? A. First, that in which one part per million of hardness is equivalent to one part of carbonate of calcium in a million parts of water. Next that in which one part carbonate of calcium in a hundred thousand of water is employed,
10 which is generally in use in France.

THE COURT—It is only ten times larger, that is all one table.

A. Yes; ten times larger. Next, the English scale, which consists of one part of carbonate of calcium in seventy thousand parts of water, that is, one grain of calcium carbonate in an imperial gallon; and next, the standard which has been used a
20 great deal in this country, which consists of one grain of calcium carbonate in a United States gallon of 58.300 grains approximately. I think those are the standards.

By the Court.

Q. What was the standard that you described here the other day which was used by Mr. Oakes, the soap test, what does that amount to? A. That
30 was the Clark test that was spoken of. The Clark scale consisted of the imperial gallon, the English gallon as the standard, that is, the gallon containing seventy thousand grains, gallon of ten pounds, seventy thousand grains each; one degree of Clark being one more than carbonate of lime of imperial gallon.

Q. I understand the Clark test is a soap test? A. Yes, sir.

Q. And it is a test for lime and also other minerals? A. It is a test for hardness in water.
40

Q. Which hardness may be caused by what?

THE COURT—Any kind of mineral.

A. Any kind of mineral, or what is apparently natural to the water, even though it contains no mineral.

Q. And it will not deduct the amount of mineral which causes the hardness? A. No, sir. 10

Q. So that you cannot tell when you apply that test whether the hardness results from lime or iron or something else? A. No, sir.

Q. Do you find any hardness—do you find any water absolutely free from hardness? A. I have never seen any; distilled water possesses hardness, it is true, a small quantity; it amounts to about eight to ten parts per million—professionally distilled water.

20

By the Court.

Q. Rain water contains no minerals? A. But it is hard; it contains hardness; it is called soft water; of course, it is soft by comparison with ground water.

By the Court.

Q. What hardness can there be in rain water? A. It is hard, as measured by the soap test; it seems that water—for instance, if we take a given quantity of distilled water and add soap solution to it, we have to add about a quantity of soap equivalent to about eight or ten parts per million carbonate of lime. 30

THE COURT—I know; but we can imagine hot water and steam, hot steam carrying over with it some particles of mineral; but can we imagine the evaporation from the ocean or from a lake due to 40

the rays of the sun combined with the wind; can we imagine them taking up any mineral?

A. Yes; the common salt is a constant constituent of the vapors arising from the ocean.

By the Court.

10 Q. There is a little actual sodium goes up, eh?
A. Yes, sir; chloride of sodium.

By the Court.

Q. But except sodium, can we imagine any lime, for instance, going up? A. Yes, sir; traces of lime and magnesium always accompany the sodium whatever minerals are present in the water.

20 THE COURT—They must be carried up in very fine mists that rises almost invisibly?

A. Yes, sir; the quantity is almost infinitesimal, but still it is there.

Q. From whom did you get that soil taken from the head-gate of the canal? A. It was delivered to me by the driver employed by the Diamond Mills Paper Company.

30 Q. When? A. On the 7th day of April; it was taken on April 6th.

Cross-examination by Mr. Richards.

Q. You have testified that there was a considerable quantity of iron in the sludge and this had a hardening effect on the water to which we agree; will you please tell us where this iron came from?

A. Apparently it came from the soil, or the rocks over which or through which the water in the canal or in the Third River passed.

40 Q. Did you find it in the sample of water that

you took from above the mill? A. Sample of water? Q. Yes.

MR. JOHNSON—Didn't take any.

DR. RICHARDS—Yes, he did; the last time.

THE COURT—Didn't take any sample of water above the mill.

DR. RICHARDS—Yes; he says "Canal at the head-gate of Diamond Mills." Marked January 26th and March 8th. 10

THE COURT—That wasn't this last time.

DR. RICHARDS—He found a large quantity of iron down below the mill, and now I have asked him where it comes from, and he says it comes on account of the iron above the mill.

20

A. Yes, sir.

DR. RICHARDS—He has analyzed the water above the mill, and I ask whether he found any iron in that.

A. Yes, sir; it contains iron.

Q. How much? A. I didn't determine it quantitatively.

Q. Have you determined it quantitatively at any 30 time?

THE COURT—He didn't determine any of the—

A. Constituent.

THE COURT—Constituent part of the hardness in his previous analysis.

Q. Now, I want to know if his ground for saying that this hardness comes from the soil above the mill— A. I said the iron comes from there. 40

Q. Why do you say that the iron in the water which you found once came from the soil in the canal above the mill? A. Because it is present in the soil forming the bottom of the canal; the water must dissolve those minerals substantially which that soil contains.

10 Q. But you performed no analysis of the water above the mill to find out how much iron was there to compare it with what you found in the water below the mill? A. Except in the determination of mineral matter, and I know iron is there.

Q. No, but excuse me.

THE COURT—He says he did not determine it quantitatively. He found iron with the other mineral matter, but he did not determine it quantitatively.

20 Q. Did you determine it enough to say that the iron in the water below the mill came from the soil above it, and, if you say so, why do you say so? A. If the water above the mill?

Q. You say there is iron in large quantities in the water below the mill? A. Yes, sir.

Q. And you say that that came on account of dissolving iron in the soil above the mill? A. Yes.

30 Q. I want to know what your grounds for that opinion are? A. Because the soil above the mill contains iron.

Q. That is all? A. Yes, sir; and I have seen iron deposits, iron stains along the bank of the canal and along the bank of the river there; iron rust.

Q. With regard to the aluminium, you have testified that the salts of aluminium cause hardness? A. Yes, sir, when they come in contact with the soluble soap; all aluminium soaps are insoluble.

40 Q. Would silica aluminium produce hardness in water? A. Yes, sir; if a soap were present.

Q. If you had silicate of aluminium, and put soap in it, would it dissolve the silicate of aluminium? A. Would the soap dissolve silicate of aluminium?

Q. Yes? A. No; the aluminium would combine with the soap.

Q. If you had silicate of aluminium it would destroy the power of the soap? A. It would combine with the fatty acid of the soap. 10

Q. Where does the aluminium which you testified that you found, together with the iron, come from in this water? A. It comes from traces, small quantities of clay forming the soil, the bed of the canal.

By the Court.

Q. That is all clay; clay is the source of all aluminium? A. Yes, sir. 20

By the Court.

Q. You don't mean to say that the mere matter of clay being mixed up with the water produced aluminium there; it must be detached and altered in its condition in some way? A. No, it has to be in a soluble form before it could render the water at all hard or have any effect on the soap, for instance.

Q. Well, would the aluminium found in the common clay of the country be dissolved by ordinary water so as to make that water hard enough to have any appreciable effect on the soap? A. No, sir; but it would in the presence of some traces of acids, such as hydrochloric acid or chlorine. 30

Q. We agree with that. Then if there is any aluminium dissolved in the water below the mill it is due to the acids which get into the water from the mill? A. No; I wouldn't say that.

Q. What would you say? A. I would say it might be partly due to that; the water might con- 40

tain aluminium in a soluble form when it reached the mill.

Q. But you didn't find any in your analysis of the water above the mill?

MR. JOHNSON—Didn't look for it.

10 A. I didn't test for it at all.

Q. You didn't find it whether you looked for it or not? A. I didn't look for it, but I believe it to be there.

Q. But you don't know?

THE COURT—I understand his analysis shows aluminium in the water—you say above the mill?

20 JUDGE COLLINS—Not the water that he took January and February above the mill?

THE COURT—He didn't take the ultimate analysis of that.

JUDGE COLLINS—All we are speaking of is he didn't report any.

Examined by the Court.

30 Q. Is or is not a certain amount of aluminum in the shape in which you speak of it found in all our running brooks? A. It is; it is a constant constituent of all ground water.

Q. But how much—how many parts to the million? A. It varies.

Q. Well, ordinarily? A. Ordinary soft water, it might vary from five to twenty-five or thirty parts per million.

Further cross-examination.

40 Q. You have testified that in the analysis of the water taken from above the mill that you found

hardness 4 and 5-10 parts per million? A. Yes, sir.

Q. Now, how much of that was due to the dissolved aluminum?

THE COURT—You need not answer that question, because he can't answer it. He has already said he took the whole quantity of solids, without discriminating between the various minerals of which it is composed. 10

Q. Well, then, Mr. Axtell, your saying that there is a certain amount of dissolved aluminum salts in the water below the mill, and that this comes from the soil above the mill, is a matter of inference only, not a matter of analysis on your part? A. It is a matter of common knowledge that all grounds contain aluminum. 20

Q. Now, you have presented an analysis of the soil in the canal bed above the mill—paper mill?

A. Yes, sir.

Q. Now, supposing that the specimen submitted to you was taken from the bed of the canal, do you find out how much ordinary water would dissolve that material that composes the bed of the canal?

A. No, sir; not at all.

Q. Then you merely state that you find that the soil has certain constituents, and that water flowing over the bed of the canal dissolves this so as to make the water hard? A. Yes, sir; I have also stated that, for instance, the lime contained in that soil is, as compared with the lime in the discharge from the mill, in a very insoluble condition—that is, that it is very slowly dissolved by the water, whereas the lime discharged from the mill is quickly dissolved; it is in a more soluble state—more soluble condition. 30

Q. Would you say, from your general knowledge 40

as a chemist, that water as it flows over the bed of the canal—would this soil in the bottom of the canal dissolve any appreciable amount of that soil? A. Oh, yes, certainly; it dissolves appreciable amounts.

Q. Well, any amount that would affect the soap test to destroy it for dyeing purposes. A. The soap test?

10 Q. Would it affect the quality of the water to be used for dyeing purposes if you had the water just as it came out of the bed of the canal, with no contamination except what it would get by dissolving the bed of the canal—would it be deleterious water to dye with? A. It would, on account of the iron. If I were asked to pass upon a water of that kind I would state there was too much iron in it for dyeing purposes or for use of any fibre; not as regards the lime, though.

20 Q. If there was a certain amount of the soil containing aluminum washed down into the lower bed of the canal below the mill, and the water there contained chlorine and hydrochloric acid, what would be the effect of these acids on the soil that was washed in? A. It would be to increase the amount of aluminum, lime and magnesium compounds in the water.

By the Court.

30 Q. The fact of there being some free chlorine set free in the mill coming in contact with other things would be to increase its hardness? A. Yes, sir.

THE COURT—Just exactly as it has been testified heretofore.

Q. Have you any knowledge of whether at the time the samples were taken on January 26th and March 8th they were running any wash water from

the mill containing lime into the canal? A. I was very careful to ask.

Q. Do you know yourself?

THE COURT—Knows nothing of his own knowledge.

A. Except from Mr. Thompson's statement.

Q. You don't know yourself?

10

A. No, sir; I wasn't there.

THE COURT—It already appears.

Q. Now, in the light of what you testified about the hardness of water, and what causes it, is it not true that by hardness of water we mean the power of water to destroy soap, its detergent powers? A. It is the power of water to combine with soap; for certain constituents of water to combine with soap. 20

Q. And thereby destroy the detergent quality of the soap. When you use a soap test the test consists in finding out how much water you have to—how much of the soap you have to put into the water for the water to be able to make a lather with the soap in it? A. Yes; leave an excess of soap. In other words, an excess of alkali soap.

Q. And therefore the hardness of a water means containing such constituents as destroy the lather and power of soap? A. Makes insoluble soaps 30 which don't lather.

Q. Do all mineral constituents of water have this soap destroying power? A. Practically all except the metals of the alkalis; the compounds of the alkalis. Practically all soaps except those of the alkalis are insoluble soaps; that is, insoluble in water.

Q. Now, the aluminium salts, you testified all the aluminium salts would combine with ordinary soaps to make the insoluble soaps; do you mean al₁ 40

aluminium salts? A. All the salts so far as I am familiar with them; all aluminium salts.

Q. Whether soluble or insoluble? A. Oh, no; salt would have to be in solution; an aluminium salt would have to be in solution in order to react with a solution of a soap, of an alkali soap.

10 Q. You testified in your direct examination the last time, Mr. Axtell, that you had had experience with waters such as these in the matter of dyeing celluloids, and that they worked all right. A. I didn't say in dyeing celluloids, sir.

Q. What was it you did say? A. I said in the manufacture of celluloid.

Q. Oh, in the manufacture of celluloid? A. Yes, sir.

20 Q. But in the dyeing of the celluloid you don't use any water at all? A. No, sir, not at all; still the bays, the pyroxyline which is used is treated with these waters. I now treat about five tons a day of nitrate celluloids.

Q. Wash the ashes away from the cone cotton? A. Yes, sir; I use three grades of water; first, the Newark city water; next, the water from a couple of driven wells we have on the plant; and next, water from a deep well. This water, about four tons of the material of the pyroxyline is washed from the water of this deep well, and it contains 30 2,200 parts per million of the upper sulphate of lime; a little carbonate.

Q. You have already testified here, have you not, that you have had no experience in the matter of ordinary dyeing of fabrics? A. No, I didn't testify to that; I testified that I was not familiar with the practical manufacture and dyeing of wool.

40 Q. What is the effect of the acids in the water found at the foot of the plane on the iron work of the plane machinery, the cable, the wheel? A. It would be to corrode it.

Q. And take the iron into the water. A. Yes, sir.

By Judge Collins.

Q. One question. I think it already appears in taking the sludge or slime, as you call it, each side were allowed to select the place where they were to take it from? A. Yes, sir.

10

Re-direct examination by Mr. Johnson.

Q. Can you give us the exact reaction of anti-chlorine upon a chlorine bearing substance, such as the bleaching liquor? A. Usually a reducing agent is used for that purpose, the chlorine compound oxidizing the reducing agent; for instance, sulphuric acid or hypo-sulphite is very often used, and the hypo-chlorine oxidizes the sulphurous acid to sulphuric acid.

20

Q. And is sulphuric acid the by-product, then, that comes away from that? A. Yes, sir.

Q. Now, what effect would sulphuric acid have upon the water of the canal for dyeing purposes? A. In the present case I should expect any free sulphuric acid which might be found to combine with some of the gases of lime which is present in the water, forming calcium sulphate or sulphate of lime.

30

By Judge Collins.

Q. That would increase the hardness, wouldn't it? A. Yes, sir; but to no greater extent than it had already been increased by the lime; it makes no difference whether the lime exists as sulphate or carbonate or chloride in any state.

By Judge Collins.

Q. It would not decrease the hardness? A. It would not increase it.

40

By Judge Collins.

Q. It would not decrease it? A. No; the hardness all depends on the amount of the base present.

COLONEL GEORGE W. THOMPSON, recalled.

Direct examination by Mr. Johnson.

10 Q. Do you use any iron in your business? A. No, sir.

Q. Paper making at that Bloomfield mill? A. None at all that I know of.

Q. Or any aluminum? A. We use alum some times in bleaching.

20 JUDGE COLLINS—If the question means they use these metals brought in commercially, it is all well enough; but, of course, iron comes off their digester, and aluminum, they say, comes in the water.

THE COURT—The wear and tear of the iron of his machinery gets undoubtedly in that water.

JUDGE COLLINS—Certainly, and they use alum.

30 A. They are all coated over; those beaters coated over; there is a thick coating on it and none of the iron comes off; we are very careful that none of it pulls off.

By the Court.

Q. It would never do for you to have any iron in your water; it would ruin your paper right away?

A. No, sir.

Q. Or any aluminum?

40 THE COURT—He uses alum, he says.

A. Alum.

Q. Isn't that something altogether different?

JUDGE COLLINS—Alum is the basis of aluminum; that is what it means.

Q. Do you use much alum? A. No; very little. If we were making colored papers we would use considerable alum for mordant, but the ordinary white paper we make we use very little, sometimes not any; we use it to make the bleach active, a little to loosen the chlorine. 10

Q. Any magnesium? A. No, sir.

Q. Since the last hearing do you know whether anything has been done in that Bloomfield mill to dispose of the contents of the rotary boiler, as it has been called? A. We have disposed of all the matter that is emptied from the rotary boiler after the completion of boiling that was carried out by conduit out into the hill and a large arrangement we have there. 20

By the Court.

Q. You made an arrangement there by which none of the contents of the rotary boiler gets into the stream? A. None at all.

By Judge Collins.

30

Q. When was that done? A. That was done recently, within the past two weeks.

THE COURT—You recollect Colonel Thompson said here before in the presence of the Court—

A. We went to work at it immediately; it was completed eight or ten days ago.

Q. So that now nothing gets into the tail-race or 40

into the canal from the rotary boiler? A. Nothing whatever.

By the Court.

Q. I suppose the color of the water that comes down with the very fine particles of fibre in it is still the same? A. Yes, it hasn't been; we have
10 not changed that materially; that is all white.

Examined by the Court.

Q. Have you a record, or who knows how much your mill has been used; how much of it has been driven by water power for the last six months or a year? A. I haven't any record, and I don't think anybody has.

Q. They could give an idea how much of it has been used? A. One of my sons, either of them,
20 would know nearer than I.

Q. I want to know how long the canal has been without use at all by boats; I also want to know what is the time taken by a boat to come from Easton to Newark and back again? A. I think the water has been out of the canal for three or four weeks at least; entirely out of it; perhaps longer than that.

Cross-examination by Judge Collins.

30 Q. Aluminum is soluble in water? A. Yes, sir.

Q. And you did use sulphate of aluminum? A. We use alum.

By the Court.

Q. Alum is sulphate of aluminum, isn't it? What is commercial alum composed of?

MR. WOODMAN—It is double sulphate of aluminium and potash; there are two salts in it, two bases.

THE COURT—It isn't aluminium alone?

MR. WOODMAN—Not alone; the sulphate of aluminum alone is called sulphate of aluminium.

Q. You use sulphate of aluminium, don't you?

A. We use alum; that is sulphate of aluminium; we use a little alum sometimes, but very little; I don't know that they use any at that mill. 10

Q. I mean don't you use besides the alum sulphate of aluminium? A. No, sir; no, sir; nothing of the kind.

By the Court.

Q. Use ordinary commercial lump? A. That is all, when we use any at all, but I am not sure that we use any out at that mill in that stock; we use it at the other mills. 20

RALPH H. THOMPSON, recalled.

Direct examination by Mr. Johnson.

Q. Do you use alum in that Bloomfield mill now?

A. No, we don't; we haven't for years.

Q. How long? A. I don't know; may be four.

Q. Did you use it there? A. We used it, used Natrona alum. 30

Q. But you don't use it now, and haven't used it for years? A. No; that is when we made some colors there.

Q. Now, what was the condition of that canal, how much water was there in the canal when these first samples were taken?

THE COURT—It don't make much difference how much water was in the canal, but how much water was passing the mill 40

every day, that is the question; was the water power used?

Q. Well, put it that way then? A. You put it that way?

Q. Yes. A. For a good long time we have had comparatively little water from that canal; we have had to pay for it right along, but we have had comparatively little either as water power or for other purposes. We don't get what we think we should.

By the Court.

Q. Well, last winter did they furnish you water to run your mill with? A. As long as there was water in the canal we used what we could of it.

By the Court.

Q. Can you tell how much you were running your mill by power last January and February when these samples were taken? A. I can tell in a certain way; we will say that seven turns of our water wheel gate is a full gate; it is a thirty-six inch turbine; we use from three to four most of the time.

By the Court.

Q. Run your turbine half power? A. So we can say half power.

By the Court.

Q. Three turns would only give you one-third power? A. Seven is wide open, a little more than third.

By the Court.

Q. I know, but the amount of power you would get in diminishes in proportion to the water? A. Yes, possibly.

By the Court.

Q. Well, you say you were using it half gates then last winter? A. Most of the time.

By the Court.

Q. Run night and day, or only day time? A. We run night and day.

10

By the Court.

Q. When did you cut you off entirely so you only had enough to run your mill? A. You mean so we had only enough to wash with?

By the Court.

Q. Wash with, yes. A. Well, when they sl ut the water out of the canal we didn't have enough to wash with.

20

Examined by the Court.

Q. Where do you get water to wash with? A. We have some in our tanks; we have it stored up in our tank, and we use some spring water.

Q. Where do you get any spring water? A. There is a large spring right by the mill there.

Q. When we were there in April, how long before that had it been that you had used your water wheels for power? A. I forget how long the canal was down; I should think it would have been a couple of weeks then; I don't remember.

30

Q. You haven't any record? A. I think it would have been two weeks. No; we have no actual record of that.

Q. Your wheels were not running the day we were there in April? A. Oh, no; oh, no.

Q. And hadn't been, you say, in two weeks? A. I think not; though I don't remember.

Q. How long since a boat has gone down that

40

canal? A. Oh, several months, of course, because the canal has been shut down all winter, you know, that is, so far as boats are concerned, and there are very few boats running now, anyway.

Q. Yes, I know; well, how long have you been there with the company? How long have you been at work at Bloomfield? A. Twelve years.

10 Q. What is the proportion of boats that run, up to the time they did run, here within a year, to what it was when you first went there? A. I should say it was approximately one-seventh; and I get my figures in this way; ten years ago there was said to be a few over three hundred boats on the canal, and it is claimed by everybody that I have talked to now that there are not more than fifty.

20 THE COURT—Mr. Powers swore there was just fifty.

A. That is it.

Q. Do the fifty that run now run as frequently per boat as they did years ago? A. Oh, no, not at all; no, indeed.

30 Q. At the time of late years when the boats were not passing through did they keep a stream of water running around that race, around the plane, or did all the water pass—what you used? A. As I remember the overflow, the canal overflow which went past the flume was pretty constant in those few years, for a few years, because the boats were pretty constant. I don't know whether they kept it running at night or not, but during the day it must necessarily be more or less constant.

Q. How was it in later years? A. It is pretty shallow now.

40 Q. I mean the stream that runs around there? A. Yes; I know what you mean; it is pretty shallow, and sometimes it is pretty dry, I think.

Q. Can you give me an idea—it must be, of course, a mere estimate—of the comparative amount of water that passed that plane for all purposes which you used on your mill to drive your power wheel and what you used to wash with, and what the canal used to lift boats up and down, and what they allowed to pass around the waste-way? A. Why, yes.

10

Q. Comparison with the last three or four years to what it was previously? A. I can only do it in regard to our mill in this way; that some years ago we could make fair shift to run that whole mill fairly well with our water wheel alone, and we estimated that we got about 160 horse power. Now, if we can run one room, which we wish to sometimes, on the wheel alone, we think we are fortunate, and sometimes we have to shut that down.

Q. But, then, the quantity passing for canal purposes; every time they run a boat up and down they used a great lot of water on the Scotch motor? A. Yes, sir; I know what you mean.

20

Q. You can tell; cannot give an idea, then, how much? A. The best I can say is that everything connected with that canal, so far as the water is concerned, is a great deal less now than it was a few years ago; there is less water running into it and less running out; less water in it.

30

Q. Less water passing the plane? A. Less water circulates.

By Mr. Johnson.

Q. Do you use any iron in your business? A. No, we don't.

THE COURT—They don't use anything that makes iron rust around that paper.

40

JOHN H. WARD, 3WORN.

Direct examination by Mr. Johnson.

Q. What is your business? A. I am superintendent of the Diamond Mills Paper Company.

Q. And how long have you worked for that company? A. Twenty-three years.

10 Q. For twenty-three years. A. Yes, sir.

By the Court.

Q. At Bloomfield? A. Twelve years at Bloomfield.

Q. Did you work in that mill at Bloomfield, be-
longing to the Diamond Mills Paper Company,
prior to the time they used it? A. Yes, sir; I
worked in it at the time that Mr. Fulton run the
mill.

20

JUDGE COLLINS—The case was closed, except
expert testimony.

THE COURT—I don't care anything about
that. I will open it for you too. I
don't want to decide this case with any
evidence left out.

30

JUDGE COLLINS—I don't want your Honor
to, but we have not come here to try
and meet anything but expert testimony.

THE COURT—Why wasn't he brought here
before?

MR. JOHNSON—Why, the witness was here
before, but we didn't have an opportu-
nity to call him.

JUDGE COLLINS—You closed the case except
experts.

40

MR. JOHNSON—I didn't close my case, and

we don't propose to contradict their rebuttal evidence. We can't do that.

THE COURT—They haven't any rebuttal evidence.

MR. JOHNSON—Yes; Judge Collins put in what I suppose he would call rebuttal evidence, showing this mill was not used continuously for twenty years. 10

JUDGE COLLINS—He means rebuttal at the former trial.

MR. JOHNSON—I was asked whether I closed and I declined to close at that time.

THE COURT—If there is anything comes out that you want to answer, I will give you an opportunity to do it, Judge Collins. 20

JUDGE COLLINS—All right.

Q. Now, how was the mill used—that same mill used in Mr. Fulton's time? How was the feed water of the canal used? A. Had lots of it at that time.

Q. How was it used in that mill? A. Wash water and power.

Q. For power and wash water? A. Yes, sir.

Q. And you say you had lots of it? A. Plenty. 30

Q. Now, when the water was used—had been used, you say, for wash water, what do you mean, washing the stock? A. Yes, sir.

THE COURT—That is just what we saw doing there.

A. Excuse me for a moment; I say we had plenty of water, except in the spring when the water went out of the canal; every spring it went out. 40

By the Court.

Q. Had to clean it out? A. We didn't have any then, of course.

By the Court.

Q. You mean when they cleaned out the canal?
A. Yes; sir; in the spring of the year.

10 Q. What became of the water after you used it?
A. All went in the lower level—one mile level at the foot of the plane.

Q. What was the condition of the water when it was turned into the level? A. It used to be in pretty bad condition those days.

By the Court.

Q. What do you mean by bad condition? A. Well, dirty, muddy, white and everything else into
20 it that went out of the mill.

Q. Dirty and white with what? A. Fibres of stuff.

Q. What stuff.

THE COURT—Dirt of the mill.

A. Dirt of the mill, refuse and everything.

Q. Was there any of the stock in it?

30 THE COURT—This fine white fibre?

Q. Making white paper? A. They made no white paper at that time; they made manila paper.

Q. What did they make it out of? A. Jute.

By the Court.

Q. That gave off the same white stuff, but it wasn't white? A. Yes; it wasn't white; there was more of it at that time, but it wasn't white.

40 Q. I understand you to say when the water was

discharged into the canal after its use, it contained this material with which the paper was made? A. Yes, sir.

Q. Was there anything else in it? A. Well, all refuse of the tanks; lime tanks, bleach tanks; they all went into it, the cooking boilers, rotary boilers.

Q. Was there any lime in it? A. At that time? 10

Q. Yes. A. Yes, sir.

Q. Chloride of lime? A. Far more lime than there is now; I couldn't tell you exactly; I didn't have anything to do with the lime business at that time.

By the Court.

Q. Did you have any pit to keep the lime from going down in the canal? A. At that time?

20

By the Court.

Q. Yes? A. No, sir.

By the Court.

Q. That pit to put the chloride of lime in wasn't there then? A. No, sir; it was emptied right out of the tank.

By the Court.

Q. Did they have these rotary beaters? A. They had four of them. 30

Q. How often would they be emptied? A. Out of those four there were twelve or thirteen a week.

By the Court.

Q. Four fills? A. Four cookings; that is twelve and thirteen cookings at that time; twelve or thirteen altogether; now, we have two and sometimes three a week out of one; that is all we have; that is all we have; one— 40

By the Court.

Q. Was the mill as big; did you handle as much stuff as you do now? A. Oh, a good deal more; they made heavy paper at that time; heavy manillas; now they make tissues.

By the Court.

10 Q. Did you notice this stuff gathering in the wheel pit in those days? A. Yes, sir; saw it every spring when the water was out of the canal.

By the Court.

Q. When the wheel revolved it stirs it up, don't it? A. Yes, sir; it did, and then it carried out of the wheel into what they call the basin a little further down.

20 JUDGE COLLINS—What we call the pool.

THE COURT—And the boats swished it on from there?

A. Yes, sir; every spring there was quite a quantity in there and every spring they cleaned that out.

By the Court.

30 Q. How long is it since you first went there? A. Twelve years ago with this company.

Examined by the Court.

Q. Can you give us an idea of the amount of difference in proportion there is to the quantity of water passing the plane for all purposes for the canal and what runs around. I mean by the canal that is lifting the boats up and down, running the motor and passing around the wasteway and over though
40 your water wheel, your wash, and everything, for

the last—say two or three years, and what it was previously? A. Well, I should say there wasn't much more than one-third; there isn't one-half; not by a good deal; I can tell by the—

Q. How long before we were there on the 5th of April was it that you had used those water wheels?

A. About two weeks.

Q. Hadn't used your power for two weeks? A. 10
No, sir; and then very little at that; we don't get but very little water. There is some days we may get for two or three hours quite a little head on the wheel, and then it will be all shut off and we get none; they simply just draw enough down to keep that lower level about pretty near full.

Q. The lower level was all out when I was up there on the 6th? A. Yes, sir; there wasn't any in the upper level either.

Q. They had been keeping that lower level full? 20
A. It isn't full now; yesterday they had to draw it off again; there was a wall fell in at the foot of the plane and they had to draw the level off, and we didn't have any water all day.

Q. They must go way up to Paterson to get it off then? A. To draw it out of the lower level? No.

Q. To draw it out of your level? A. Up above at the Stone House Plains they have got a waste gate.

Q. Turn it into what river? A. Third River. 30

Q. Turn it right into Third River? A. Yes, sir.

Q. Then they can at any time draw all the water away from you by opening a gate up at Stone House Plains and let it run into Third River? A. Yes, sir.

Further direct examination by Mr. Johnson

Q. Now, what do you do with the solid lime now?

A. Lime from the rotary boiler?

Q. Yes. A. Run it right out into a hole we made there.

Q. No, I don't mean in the rotary boiler. A. Lime tanks?

Q. Yes. You say formerly the solid lime used to be discharged—

10 THE COURT—It is now shown to the Court emptied into a pool by itself; they have got a pit there for it on the ground there.

Q. Is that so? A. Yes, sir; that is so; I had that hole made myself; tight fitted and everything for it.

Examined by the Court.

20 Q. That has been in use how many years? A. This pit?

Q. Yes; that we saw there on the 5th of April?

A. That has been in there five or six—five years.

Q. Now, then, have you made a new pit? A. Yes, sir.

Q. To take the lime from the rotary digester, eh?

A. Yes, sir; put in a ten inch tile pipe from the rotary boiler to this pool.

30 Q. To this same pool? A. Not to the same; to another one.

Q. Another one? A. Yes, sir.

Further direct.

Q. It was suggested at the last hearing that this solid lime might be allowed to run into the canal by the carelessness of the men. What do you say about that? Have you charge of the men there? A. Yes, sir.

40 Q. What do you say about that? A. Well, at that time it was going in there.

Q. I mean within the last few years? A. Well, there wasn't any went in by the carelessness of the hands as I know of.

By the Court.

Q. Was it practicable by carelessness to get that lime into the river? A. No; there wasn't any went in that way. 10

Q. Now, how does the amount of fibre which is now discharged into that—

THE COURT—He says nothing like as much now as there was before—amount of fibre, fine stuff. He has answered that question, I think; not as much nowadays?

A. No, sir; because the wires they used to run this on, machine they run 60 and 70 mesh; that is pretty coarse wire; now we run 90 and 100. 20

By the Court.

Q. Of course; the finer the mesh the less goes through? A. Certainly; that is very fine.

Q. Do you know anything about the operation of this canal; were you formerly employed on the canal? A. Yes, when I was a boy. 30

By the Court.

Q. Before the twelve years? A. When I was a boy.

Q. Do you know whether the water of this canal, with the exception of that in the wheel pit, can be drawn off at the spillway over Second River? A. Second River or Third River?

Q. I mean Second River.

THE COURT—The Second River is which side? 40

MR. JOHNSON—Second River is on this side.

JUDGE COLLINS—East of Third River. I object to it as irrelevant.

A. I don't know where Second River is. It must be down below Newark and one mile level.

Q. Between Newark and Bloomfield? A. Between Newark and one mile level; yes, sir.

JUDGE COLLINS—I object to that question as irrelevant, as to whether the water can be drawn off.

THE COURT—No; whether there is a place to draw the water out of that canal further down.

A. No.

20

By the Court.

Q. How do they draw it out when they want to get it out here at Newark? A. They draw it out at Newark; I guess they draw it on down through the city here; yes, they do.

By the Court.

Q. Isn't there a way of drawing it out? A. There is another place right below the lock; below the one mile level there is an aqueduct there, that is Second River, I believe.

30

Q. That is the one, I believe? A. That has got gates in there; at least they use to have.

JUDGE COLLINS—I would really like to know the purpose of the question.

THE COURT—He wants to show—I suppose, I would if I was in his place—that it is quite practicable on your part to get

40

clear of this water without washing it over into Mr. Oakes' pond?

Q. Yes. A. This water don't go anywhere near Mr. Oakes out of that aqueduct.

THE COURT—Does the canal company want to carry the water out the one mile level and carry it through that gate and over the waste gate just below the—— 10

A. I suppose they could do that, yes, sir.

THE COURT—That is what he is driving at.

Q. Did you ever see them dredging at the bottom of that canal, the canal people, did you ever see them doing that while the water was still in it? A. Yes, sir. 20

By Judge Collins.

Q. Dredging out that wheel pit? A. No; not in the wheel pit.

By Judge Collins.

Q. Dredging out the canal where? A. All along the canal.

JUDGE COLLINS—While the water was still in it? 30

MR. JOHNSON—Yes.

JUDGE COLLINS—What has that to do with it?

MR. JOHNSON—I want to find out whether there is some way of digging out that wheel pit without drawing the water off. 40

A. You couldn't get a dredge in there.

Q. Couldn't get a dredge in there? A. No, sir.

Q. Why couldn't it be taken out in buckets while the water was still there? A. If you ever got any of that stuff into a bucket it would all go away like water.

10

THE COURT—I can tell—you better meet it—the actual running of the boats will take all the stuff out there that does any harm to the canal. It is too soft to be in their way at all, in my judgment; I will give Judge Collins notice of that. It isn't a material like sand or any hard sand that they have to take out; scrape the bottom of the boats. I saw it there; a little stirring up and the wheel whirling around and boats going through there would carry it right out. I could see myself where it was left on the sides where the boats didn't reach it; but I may be mistaken. As a juryman, that is my judgment now. I haven't seen any evidence to satisfy me yet, Judge, that that sludge down there does you a bit of harm in the canal.

20

30

JUDGE COLLINS—Canal; maybe not. It is Mr. Oakes we are trying to protect.

THE COURT—Your superintendent, Mr. Powers, talked what an awful thing it was to have all that sludge down in there—part of your opening, part of your claim. Very simply if you have got nobody but Mr. Oakes to take care of.

40

JUDGE COLLINS—It is a great nuisance to have to clean it out every year, and expense, but if Mr. Oakes is taken care of,

taking care of him will prevent that nuisance, why, we don't care. If that will keep that so he wouldn't be hurt we wouldn't suffer very much.

Q. How long have you known this mill? A. Long since it was built.

JUDGE COLLINS—I object to it; it is part of
of their principal defense. They went
into that fully. 10

THE COURT—The difficulty you got there, Mr. Johnson, is to meet the evidence. It is a great deal worse now than it used to be. The best answer to that—I will talk to you right out, speaking out in meeting, you know—is if the canal was operated now as it was twenty years ago there wouldn't be any difficulty. That is the best answer. 20

JUDGE COLLINS—But that don't affect the claims of Mr. Oakes.

THE COURT—Now, then, the question is whether there has been any increase in the quantity of vicious matter put into that canal more than what there has been in more than twenty years use? Now, then, you have got a break, you see, in there. On the other hand, Colonel Thompson says it is a matter of lime and he can fix it, and he says he has fixed it. I can see a way out of the whole thing very easy; but I think Mr. Johnson is entitled to show, and he ought to have shown the other day, and I think he did show— 30

JUDGE COLLINS—I think he did, and that is what I am complaining of.

THE COURT—I don't want to hold him to that if he had his mind on something that he didn't know; he knew the other day with regard to the long adverse use of this canal.

10 MR. JOHNSON—We don't rely entirely on adverse use. There is another legal question here, and that is whether this thing has not been going on so long to their knowledge, even although it is less than twenty years, that they are not precluded—

20 THE COURT—They saw Colonel Thompson going there and spending twenty or thirty thousand dollars on this mill, and they saw him putting these improvements in.

JUDGE COLLINS—The canal company is principally interested for Mr. Oakes, and brought the suit because Mr. Oakes made this complaint.

30 Q. What I want to ask this witness, and what I started to ask him, is this: He says he has known it now for a good many years. How many years do you say?

JUDGE COLLINS—I object.

THE COURT—He objects. It is overruled for the present.

A. I have known the canal—

Q. No, no; the mill? A. Well, that is about the second place I ever worked; in that mill.

Q. You have known it since 1882 continuously?

40 A. Yes, sir.

Q. Was there ever a time when that mill was running when the water, the feed water of the canal, was not discharged into the canal after use containing lime or chloride of lime or fibrous matter?

JUDGE COLLINS—I object as part of their affirmative defence.

10

A. No, sir; there was no other place for it to go.

By the Court.

Q. And lime, too? A. Yes, sir.

By the Court.

Q. How long has it been under your observation? Have you worked there all the time? A. No, sir; I was away from there for about eleven years.

20

By the Court.

Q. Wasn't in Bloomfield there? A. No, sir; I was working in Whippany for the Diamond Mills.

Q. What, eleven years? A. Well, I have been back here now twelve; eleven years before that I was in Whippany.

Q. When did you come back. A. Twelve years ago.

JUDGE COLLINS—Twelve years ago. I don't care now.

30

MR. JOHNSON—I want to offer some deeds in evidence.

JUDGE COLLINS—That is all you have got, isn't it? That is all your evidence?

MR. JOHNSON—These are all the deeds I have. I offer in evidence certified copy of an agreement between Robert W. Southmayd and others to Archi-

40

bald T. Finn, dated 20th day of November, 1866, assigning the right to use the water of the canal.

Marked Exhibit D 3, May 16.

Also certified copy of an agreement from Archibald T. Finn and the Silver Spring Paper Company, dated 23d day of August, 1870, and duly acknowledged. That assigns the right to use and employ the feed water on the second level of the inclined plane.

Marked Exhibit D 4, May 16.

Certified copy of deed from the Silver Spring Paper Company to Elisha M. Fulton, dated 22d day of March, 1882, duly acknowledged and recorded. Assigns all the right to use and employ the feed water on the second level of plane No. 11.

Marked Exhibit D 5, May 16.

Then a certified copy of deed from Elisha M. Fulton and wife to the Essex Paper Company, dated the 11th day of December, 1883, duly acknowledged and recorded, which grants the right to use and employ the feed water of the Morris Canal on the second level.

Marked Exhibit D 7.

Next, I offer a deed from Edwin W. Hine, Sheriff, to Marie Antoinette Whitlock, certified copy, and that is dated, appears to be dated third day of August, in the year 1899, duly acknowledged and recorded. That is the deed for land described in the foreclosure suit against the Essex Paper Company and others, and includes the rights and privileges granted to Robert W. Southmayd and Charles A. McCracken. That is, the right to use these feed waters.

Exhibit D 8.

Then I offer the deed of Marie A. Whitlock to

Elisha M. Fulton, dated 4th day of June, 1891, duly acknowledged and recorded. It conveys all the right to use and employ the feed water on the second level.

Marked Exhibit D 8a

Next I offer deed from Elisha M. Fulton to the National Paper Company, dated the 13th day of July, in the year 1891, duly acknowledged and recorded. Conveys all the right to use and employ 10 the feed water on the second level of plane No. 11.

Marked Exhibit D 9.

Next I offer a deed from the National Paper Company to the United Paper Company, dated the 1st day of October, in the year 1893, duly acknowledged and recorded. That also conveys the feed water on the second level of plane No. 11.

Marked Exhibit D 10.

THE COURT—I want to ask Mr. Johnson 20 whether, under all the circumstances of this case, he can contend that Mr. Oakes has not been disturbed by his works, and whether he can contend that he has not been disturbed more of late years than formerly, no matter what the cause was. I can see the cause fast enough.

MR. JOHNSON—I think so. I can make both of those contentions.

THE COURT—You can make it. I don't believe 30 you are in any danger myself, because I think Colonel Thompson's taking out that lime will alter the whole thing and remedy it forever. But I think, before any proper test can be made, that somebody—canal company and the paper mill together—ought to clear all that sludge out and start fresh. Now, you will have that reservoir of lime down there to work on for years and you can't get a fair test until that has been washed out, and it will not be washed out by the present circum- 40

stances, and that ought to be cleaned out once for all, and then start fresh, and then you can take your tests—take your tests hereafter and see. But there can be no fair test—it would not be fair as against Colonel Thompson to leave that sludge there, because the evidence tends to show and satisfies me that it is loaded with lime, actually
 10 loaded with it, and the water that runs from it now on will have more than the usual lime in suspension, more than you send down probably under the changed work. Do you get my idea?

MR. JOHNSON—I get your idea perfectly.

THE COURT—Yes; my idea is to hold the case and to have that sludge cleaned out. I think it ought to be done jointly at the expense of the canal and at the expense of your people, and then
 20 start fresh and make your experiments. You won't have any water in the canal for a long time to come, anyhow, probably; and there will be more fresh sludge settle there, and you can take any quantity of analyses there, and you can soon find out whether your running the mill under the new conditions produces any particular quantity of lime, increases the hardness appreciably.

30

40

FINAL DECREE.

FILED SEPTEMBER 12, 1906.

This cause having been referred to the Honorable Henry C. Pitney, one of the Vice-Chancellors of this Court, who proceeded to hear the same on the fourth day of April, nineteen hundred and six, on which day the complainants, Thomas Oakes, David Oakes and George A. Oakes, partners, etc., applied 10
for leave to be admitted as parties complainant, on the ground that they were interested with the complainants named in the bill in the subject matter and prayer of the bill, and were duly admitted complainants by order of that date without change in the pleadings, and the said Vice-Chancellor in the presence of Collins & Corbin, of counsel for the complainants, the Morris Canal and Banking Company and the Lehigh Valley Railroad Com- 20
pany. Harry E. Richards, of counsel for Thomas Oakes & Company, and Frederick T. Johnson of counsel for the defendant, having read the pleadings and heard and considered the evidence taken in the said cause and the arguments of counsel for the complainants and defendant, and having concluded that the complainants are not or are any or either of them entitled to the relief prayed for by their said bill,

It is, on this twelfth day of September, nineteen hundred and six, ordered, adjudged and decreed 20
that the said bill be, and the same is hereby dismissed as to all of the said complainants. And it is further ordered, that the complainants pay to the said defendant's solicitors the defendant's costs of this suit to be taxed.

W. J. MAGIE,
C.

Respectfully advised,

H. C. PITNEY,

V. C.

OPINION.

SEPTEMBER 1st, 1906.

The bill as originally framed was filed November 29th, 1905, by the Morris Canal and Banking Company and its lessee, the Lehigh Valley Railroad Company, against the Diamond Mills Paper Company, and the answer thereto was filed January 11th, 1906, and an amended answer was filed March 13th, 1906.

The cause was set down for hearing on the fourth of April, 1906, and on that day the firm of Thomas Oakes & Co., in the name of its individual members applied for leave to be made parties complainant, on the ground that they were interested with the canal company in the subject matter and prayer of the bill, and were duly admitted complainants by an order of that date. No change was made in the pleadings.

MR. GILBERT COLLINS and MR. GEORGE S. HOBART for the Canal Company.

MR. HARRY E. RICHARDS for Thomas Oakes & COMPANY.

MR. FREDERICK T. JOHNSON for the defendant.

30 PITNEY, V. C.

The case made by the bill has a double aspect.

In the first place, it charges the defendant with emptying into the canal certain solid matter which there accumulates and is required to be occasionally removed by the canal company in order to properly facilitate the operation of its canal.

In the second place, it charges the defendant with discharging into the canal certain waters holding lime in solution, which lime water is of no

injury whatever to the canal company, but which it finds convenient to discharge into a small stream called Third River, through which the lime water finds its way into the mill pond of the complainants Oakes, who are manufacturers of woolen goods for men's wear, and use the waters of their mill pond for making dyes, and when the water becomes impregnated with lime above a certain degree it becomes unfit for dyeing purposes. 10

Oakes & Company complained to the canal company for discharging this lime water into their mill pond, and the canal company, by way of defending themselves against this complaint, filed this bill against the paper company. Then, after answer filed and on the day set for hearing, Oakes & Company applied for leave to be made complainants with the canal company, taking the pleadings precisely as they stood. An order was thereupon made admitting them, against the strong protest of the counsel for the paper company. 20

I must say that I think it a matter of regret that Oakes & Company did not, in the first instance, file their bill against the canal company, against which, it is not improper at this point to say, they seem to have a perfect case.

Taking up now the case made by the pleadings and proofs, we find the following facts: 30

The Morris Canal as originally constructed had an unbroken level from a point near Lincoln Park in Morris County, to Bloomfield, in Essex County, known as the seventeen mile level.

At Bloomfield it descended a vertical height of sixty feet by an inclined plane, known as "Number 11 East."

The mechanism of the plane is this: an inclined railroad upon which runs a large car or cradle 40

which runs down into the water at each end and takes on a canal boat, which it carries up or down, as the case may be, from one level of the canal to the other.

The motive power is a water wheel, known as the "Scotch Motor," being a hollow vertical shaft with hollow arms and openings on one side, from
 10 which the escaping water causes the shaft to revolve, which drives a drum, around which is wound a wire cable, which in turn is attached to the car or cradle, and in performing its work passes around a large horizontal wheel lying in a pit at the foot of the plane (also at the head).

This pit is sufficiently depressed below the level of the bottom of the canal to receive the car or cradle at a sufficient depth to allow the boat to be floated
 20 on and off of it.

This depression in the bottom of the canal was, in the evidence, called the "Wheel Pit."

In the year 1858 the canal company, finding that it was able to divert from the Passaic River above Little Falls without being prevented by the Water Power Company of Paterson, more water than it really needed for operating its canal from that
 30 point to tide water, conceived the idea of selling water power at its Bloomfield plane, and in that year granted in perpetuity to one Unangst the right to use what was called the "feed water" of the canal, for an annual rental.

The grant contemplated the use of the water in two sections of over twenty feet vertical fall each.

This grant was acted upon by the assignees of Unangst almost immediately, and about forty years ago a paper mill was established on the lower section, and a paper mill has been there maintained
 40

New Jersey State Library

and used ever since, with some slight interruptions which I will refer to farther on.

By the terms of the grant all the water used must be returned into the canal at the foot of the plane, and in point of fact that has been done by the several successions of paper mills which for all these years have occupied the location of the defendant's paper mill. 10

The defendant came into possession and title in the year 1894.

A previous occupant had failed financially in 1888-90, and the mill had lain idle for a considerable period of time. A successful occupant took it about 1890.

When the defendant took possession it immediately expended many thousands of dollars in repairs and additions to the mill, necessary for the manufacture of its peculiar product — white tissue paper. 20

This was done openly and under circumstances which must have brought it to the knowledge of the canal company and its officers. That company was entirely familiar, by many years' experience of a succession of paper mills, with the effect of its operation on the operation of the canal. And if it had any objections to the operation of a paper mill at that point it seems to me it should then have made them; and having stood by while these large expenditures were being made it is now estopped from asserting that any injury has been done or is being done to it by the defendant's operation. 30

But to dispose of this part of the case at once I will say that at the earnest request of all parties, on April 5th, 190 , I visited the mill plant in their presence and was pointed out the whole operation of paper making from beginning to end, and saw 40

with my own eyes the results. And some of my observations at the time were taken down by the stenographer.

In the course of the manufacture the raw material, composed of the clippings of white linen or other white material, was ground into a fine pulp and in a milky condition was passed over a fine
 10 moving wire screen, the object of which is to allow the liquid to escape and the fine fiber to be carried on, dried, and made into paper. But the mesh of the screen cannot be made so fine as to allow the water to escape without carrying with it a small quantity of white fibre which is discharged with the water at the foot of the plane. To a casual observer the fibre laden water appears like lime water. Beside this fibre there is absolutely nothing
 20 emptied into the canal by the defendant which can possibly interfere with its operation.

When the canal is substantially idle and the water drawn out, as it is every winter and has been for the whole season for a considerable period of late years, and no boats are moving and the large circular wheel in the wheel pit is not revolving to stir up the fine and exceedingly light fibrous and fluffly matter, it settles in considerable quantities and turns to a dark gray color.

30 And here it may be proper to remark that there are several different channels in which the water passes from the upper level to the lower level of the canal.

One is the tail race of the Scotch Motor which carries the boats up and down; and when few, if any, boats are moving, little or no water comes in that way.

Another is the old original by-race which carries the actual overflow of water from the upper to
 40 the lower level.

And the third is the tail race of the turbine wheel which in part drives the machinery of the paper mill. Besides these there is the water actually used in the washers and also beaters, which grind the rags into pulp, and the water which drains off through the wire screens, as before remarked.

Now, the turbine wheels, which are relied upon in 10 part to drive the machinery of the paper mill, are gauged to suit the quantity of surplus water which the canal can furnish when it is in full and active operation. The remainder of the power necessary for driving machinery is supplied by steam.

The result of this situation is that for the last two or three years and more, during which not a third of the number of boats have passed through the canal of what formerly passed through, the inactivity of the water and horizontal wheel at the 20 foot of the plane have allowed a much larger quantity of fibre to stop and settle there than would have been the case, or ever had been the case, when the canal was in anything like active operation.

Upon the whole case and quite independent of the question of estoppel, I am not satisfied that the canal company is suffering any substantial injury from the operation of the defendant's mill. I will 30 give more in detail farther on my reasons for this.

The contribution of water highly impregnated with lime held in suspension to the canal by the paper company furnishes a more serious question. There is no doubt that up to the time of the hearing the defendant did deliver at the foot of the plane more or less water highly impregnated with lime. Samples taken in January, 1906, and again in March, 1906, and I believe fairly taken, did indeed 40 show no unusual quantity of lime. But samples

of water thickened with fibre taken from the wheel pit in my presence on April 5th, 1906, upon analysis did show a large quantity of lime.

Let us now inquire how and under what circumstances this lime gets into the Oakes' mill pond.

10 The canal at the foot of the plane is several feet higher than Third River, which runs near it, and as the wheel pit is two or three feet deeper than the canal, and of course the emptying of the canal does not drain it, in order to drain it an underground conduit is provided leading from its bottom to the edge of the river. In my presence the gate or stop at the upper end of this conduit was opened and the water in the pit permitted to run out into Third River. No evidence at the next hearing on
20 May 26th, 1906, was offered to show that this contribution of lime water affected the hardness of the water at Oakes' mill, though it was quite easy to make the test. All that was shown on this subject was that a discoloration of the water was seen at the head of the pond. Samples of water taken from the pond on May 3rd showed no more hardness in the water than usual.

30 And I shall assume, however, that the emptying of that wheel pit, when charged with sludge, into the pond would have the effect of temporarily making the water at Oakes' mill too hard for use in making dyes.

The evidence of the experts was to the effect that the limit of hardness in water for use in making dyes was thirteen or fourteen degrees of hardness by Clark's test, and that the natural hardness of Third River was from eight to eleven degrees, varying with the seasons of the year, so that there was a margin of softness of in the neighborhood of three degrees. Now, the evidence was entirely
40 clear that on several occasions prior to the filing of

the bill the water was much too hard for use for dyeing purposes, and the evidence satisfies me that that that hardness was due to the emptying of the water from the canal into Third River, and the hardness of the canal water in its turn was due to lime contributed to it by the defendant's paper mill.

The canal crosses Third River just below plane 10 eleven by an aqueduct made of planks, being a part of what is called the one mile level just below plane eleven, ending in a lock. The canal company provided this aqueduct with large gates at one side of it by which the water can be conveniently and rapidly drawn out of that one mile level and into Third River. But I find as a matter of fact from the evidence that it was in nowise necessary for them to empty it at that point.

There was another gate in the side of the canal 20 near or at Second River, on the next level below, where it could be equally well discharged, though perhaps not so rapidly.

But with regard to the water settling in the wheel pit below the plane and below the level of the canal bottom, that could only be discharged by the underground conduit previously mentioned, ending at the edge of Third River, and thus necessarily mingling with the waters of Oakes' mill 30 pond.

Now, with regard to the sludge which, while the canal is not in operation, settles and accumulates in the wheel pit. It is composed largely of this very minute white fiber which is given off by the paper machines in the process of manufacture. It is exposed, in the process, to contact with water highly impregnated with lime held in solution, and seems to have a great affinity for lime and a sort of 40 capacity for grasping and holding it when it sub-

sides, as it does when the canal is not in operation, at the foot of the plane and the wheel pit becomes a sort of reservoir for lime. This attraction for lime and capacity to grasp and hold it accounts for the large amount of lime found in the sludge and sludge water, samples of which were taken in my presence, as before stated.

- 10 Now, this fibre subsides very slowly and is easily excited by any physical disturbance and mixes readily with the water above. The proof of the canal witnesses was that, while the canal was in operation, it was stirred up by the horizontal wheel and carried along for miles by the passing boats and the current of the water, and finally deposited in the bottom of the canal or carried on through to an overflow or outlet. It formed no obstacle whatever to the navigation of the canal. But in years
- 20 gone by a quantity would naturally, in the winter season, as before remarked, accumulate around the wheel in the pit; and in the spring, when the canal was being prepared for navigation, it had to be removed. Now, a very easy mode of removal was to let down into the wheel pit a heavy flow of water, which was easily done through the tail-race of the Scotch motor and the side wash, open the lock gates at the end of the one mile level or in the side of the
- 30 aqueduct over Third River; stir up the sludge with a rake or hoe, and let it wash down the canal.

I am entirely satisfied, from a careful study of the evidence and an observation of the matter on the ground, that this was actually done by the canal employees in several instances in the spring of the year and the whole or the greater part of the contents of this wheel pit emptied into Oakes' mill pond. And this mode of disposing of the sludge highly impregnated with lime accounts for the fact

40 that the Oakes' were troubled with this excess of

lime in their mill pond only just after one of these annual discharges, the effect being felt, as they swear, on one occasion several weeks.

Now, I find, as a matter of fact, that there is no sort of necessity for the canal company to discharge this accumulation of lime into Oakes' mill pond. I find that it can all be driven down beyond the river and pond and deposited where it will be harmless. 10

I find further, as a fact, that it is entirely practicable for the canal company not only to substantially free the wheel pit of sludge in the manner just stated, but also, by flushing it freely with water, that it may at any time after such flushing empty the water left in the pit out into Third River without any appreciable injury to the waters of that river. I doubt if the whole liquid contents of the pit, highly charged as they were with lime, which were discharged into the river on the 5th of April, in my presence, had any appreciable effect on Third River. The quantity of water in the wheel pit was too small in comparison with the size of Oakes' pond to produce any appreciable effect. A different result, however, might be expected from the discharge into the river of the sludge there deposited which, as before remarked, contained a large amount of lime ready to be taken up and held in suspension by running water. But that highly charged water can be easily flushed out by a free discharge of clear water from the upper level into the canal with the gates of the next lock below opened to insure a free flow. I find, therefore, as a fact, that there is no practical difficulty in so operating the canal that practically no lime water shall be delivered by it into Oakes' mill pond. 20 30

Now, to go back again to the paper mill itself.

The process of making this fine white tissue paper 40

is substantially the same as that which is in use in all paper mills for making nearly all kinds of paper and was in use in the paper mills which preceded that of the defendant. All paper making, or nearly all, and all those which preceded the defendant at this point, use chloride of lime in the shape of a bleach. The evidence is clear that those which preceded the defendant used a great deal more than does the defendant; and that formerly they deposited the spent lime with the rest of their refuse in the canal. Complaint was made of this lime deposit from time to time, but it was never remedied until about six or seven years before the bill filed herein, when the defendant corporation, having its attention called to this deposit of lime, made an arrangement by which all its spent lime was deposited on its own ground and carted away. I am satisfied that none of it has found its way into the canal or into Third River. This appears by a careful examination on the mill and all its processes, made on the 5th of April in the presence of all the parties, including one of the Messrs. Oakes and his counsel, Mr. Richards, himself an expert chemist.

In addition to the lime held in solution and grasped, as before stated, by the fine fibre which, escaping through the fine meshes of the endless wire screen, found its way into the canal, there was but one process used by the defendant by which lime, except in fibre, could be contributed thereto by the defendant. That was an instrument called a rotary digester. I have said the defendant company used for its stock entirely the refuse cuttings from shirt factories. These were all perfectly clean and nearly all pure white. But they did also use some clippings of a figured material for shirts containing colors, and in order to remove these colors they subjected this material to the action of this

digester in contact with a chemical liquid of which lime, as milk of lime, was a component part.

The amount of lime used in this digester was so small that it had not been supposed that it could seriously affect the water of the canal. Upon attention being called on April 4th to this matter, the defendant company at once took measures to have even this small quantity of lime separated and kept 10 by itself and excluded from the canal or the Third River, and these measures were perfected before the final hearing.

It is proper to remark that the liquid which comes from this digester is dark in color, and accounts for the dark color of the refuse sometimes seen coming from defendant's mill, in sharp contrast with the usual pure milky flow whose hue, or rather lack of hue, was due to the fine white fibre.

I will here state the process of making tissue paper from pure white clippings, as detailed by Col. Thompson, the president of the defendant company, and as witnessed by all of us on the 5th of April. The clippings are first sorted over to remove as far as practicable, any colored cloth or foreign material. They are then cut up while dry, reducing them to a proper fineness to be washed. They are then immersed in a bleach, being a weak solution of water and chlorine and agitated. This is called washing 20 them. They are then placed on a drainer to allow this chlorine water or bleach to drain off. This water, after being drained off, is pumped up and used over again. The rags are then subjected to an anti-chlorine treatment to remove, as far as practicable, all chlorine that may remain. They are then placed in an engine called a beater, wherein they are subjected to a severe process which reduces them to a fine white pulp. This pulp is then placed on a moving wire screen with a mesh of 40

about ninety to the inch. The water is drained out and with it some of the fibre, and this water, rendered milky in appearance by the fibre, runs down into the canal.

One more remark may be made. Notwithstanding any pains taken to prevent any chlorine from escaping there was a slight odor of chlorine in the water at the foot of the plane on the 5th of April. But it clearly appears that this chlorine could not injure the Messrs. Oakes, except as it had a slight tendency to render the water a little harder.

One or two other matters may be mentioned.

The water brought down by the canal is naturally softer than that of Third River, and both are unusually soft. When delivered to the defendant company it contains many foreign matters—decayed vegetables, dead animals and the like—which, before using it for washing the rags, are carefully and thoroughly excluded.

The deposit found in the wheel pit is not composed exclusively of the refuse fibre of the mill, but there is also found in it leaves, decayed vegetables and some ordinary earth, gravel and coal ashes, which find their way into it in the shape of wash from one or two roads in the neighborhood and from the banks of the canal.

Let us now inquire as to the rights of the parties under this state of facts. I have already intimated that the canal company has no cause of action. There was, indeed, a hiatus of about two years at or near 1890 when the paper mill in existence at this point was idle, but that will not help the canal company, for it abundantly appears that it had already been in existence under the grant of the canal company to Unangst for more than twenty years before this suspension, and though the grant

itself does not specify any particular use to which the water power should be put, yet its use for so many years by a paper mill, operated in its most offensive manner, ripened into a right; moreover, I think that the defendant's argument, that it was a practical construction placed by the parties upon the terms of the grant, is sound.

The canal company, it appears, did, from time to time, object to the paper mill people casting refuse matters into the canal, but it appears that those refuse matters were lime in its crude condition and pieces of rope and jute canvas, and things of that sort which defendant does not claim the right to place there and is not in the habit of placing there. 10

The proof does not satisfy me that the canal company ever seriously objected to the discharge in the canal of the pulp fibre which, during all this time had been discharged and, as the evidence satisfies me, in much greater bulk and quantity than the defendant has ever done, the discharge of which is quite necessary for the making of paper. 20

Under the doctrine of *McFarlan vs. Canal Co.*, 14 Vr., 605, a verbal protest was inefficient to arrest the running of time for the purpose of acquiring a right by virtue of adverse user.

The only possible effect that I can conceive that a verbal protest has upon the relative rights of the parties is to so far modify the practical construction which the parties have put upon the contract as to reduce the quantity and offensive character of the contribution by the paper mill to the canal to such matters as did not affect injuriously the operation of the canal and could not from the very nature of things extend to the contribution of so much of the paper pulp as the proof shows necessarily must escape from the machines. 30
40

But be that as it may, I think, as before stated, the canal company is clearly estopped by its standing by without objection, while the defendant was expending thousands of dollars in repairs and additions to the structure of the mill building, and many more thousands in the introduction and installing therein of new and expensive machinery.

10 There remains to deal with the position of the Oakes Company.

I have found, as a matter of fact, that there was no necessity for the canal company to deposit any of this lime water or lime bearing material into Third River.

I have found also that the defendant was guilty of no wrong to the canal company in any deposit which it has made in the canal.

20 Now, before the Oakes' Company can show itself entitled to a remedy by injunction against the defendant it must show that the defendant is doing it an injury for which it would have a remedy at law.

Now, I find it difficult to see where the defendant is doing the Oakes' Company any actionable injury. The contribution of lime held in suspension or in the grasp of paper fibre to the waters of the canal is not the cause of any injury to the
30 Oakes. That injury is due to the independent action of a third party, the canal company, in causing that lime to be emptied into Third River.

Chief Justice Cooley, treating of this subject in his book on Torts, page 68, says: "If an injury has resulted in consequence of a certain *wrongful* act or omission, but only through or by means of some intervening cause, from which last cause the injury followed as a direct and immediate consequence, the law will refer the damage to the last or proximate cause, and refuse to trace it to that which was
40

more remote." And further on, at page 70, he says: "If the original act was wrongful, and would naturally, according to the ordinary course of events, prove injurious to some other person or persons, and does actually result in injury through the intervention of other causes which are not wrongful, the injury shall be referred to the wrongful cause, passing by those which are innocent. But if the original wrong only becomes injurious in consequence of the intervention of some distinct wrongful act or omission by another, the injury shall be imputed to the last wrong as the proximate cause, and not to that which was more remote." 10

The learned author, in support of these propositions, cites several adjudged cases, commencing with the famous Squib Case of *Scott vs. Shepherd*, 3 Wil., 403, and he also mentions *Morrison vs. Davis*, 20 Pa. St., 171; *Michaels vs. N. Y. Cen. R. R.*, 30 N. Y., 564. 20

Now, here, granting for argument's sake only that the defendant committed a wrong as against the canal company in depositing the lime bearing material in the canal, that wrong would never have injured the complainant Oakes if the canal company had not in turn deposited it in the Third River. So that, according to the well settled canon in such cases, the Oakes' Company have no cause of action against the defendant. 30

But there is another point of view worthy of notice. The deposit of lime water in the canal was not inherently injurious to the canal for any purpose, hence it was not what may be termed a natural wrong, whatever it may have been, if deposited in Third River.

Now, it is of the essence of the proposition that a party secondarily injured shall not, under any cir- 40

cumstances, be allowed to go back to the original cause of the injury for a remedy when the original act was not a wrongful act in itself, as in the case of the original thrower of the squib.

I find no authority for the position that an act originally innocent of itself can be turned into a wrongful act by the intervention of the act of some
10 third party.

These considerations lead me to the conclusion that none of the complainants are entitled to relief, and I will advise that the bill be dismissed.

20

30

40

APPEAL.

FILED SEPT. 21, 1906.

The complainants jointly and severally hereby appeal from the whole and every part of the decree of this Court made in the above stated cause on the twelfth day of September, nineteen hundred and six, to the Court of Errors and Appeals in the last resort in all cases. 10

COLLINS & CORBIN,
HARRY E. RICHARDS,
Solicitors of Complainants.
GILBERT COLLINS,
Of Counsel.

Dated September 21st, 1906.

I conceive there is good cause for appeal in the above stated cause. 20

GILBERT COLLINS,
Of Counsel with the Complainants.

PETITION OF APPEAL.

FILED OCT. 12, 1906.

To the Honorable Court of Errors and Appeals in the last resort in all causes.

The petition of the Morris Canal and Banking Company and the Lehigh Valley Railroad Company, lessees of the Morris Canal and Banking Company, and Thomas Oakes, David Oakes, and George A. Oakes, the appellants in the above stated cause, respectfully shows that your petitioners find themselves aggrieved by a final decree made in the Court of Chancery by his Honor William J. Magie, Chancellor of the State of New Jersey, bearing date the twelfth day of September, nineteen hundred and six, in a cause wherein the said appellants were 40

complainants, and the Diamond Mills Paper Company was defendant, in this respect, to wit, that the said decree dismisses the bill of complaint in said cause as to all of the complainants, and awards costs against the said complainants.

And your petitioners appeal from the whole and every part of the said decree upon the grounds that
 10 the same is erroneous for that (1) the said bill should have been sustained as to some or all of the complainants, and a decree made for the injunctive restraint prayed in the bill of complaint, and (2) even if the bill were rightly dismissed as to all of the complaints no costs should have been awarded against them.

Your petitioners, therefore, pray, that the said decree may be wholly or in part reversed, set aside,
 20 and for nothing holden, and that your petitioners may have such relief in the premises as to this Honorable Court shall seem meet.

COLLINS & CORBIN,
 Solicitors for Appellants the Morris
 Canal and Banking Company, and
 the Lehigh Valley Railroad Company.

HARRY E. RICHARDS,
 Solicitor for Thomas Oakes, David
 Oakes, and George A. Oakes.

30 Dated October 11th, 1906.

COMPLAINANT'S EXHIBITS.

EXHIBIT C 1.

Map, not printed.

EXHIBIT C 2.

10

PHILLIPSBURG, N. J., April 26, 1905.

The Diamond Mills Paper Co.,
Bloomfield, N. J.

GENTLEMEN :

It has come to my notice that you are emptying from your mills into the raceway through which water flows into the Morris Canal at the foot of Plane 11 East, solid matter in such quantities as is claimed to contaminate the waters and cause injury to other interests. 20

You are hereby notified to discontinue at once discharging from your mills anything into the waters that empty into the canal that may discolor, contaminate or make a sediment in the canal.

yours truly,

(Sig.) W. I. POWERS,
Superintendent.

 30

EXHIBIT C 3.

Unangst Agreement. Printed as Exhibit A, annexed to Bill of Complaint.

EXHIBIT C 4.

BLOOMFIELD, N. J., Sept. 12, 1905.

Discolored water running in the canal from the 40

Diamond Mills Paper Company on the following dates:

Aug. 31st—11 A. M.
 Sept. 1st— 6 A. M.
 “ 2d — 9 A. M.
 “ 4th—11 A. M.
 “ 5th— 1 P. M.
 10 “ 6th—11.30 A. M.
 “ 7th—11.30 A. M.
 “ 8th—11.55 A. M.
 “ 11th— 1.30 P. M.

RICHARD SHEARS,
 CHARLES RUGG.

BLOOMFIELD, May 26th, 1905.

Discolored water coming from the Diamond Mills
 Paper Mill on the following dates :

20 May 26th—4 P. M.
 “ 27th—6 P. M.
 “ 30th—6 P. M.
 June 1st —12 M.
 “ 2d — 7 A. M. and 4 P. M.
 “ 7th — 1 P. M.
 “ 8th — 9 A. M.
 “ 9th —
 “ 10th —
 30 “ 12th — 4 P. M.
 “ 13th —12 M.
 “ 16th — 7 A. M.
 “ 17th — 9 A. M.
 “ 19th — 6 P. M.
 “ 20th —11 A. M.
 “ 26th — 4 P. M.
 “ 27th — 3 P. M.
 “ 29th —11 A. M. and 6 P. M.
 July 1st — 1 P. M.
 40 “ 5th — 2 P. M.

July 6th — 3 P. M.
 “ 8th — 11.30 A. M.
 “ 10th — 10 A. M.
 “ 11th — 11 A. M.
 “ 13th — 2 P. M.
 “ 14th — 11.30 A. M.
 “ 15th — 11.30 A. M.
 “ 17th — 10.30 A. M. 10

Bloomfield, July 17, 1905.

RICHARD SHEARS, Pt. No. 11 E.
 CHARLES RUGG, B. K. P. No. 11 E.

EXHIBIT C 1, MAY 16.
 Printed at page 250.

20

EXHIBIT C 2, MAY 16,
 Printed at page 253.

EXHIBIT C 3, MAY 16.
 Printed at page 256.

EXHIBIT C 4, MAY 16 30
 Printed at page 258.

EXHIBIT C 5.
 Printed at page 260.

EXHIBIT C 6, MAY 16.
 Printed at page 261 40

EXHIBIT D 2.

JONATHAN W. POTTER,
 TO
 ROBERT W. SOUTHMAYD AND
 CHARLES A. McCracken.

10

Deed dated November 1, 1865; recorded September 25th, 1867, in Book N 13, pages 544-545 of Deeds.

Recites agreements recorded in Q 10-194 and P 11-59.

Permits and grants to the said Robert W. Southmayd and Charles A. McCracken, their heirs and assigns, in consideration of the sum of four hundred and fifty dollars to be paid as annual rent, yearly and every year during the operation of this agreement and the continuance of this demise, "the right to use and employ the said feed water on the second level of the said inclined plane, and after the same has passed into and from the tail race of the mill of the said Jonathan W. Potter, as fully and beneficially as the said party of the first part is by the terms of the above mentioned agreement authorized to grant the same, and subject to the stipulations mentioned in this agreement, as well as in the said agreement between the said canal company and Christopher T. Unangst."

"And it is hereby further agreed that the water after being used by the said party of the second part shall be conveyed into the said canal."

40

EXHIBIT D 3, MAY 16.

ROBERT W. SOUTHMAYD AND
CHARLES A. MCCRACKEN,

TO

ARCHIBALD T. FINN.

10

Agreement dated November 28th, 1866,
and recorded in Book N 13, p. 546, of
Deeds on September 25th, 1867.

Recites agreements in Q 10-194, P 11-59, N 13-
544.

20 Sells, grants and assigns, in consideration of one
dollar, to the said Archibald T. Finn, his heirs and
assigns, all the right of the said Southmayd and
McCracken, "to use and employ the said feed water
on the second level of the said inclined plane
granted to them as aforesaid by the said Jonathan
W. Potter, subject nevertheless, to all the condi-
tions and stipulations contained in all the aforesaid
agreements and grants, the said party of the
second part hereby agreeing to conform to and
30 comply with all the said conditions and stipula-
tions."

EXHIBIT D 4, MAY 16.

ARCHIBALD T. FINN,
 TO
 SILVER SPRING PAPER COMPANY.

10

Agreement dated Aug. 23, 1870; recorded
 N 21, p. 387 of Deeds on August 14,
 1882.

Recites agreements above stated, recorded in Q
 10-194, P 11-59, N 13-544, N 13-546.

Sells, grants, assigns and conveys in considera-
 tion of the sum of one dollar to the said Silver
 Spring Paper Company, its successors and assigns,
 all the right of the said Archibald T. Finn, "to use²⁰
 and employ all the said feed water on the second
 level of the said inclined plane, granted, to him
 as aforesaid. Subject, nevertheless, to all the con-
 ditions and stipulations contained in all the afore-
 said agreements and grants, the said party of the
 second part hereby agreeing to conform to and com-
 ply with all the said conditions and stipulations."

30

40

EXHIBIT D 5, MAY 16.

THE SILVER SPRING PAPER COM-
PANY,

to

10

ELISHA M. FULTON.

Deed dated March 22, 1882; recorded in N
21, p. 395 of Deeds on August 14,
1882.

Recites agreement above stated in Q 10-194, P
11-59, N 13-544, N 13-546, N 21-387.

Sells, grants, assigns and conveys in considera-
20 tion of the sum of one dollar to the said Elisha M.
Fulton, his heirs and assigns, all the right of the
said Silver Spring Paper Company, "to use and
employ the said feed water on the second level of
the said inclined plane, granted to it as aforesaid,
or held and enjoyed by it in any other manner
whatsoever. Subject nevertheless to all the con-
ditions and stipulations contained in all the afore-
said agreements and grants, the said party of the
second part agreeing to conform to and comply
30 with all the said conditions and stipulations."

EXHIBIT D 7.

ELISHA M. FULTON AND SARAH C., HIS WIFE, <i>to</i> ESSEX PAPER COMPANY.	}
--	---

10

Deed dated December 11, 1883, recorded in
 B 22, p. 470 of Deeds on December 15,
 1883.

Recites agreements and deed recorded in Q 10-
 194, P. 11-59, N 13-544, N 13-546, N 21-387, N 21-
 395.

Sells, grants, assigns and conveys in considera-
 tion of the sum of one dollar to the Essex Paper 20
 Company, its successors and assigns, all the right
 of the said Elisha M. Fulton and wife, "to use and
 employ the said feed water on the second level of the
 said inclined plane as contained in the grant or
 agreement from the said Potter to the said South-
 mayd and McCracken aforesaid; subject, neverthe-
 less, to the covenants, conditions and stipulations
 in all the aforesaid grants or agreements contained,
 the said party of the second part hereby agreeing 30
 to conform to and comply with all the covenants,
 conditions and stipulations aforesaid, and to pay
 such rent as may hereafter and from time to time
 become due for and on account of said water under
 the said grants and agreements."

40

EXHIBIT D 8.

	EDWIN W. HINE,	}
	<i>to</i>	
10	MARIE ANTOINETTE WHITLOCK.	}

Sheriff's Deed, dated August 3, 1889; re-
 corded August 19, 1889, Bk. T 24 of
 Deeds, p. 558-562.

Recites sale of the property in the deed under a certain decree made in the Court of Chancery on the 25th of May, 1889, in a certain cause therein depending, wherein Marie Antoinette Whitlock is complainant, and the Essex Paper Company, The
 20 Guaranty Trust and Safe Deposit Company of Philadelphia and Maurice O'Meara are defendants.

In consideration of \$15,000 conveys property in Township of Bloomfield on the westerly side of the road lying along the inclined plane of the Morris Canal on the southeast corner of land now or late of J. W. Potter, containing 63-100 acres more or less; also a strip of land on the west side of the ward above described, &c.

30 "Also conveys land on the southerly side of the present road leading from Bloomfield to Franklin at the southeast outside corner of the abutment of the stone arch bridge over Third River, containing one acre more or less.

The above described tracts being the same as were conveyed by Elisha M. Fulton and wife to the Essex Paper Company by deed dated December 11th, 1883.

40 "Together with the rights and privileges granted

by Jonathan W. Potter to Robert W. Southmayd and Charles W. McCracken by his certain agreement or deed bearing date on or about December 1, 1865, and recorded in the Register's Office of Essex County, in Book N 13 of Deeds, 534, etc., as by reference to said deed will appear. Subject to the conditions, limitations and covenants in said deed expressed."

10

EXHIBIT D 8a.

MARIE A. WHITLOCK,	}
<i>to</i>	
ELISHA M. FULTON.	

Deed dated June 4, 1891; recorded M 26, p. 20
325, on November 17, 1891.

Recites agreements and deeds above stated, recorded in Q 10-194, P 11-59, N 13-544, N 13-546, N 21-387, N 21-395, B 22-470, T 24-558.

Sells, grants, assigns and conveys in consideration of the sum of one dollar to the said Elisha M. Fulton, his heirs and assigns, all the right of the said Marie A. Whitlock, "to use and employ the said feed water on the second level of the said inclined plane, and after the same has passed into and through the tail-race of the mill, now or late of Jonathan W. Potter as fully and beneficially as she acquired the same by virtue of the above mentioned agreements and grants. Subject, nevertheless, to all the conditions and stipulations contained in all the aforesaid agreements and grants, the said party of the second part hereby agreeing to conform to and comply with all the said conditions and stipulations."

30

40

EXHIBIT D 9.

10	ELISHA M. FULTON, <i>to</i> NATIONAL PAPER MANUFACTUR- ING COMPANY.
----	--

Deed dated July 13, 1891; recorded M 26, p.
326, on November 17, 1891.

Recites conditions and agreements above stated,
recorded in Q 10-194, P 11-59, N 13-544, N 13-546,
N 21-387, N 21-295, B 22-470, T 24-558, M 26-325.

20 Sells, grants, assigns and conveys in considera-
tion of the sum of one dollar to the said National
Paper Manufacturing Company, its successors and
assigns forever, all the right of the said Elisha M.
Fulton "to use and employ the said feed water on
the second level of the inclined plane and after the
same has passed into and from the tail-race of the
mill, now or late of Jonathan W. Potter as fully
and beneficially as he acquired the same by virtue
of the above mentioned agreements and grants,
30 subject nevertheless to all the conditions and stipu-
lations contained in all the aforesaid agreements
and grants, the said party of the second part hereby
agreeing to conform to and comply with all the said
conditions and stipulations."

EXHIBIT D 10.

NATIONAL PAPER MANUFACTUR- ING COMPANY,	}
<i>to</i>	
THE UNITED PAPER COMPANY.	

10

Deed dated October 1, 1893, Bk. F 27, p. 480,
on January 31, 1894.

Recites agreements and deeds recorded in Q
10-194, P 11-59, N 13-544, N 13-546, N 21-387, N
21-295, B 22-470, T 24-558, M 26-325, M 26-326.

Sells, grants and conveys in consideration of the
sum of one dollar to the said United Paper Com-
pany, its successors and assigns all the right of the 20
said National Paper Manufacturing Company "to
use and employ the said feed water on the second
level of the said inclined plane and after the same
has passed into and from the tail-race of the mill
now or late of Jonathan W. Potter, as fully and
beneficially as it acquired the same by virtue of the
above mentioned agreement and grants, subject
nevertheless to all the conditions and stipulations
contained in all the aforesaid agreements and
grants, the said party of the second part hereby 30
agreeing to conform to and comply with all the
said conditions and stipulations."

40

EXHIBIT D 3.

FREDERICK K. DAY, RECEIVER,
OF UNITED PAPER COMPANY,

to

ELISHA M. FULTON.

10

Deed dated July 3, 1894; Bk. M. 28, p. 191;
recorded July 10, 1894.

Recites an order of the Court of Chancery made on the 9th day of May, 1893, in a certain cause in said Court depending in which Edward La Montague, Jr., and others were complainants and the said United Paper Company was defendant, in which it was ordered that the said Frederick K. Day together with one Herman Clark be appointed receivers of the said Company; that the said receivers qualified and enter upon the duties of their office; that the said Frederick K. Day, Receiver, on the 19th day of December, 1893, exhibited for sale the land and premises, water rights, and machinery, tools and fixtures thereafter particularly described and sold the same to the party of the second part, the said Elisha M. Fulton, for twenty thousand dollars; that by another order of the Court the appointment of the said Herman Clarke was vacated and the said Day continued as sole receiver, and a further order of the Court confirming the said sale. Grants, bargains, sells and conveys in consideration of the sum of twenty thousand dollars to the said party of the second part, his heirs and assigns, four tracts of land in the said deed particularly described, situated in the Township of Bloomfield in the County of Essex and State of New Jersey.

40

“Together with the machinery, tools and fixtures in and about the above described premises, and all the water rights and privileges connected therewith, and especially the water rights and privileges granted by Jonathan W. Potter to Robert W. Southmayd and Charles A. McCracken by his certain agreement or deed of grant bearing date on or about December, 1, 1865, and recorded in the Register’s Office of Essex County in Book N 13 of deeds, at pages 534, etc., as by reference to said deed will appear. Subject to the conditions, limitations and covenants in said deed expressed.” 10

And being the same land and premises, machinery, tools and fixtures and water rights which were conveyed to the United Paper Company by National Paper Manufacturing Company by Deed dated October 1, 1892 and recorded in the Register’s Office of Essex County in Book F 27 of Deeds, at page 277, and by deed of the said water rights dated October 1, 1892 and recorded in said Register’s Office F 27 of Deeds, at page 480. 20

30

40

EXHIBIT D 4.

ELISHA M. FULTON AND SARAH
C. HIS WIFE,

to

DIAMOND MILLS PAPER COM-
PANY, A CORPORATION OF THE
10 STATE OF NEW YORK.

Deed dated July 3, 1894; recorded M 28,
p. 194, on July 10, 1894.

Grants, bargains, sells and conveys in considera-
tion of the sum of one dollar and other valuable
considerations four tracts of land in the Township
of Bloomfield, in the County of Essex and State of
New Jersey:

20 "Together with the machinery, tools and fixtures
in and about the above described premises, and all
the water right and privileges connected therewith
and especially the water rights and privileges
granted by Jonathan W. Potter to Robert W.
Southmayd and Charles A. McCracken by his
certain agreement or deed of grant bearing date
on or about December 1st, 1865 and recorded in the
Register's Office of Essex County in Book N 13 of
deeds, on pages 544, etc., as by reference to said
30 deed will appear. Subject to the conditions, limi-
tations and covenants in said deed expressed. And
being the same land and premises, machinery, tools,
fixtures and water rights which were conveyed to
the United Paper Company by the National Paper
Manufacturing Company by deed dated October 1,
1892, and recorded in the Register's Office of Essex
County in Book F 27 of Deeds, at page 477, and by a
deed of the said water rights dated Oct. 1, 1892 and
40 recorded in said Register's Office in Book F 27 of
Deeds, at page 480."

EXHIBIT D 5.

DIAMOND MILLS PAPER COM-
PANY, A CORPORATION OF
NEW YORK STATE,

to

DIAMOND MILLS PAPER COM-
PANY, A CORPORATION OF
THE STATE OF NEW JERSEY.

10

Deed dated Sept. 28, 1894; recorded in O
28, p. 426, on October 1, 1894.

Grants, bargains, sells and conveys in consider-
ation of the sum of one dollar and other valuable
considerations to the said party of the second part, 20
its successors and assigns, four tracts of land and
premises in said deed particularly described in the
Township of Bloomfield, Essex County, New Jer-
sey, "together with the machinery, tools and fix-
tures in and about the above described premises and
all the water rights and privileges connected there-
with, and especially the water rights and privileges
granted by Jonathan W. Potter to Robert W.
Southmayd and Charles A. McCracken, by his cer-
tain agreement or deed of grant bearing date on or 30
about December 1, 1865, and recorded in the Regis-
ter's Office of Essex County, in Book N 13 of
deeds, on pages 544, etc., as by reference to said
deed will appear. Subject to the conditions and
limitations and covenants in said deed expressed."

40

EXHIBIT D 6.

CERTIFICATE OF ORGANIZATION
OF
DIAMOND MILLS PAPER COMPANY.

This is to certify that we, George W. Thompson, of the City of Brooklyn, in the County of Kings and State of New York, Charles G. VanGilder, of Morristown, in the County of Morris and State of New Jersey, and Henry K. Raynolds of the Township of East Orange, in the County of Essex and State of New Jersey, do hereby associate ourselves into a company, under and by virtue of the provisions of the provisions of an Act of the Legislature of New Jersey, entitled "An Act Concerning Corporations," approved April 7th, 1875, and the several supplements thereto, for the purposes hereinafter mentioned, and to that end we do by this our certificate set forth,

FIRST—That the name we have assumed to designate such company and to be used in its business and dealings is Diamond Mills Paper Company.

SECOND—That the places in this State where the business of such company is to be conducted are the Townships of Bloomfield and Milburn, in the County of Essex, and the Township of Hanover, in the County of Morris, and such other place or places as may be found convenient or necessary as the directors of the company may, from to time, determine upon.

The principal part of the business of said company within this State is to be transacted in the said Township of Bloomfield, in the County of Essex, which is to be the principal place of business of the said company, and the place where its principal office is to be located within this State; and

the places out of this State where the same is to be conducted are the City of New York, in the County and State of New York, and the Township of Wawayanda, in the County of Orange, in the State of New York, and such other places in the several States of the United States and elsewhere as, from time to time, may be found necessary or convenient for the purposes of the company's business as the directors of the company may determine upon . 10

The objects for which the company is formed are to purchase, manufacture, sell and deal in all kinds of paper, and also in wood pulps and all the materials commonly or conveniently used in or about the manufacture of paper; to acquire by purchase, lease or other contract, lands and premises, mills and mill plants, patents, processes, machines, businesses and their good will, special papers, labels, trademarks, and any and all other property rights and privileges convenient or necessary for the purposes of such manufacture; to engage in any business or undertaking in any way growing out of or pertaining or relating to any of the aforesaid objects or purposes; to purchase the factories, mills, mill plants and equipment, stock, debts, choses in action and all the property and assets generally of the Diamond Mills Paper Company, a corporation of the State of New York, including the good will of its business, and also other factories, mills and mill plants, and the property and good will of other businesses, and to issue the capital stock of this company in payment therefor; to issue bonds, debentures or obligations of the company, from time to time, for any of the objects or purposes of the company, and to secure the same by mortgage or mortgages, or deed or deeds of trust, on any or all of the property and franchises of the company wheresoever situated, acquired and to be 20
30
40

acquired, and to sell and dispose of the same in such manner and upon such terms as the directors of the company may deem proper; and to do and transact all acts, business or things incident to, or in any-wise connected with, any of the purposes or objects above generally expressed.

10 The portion of the business which is to be carried on out of this State is the manufacture and sale of the various manufactured products of the company above mentioned, and in addition such and so much of the manufacturing, financial and other business of the company as the directors of the company may, from time to time, find convenient or as the needs of the company may require. The principal office or place of business of said company out of this State is the City of New York, in the County and State of New York.

20 **THIRD**—That the total amount of the capital stock of the said company is three hundred thousand dollars; the number of shares into which the same is divided is three thousand, and the par value of each share is one hundred dollars. The amount with which said company will commence business is two thousand dollars, which is divided into twenty shares of the par value of one hundred dollars each.

30 **FOURTH**—The names and residences of the stock holders, and the number of shares held by each, are as follows, to wit:

George W. Thompson, Brooklyn, N. Y., 10 shares.
Charles G. Van Gilder, Morristown, N. J., 5 shares.
Henry K. Raynolds, East Orange, N. J., 5 shares.

40 **FIFTH**—The period at which said company shall commence is the first day of September, eighteen hundred and ninety-four, and the period at which

it shall terminate is the thirty-first day of August, nineteen hundred and forty-four.

IN WITNESS WHEREOF, we have hereunto set our hands and seals the twenty-eighth day of August, eighteen hundred and ninety-four.

GEORGE W. THOMPSON, [L. S.]
 CHARLES G. VANGILDER, [L. S.] 10
 HENRY K. RAYNOLDS, [L. S.]

Signed, sealed and delivered }
 in the presence of }

GERALD R. CUSHMAN.

20

STATE OF NEW YORK, }
 COUNTY OF NEW YORK, } ss.

Be it remembered, that on this twenty-eighth day of August, eighteen hundred and ninety-four, before me, the subscriber, a Master in Chancery of New Jersey, personally appeared George W. Thompson, Charles G. Van Gilder, and Henry K. Raynolds, who I am satisfied are the persons named in and who executed the foregoing certificate of incorporation, and I having first made known to them the contents thereof, they severally acknowledged that they signed, sealed and executed the same as their voluntary act and deed for the uses and purposes therein expressed. 30

GERALD R. CUSHMAN,
 Master in Chancery of New Jersey.

Endorsed:—“Received in the Clerk’s office of the County of Essex, on the 29th day of August, A. D. 40

1894, and recorded in Book 10 of Incop. Bus. Co.
for said County, page 43.

JAMES T. WRIGHTSON,
Clerk."

"Filed August 29, 1894.

10 HENRY C. KELSEY,
Secretary of State."

EXHIBIT A.

20 Frank Carlton Axtell, Ph. D.
Consulting Chemist,
Short Hills, N. J.

SHORT HILLS, N. J., February 8, 1906,

Mr. R. H. Thompson, Treasurer,
Diamond Mills Paper Co.,
Bloomfield, N. J.

30

DEAR SIR:

At your request, I have analyzed four samples of
water taken from various points in the vicinity of
your mill at Bloomfield, the object being to ascer-
tain to what extent, if any, the water of the Morris
Canal was contaminated or rendered unfit for fur-
ther use in manufacturing operations by the chemi-
cals used in your manufacture. These four samples,
40 as received, were assigned as follows:

No. 1. Canal water at headgate of Diamond Mill.

No. 2. Canal water from foot of plane 11.

No. 3. Water from intake at Oakes' Mill.

No. 4. Water from tail-race of Diamond Mill.

All samples were taken on January 26th, 1906, and were analyzed immediately. 10

Sample No. 1, taken from the canal at headgate of the Diamond Mill, yielded the following results upon analysis:

	<i>Parts per million</i>
Total solids	69.0
Loss on ignition	15.0
Fixed solids	54.0
Free ammonia	0.082
Albuminoid ammonia	0.136 20
Nitrogen as nitrites	0.000
Nitrogen as nitrates	1.065
Chlorine	3.170
Required oxygen	2.810
Hardness	4.500

Sample No. 2, consisting of the canal water from the foot of plane 11, had the following composition:

	<i>Parts per million</i>
Total solids	101.000 30
Loss on ignition	40.000
Fixed solids	61.000
Free ammonia	0.050
Albuminoid ammonia	0.219
Nitrogen as nitrites	0.002
Nitrogen as nitrates	1.103
Chlorine	3.200
Required oxygen	2.800
Hardness	4.600 40

Sample No. 3, consisting of water from the pond at the intake at Oakes' Mill, contained:

	<i>Parts per million</i>
Total solids.....	129.000
Loss on ignition.....	34.000
Fixed solids.....	95.000
10 Free ammonia.....	0.104
Albuminoid ammonia.....	0.076
Nitrogen as nitrites.....	0.0015
Nitrogen as nitrates.....	2.3640
Chlorine.....	5.2600
Required oxygen.....	2.9100
Hardness.....	9.8000

Sample No. 4, taken from the tail-race of your mill, yielded the following results:

	<i>Parts per million</i>
20 Total solids.....	87.000
Loss on ignition.....	30.000
Fixed solids.....	57.000
Free ammonia.....	0.080
Albuminoid ammonia.....	0.090
Nitrogen as nitrites.....	0.0007
Nitrogen as nitrates.....	2.3650
Chlorine.....	3.4700
Required oxygen.....	2.9600
30 Hardness.....	5,2000

During my experience as an analyst I have seldom examined or analyzed samples of surface waters in which the total solids were present in such small proportions as they are in the water from the canal above your mill. In all probability this is largely due to the fact that the samples were taken during a somewhat protracted drought, and consequently the water had not been subjected to
40 contamination by lateral drainage. These remarks

apply also to sample No. 3, which was taken from the intake at Oakes' Mill.

As you will note by reference to the results of the analysis of sample No. 4, taken from the tail-race of your mill, the total solids were increased to the extent of eighteen parts per million of water by the substances with which it was contaminated in passing through your mill; but this amount of contamination is very slight, and the quality of this water is still far superior to that found in the great majority of rivers and other streams. 10

In sample No. 2, which was taken from the basin at the foot of plane 11, the total solids have increased to the extent of one hundred and one parts per million, which indicates contamination either by solid matter or by water containing a larger proportion of solid matter from some source other than the tail-race of your mill. Sample No. 2 also contains nitrites which are not present in the uncontaminated water of the canal, though the amount is, as you will note, exceedingly minute. The quantity of chlorine in the water from the tail-race (sample No. 4), is very slightly greater than that in either the water from the headgate or from the basin at the foot of plane 11. The same is true of the hardness of the various samples, and these slight differences indicate the amount of lime which is added to the water from your mill; but this is almost infinitesimal, and, as I have stated above, the water is in no way deleteriously affected for manufacturing purposes. 20 30

Sample No. 3, consisting of water from the pond at the intake of Oakes' Mill exhibited a very distinct difference in composition from that of the canal water. As you will see, the total solids are considerably higher in amount, as are also the fixed solids, nitrates, chlorine and hardness. The com- 40

position of this water, as indicated by the results of the analysis, approximates more closely to that of an average river water than does the water from the canal. It is what may be termed very good water for manufacturing purposes.

All samples were carefully tested for the presence of free chlorine and for hypochlorites (such as
10 "chloride of lime"), but in no case were these substances found. It may be said, however, as a general proposition, that the increase in the amount of chlorine and hardness of the water after passing your mill is due to the small amount of "chloride of lime" which has been added to the water during its use in the operation of your plant; but the negative results obtained in testing for "chloride of lime" show that, by reason of the extreme state of
20 dilution and the presence of other unstable substances in the water, the "chloride of lime" has been reduced to calcium chloride and calcium carbonate, both of which are innocuous when present in such small proportion as in the present case.

In each and all of the samples a portion of the solids consisted of organic matter in suspension. In the sample of water taken from the canal at the headgate of your mill the suspended matter consisted of small particles of organized fibre of vegetable origin, such as might have been derived from
30 aquatic plants. The suspended matter in the sample taken from the tail-race consisted in part of matter of similar origin and in part of very fine fibres of cotton, while the suspended matter in No. 2, taken from the basin at the foot of plane 11, was of a nature similar to that of the sample from the tail-race, the cotton fibres predominating. The suspended matter in the sample taken from the pond at Oakes' Mill consisted essentially of vegetable
40 matter.

As a result of these analyses and tests, it may be said that if the conditions prevailing at the time at which the samples were taken were what may be termed normal—that is, if your mill was in full operation and the discharge through the tail-race into the basin at the foot of plane 11 was of the average volume and character—the matter added to the water in passing from your mill will in no way deleteriously affect the water of the canal for further use in manufacturing operations. As a matter of fact, the analyses prove that the canal water from the basin at the foot of plane 11, after it has received the entire discharge from your mill, is considerably better in quality than that taken from the pond at the intake to Oakes' Mill. Hence, while the analyses show that in using the water from the canal you have subjected it to a comparatively slight contamination. Such contamination is by no means of a serious nature when we consider that the water is to be used for manufacturing purposes only.

For purposes of comparison, I give below standards which have been fixed as a result of a great number of analyses of water from American rivers:

STANDARD FOR AMERICAN RIVERS.

	<i>Parts Per Million</i>		
Total solids.	150.00	to	200.00
Free ammonia	0.01	“	0.12 30
Albuminoid ammonia	0.10	“	0.28
Nitrogen as nitrites	0.003	“	
Nitrogen as nitrates.	1.11	“	3.89
Chlorine	3.00	“	10.00
Required oxygen.	5.00	“	7.00
Hardness	50.00	“	150.00

If you will compare these figures with those obtained by the analyses of the samples which you have submitted, you will perceive that even the

sample from the pond at the intake to Oakes' Mill shows a composition well within these limits.

Yours very truly,

(Signed) F. C. AXTELL.

10

EXHIBIT B.

Frank Carlton Axtell, Ph. D.,
Consulting Chemist,
Short Hills, N. J.

SHORT HILLS, N. J., March 27, 1906.

20 Mr. R. H. Thompson, Treasurer,
Diamond Mills Paper Co.,
Bloomfield, N. J.

DEAR SIR:

Supplementing the report which I rendered to you on February 8th, of the present year, of the analyses of samples of water taken on January 26th, 1906, from the canal and pond in the vicinity of your mill at Bloomfield, I have, at your request, 30 analyzed four additional samples taken at the same points as were the previous samples, the object being to ascertain if the composition of the water as determined by the analyses of the first samples was what might be termed normal. The results of the analyses of the first samples indicated that the water was unusually pure considering its source and the possible contamination to which it was subjected in passing through your mill; further, 4) the samples of January 26th were taken after a

protracted drought, and this condition also affects the normal composition of surface waters in a marked degree.

The following are the results of the analyses of the last four samples, all of which were taken March 8, 1906, at the points specified.

Sample No. 1, taken from the canal at the head- 10
gate of the Diamond Mill:

	<i>Parts per million</i>	
Total solids.....	117.0	
Loss on ignition.....	54.0	
Fixed solids.....	63.0	
Free ammonia.....	0.076	
Albuminoid ammonia.....	0.122	
Nitrogen as nitrites.....	0.0	
Nitrogen as nitrates.....	1.07	
Chlorine.....	10.12	20
Required oxygen.....	2.06	
Hardness.....	4.13	

The results of the analysis of this sample, as compared with those of the sample taken on January 26th, at the same point, show that the solids have increased very materially, the principal increase being in organic matter of vegetable origin; the amounts of ammonia and nitrogen are normal. Chlorine has increased considerably, and would indicate (taken in conjunction with the other figures), that the increase in solids is partly due to soluble mineral matter, which was added to the water by the heavy rains which occurred just previous to the time the samples were taken. 30

Sample No. 2, taken from the basin at the foot of plane 11, shows like differences as compared with the analysis of the sample taken from this 40

point on January 26th. The results of this analysis of this sample were:

	<i>Parts per million</i>
Total solids.....	119.0
Loss on ignition.....	55.0
Fixed solids.....	64.0
Free ammonia.....	0.061
10 Albuminoid ammonia.....	0.119
Nitrogen as nitrites.....	0.001
Nitrogen as nitrates.....	1.16
Chlorine.....	11.06
Required oxygen.....	2.02
Hardness.....	4.36

As compared with the results of the analysis of sample No. 1, given above, it will be seen that there is a very slight increase in the amount of
 20 total solids, fixed solids, chlorine, and that the water is slightly harder; this increase is, of course, due to the contamination of the water by a slight amount of solid matter in passing through your mill.

Sample No. 3, taken from the pond at the intake to Oakes' Mill, differs only very slightly in composition from the canal water. Its composition was found to be as follows:

	<i>Parts per million</i>
30 Total solids.....	109.0
Loss on ignition.....	33.00
Fixed solids.....	76.0
Free ammonia.....	0.099
Albuminoid ammonia.....	0.067
Nitrogen as nitrites.....	0.0
Nitrogen as nitrates.....	1.74
Chlorine.....	11.80
Required oxygen.....	2.24
40 Hardness.....	8.16

It will be seen that, if anything, this water is of slightly greater purity than is the water from the canal, and it is of a somewhat different character. It contains more mineral matter and less organic matter than does the canal water, and the hardness is nearly twice as great as is that of the latter. It may be considered as a typical river water of unusual purity considering its situation. 10

The results of the analysis of sample No. 4, which was taken from the tail-race of your mill, when compared with the results of the analysis of sample No. 1, taken at the headgate, show the exact amount of contamination to which the water is subjected when passing through your mill. The total solids have increased by four parts per million of water, and the fixed solids by eight parts per million. For the total solids, this is equivalent to an increase of two-tenths of a grain per gallon. 20
The results of the analysis of this sample were as follows:

	<i>Parts per Million</i>
Total	121.0
Loss on ignition.....	50.0
Fixed solids	71.0
Free ammonia.....	0.072
Albuminoid ammonia.....	0.129
Nitrogen as nitrites.....	0.002 30
Nitrogen as nitrates.....	1.18
Chlorine ..	12.27
Required oxygen.....	12.12
Hardness	5.02

On the whole, the results of the analysis of the four samples were somewhat more satisfactory than were those of the first sample taken on January 26th, and, I think, justified the doubt which I expressed in regard to the fact that the first samples 40

taken were hardly representative of normal conditions. However, the results of the analyses amply confirm the statement which I made in my report of February 8th, that the slight amount of soluble matter which was added to the water during its passage through your mill, would in no way deleteriously affect it for future manufacturing purposes, and I fail to see wherein any insoluble matter, such as fibres, which escape from the mill could affect the channel. These fibres are, of course, organic vegetable matter, and the relative amount of matter of this description, in water, is given by the figures for "loss on ignition." As you will note the "lose on ignition" in sample No. 1, taken from headgate, is fifty-four parts per million, while in sample No. 4, taken from the tail-race, it is fifty parts per million. This would indicate that some of the vegetable matter in suspension in sample No. 1 has been removed from the water during its use in your mill; and this might reasonably be expected to occur since, in your operation, the rags and pulps which you wash act, more or less, as filtering media.

Another point which I would strongly impress upon those interested in this question, is the fact that the canal does not receive more than a trace of solid matter from your mill, because all matter containing chemical waste is discharged into a basin where it is subjected to sedimentation and, practically, filtration.

As regards the water from the pond at Oakes's Mill, it may be said to be unusually pure and perfectly suitable for use in any ordinary manufacture.

All samples of water were carefully tested for the presence of *free* chlorine and hypochlorites ("chloride of lime") but with negative results.

As a result of these eight analyses of samples taken at different times, it is perfectly safe to state that the canal water is in no way deleteriously affected. The season during which the samples were taken was that which is best calculated to show contamination because, during the winter, both soluble and suspended matter in ground water are present in relatively small quantities, and any contamination is, therefore, made more clearly evident. 10

During the spring and summer months, the total solids in such waters frequently amount to from two hundred to two hundred and fifty parts per million, and it is therefore evident that if the water had been analyzed while under conditions just described, the amount of contamination due to the operation of your mill would have been even more infinitesimal than it is at present. 20

Yours very truly,

(Signed) F. C. AXTELL.

30

40

EXHIBIT C.

Statement of results of two analyses of water received by F. C. Axtell, consulting chemist for analysis from Diamond Mills Paper Company, the first samples on January 26, 1906, and the second on March 8, 1906, and analyzed by him.

10 CANAL AT HEADGATE OF DIAMOND MILLS.

Jan. 26, 1906.

March 8, 1906.

	<i>Parts per million</i>	<i>Parts per million</i>
Total solids	69.0	117.0
Loss on ignition	15.0	54.0
Fixed solids	54.0	63.0
Free ammonia	0.082	0.076
Albuminoid ammonia	0.136	0.122
20 Nitrogen as nitrites	0.000	0.0
Nitrogen as nitrates	1.065	1.07
Chlorine	3.170	10.12
Required oxygen	2.810	2.06
Hardness	4.500	4.13

CANAL WATER FROM FOOT OF PLANE No. 11.

Jan. 26, 1906.

March 8, 1906.

	<i>Parts per million</i>	<i>Parts per million</i>
30 Total solids	101.000	119.0
Loss on ignition	40.000	55.0
Fixed solids	61.000	64.0
Free ammonia	0.050	0.061
Albuminoid ammonia	0.219	0.119
Nitrogen as nitrites	0.002	0.001
Nitrogen as nitrates	1.103	1.16
Chlorine	3.200	11.06
Required oxygen	2.800	2.02
Hardness	4.600	4.36

40

Statement of results of two analyses of water received by F. C. Axtell, consulting chemist for analysis from Diamond Mills Paper Company, the first samples on January 26, 1906, and the second on March 8, 1906, and analyzed by him.

CANAL AT HEADGATE OF DIAMOND MILLS.

Jan. 26, 1906.	March 8, 1906.	
	<i>Parts per million</i>	<i>Parts per million</i>
Total solids, - - -	69.0	117.0
Loss on ignition, - - -	15.0	54.0
Fixed solids, - - -	54.0	63.0
Free ammonia, - - -	0.082	0.076
Albuminoid ammonia, - - -	0.136	0.122
Nitrogen as nitrites, - - -	0.000	0.0
Nitrogen as nitrates, - - -	1.065	1.07
Chlorine, - - -	3.170	10.12
Required oxygen, - - -	2.810	2.06
Hardness, - - -	4.500	4.13

CANAL WATER FROM FOOT OF PLANE NO. 11.

Jan. 26, 1906.	March 8, 1906.	
	<i>Parts per million</i>	<i>Parts per million</i>
Total solids, - - -	101.000	119.0
Loss on ignition, - - -	40.000	55.0
Fixed solids, - - -	61.000	64.0
Free ammonia, - - -	0.050	0.061
Albuminoid ammonia, - - -	0.219	0.119
Nitrogen as nitrites, - - -	0.002	0.001
Nitrogen as nitrates, - - -	1.103	1.16
Chlorine, - - -	3.200	11.06
Required oxygen, - - -	2.800	2.02
Hardness, - - -	4.600	4.36

WATER FROM POND AT THE INTAKE TO OAKES'
MILL.

Jan. 26, 1906.		March 8, 1906.	
		<i>Parts per million</i>	<i>Parts per million</i>
	Total solids, - - -	129.000	109.0
	Loss on ignition, - - -	34.000	33.00
10	Fixed solids, - - -	95.000	76.0
	Free ammonia, - - -	0.104	0.099
	Albuminoid ammonia, - - -	0.076	0.067
	Nitrogen as nitrites, - - -	0.0015	0.0
	Nitrogen as nitrates, - - -	2.3640	1.74
	Chlorine, - - -	5.2600	11.80
	Required oxygen, - - -	2.9100	2.24
	Hardness, - - -	9.8000	8.16

TAKEN FROM TAIL-RACE OF DIAMOND MILLS.

20 Jan. 26, 1906.		March 8, 1906.	
		<i>Parts per million</i>	<i>Parts per million</i>
	Total solids, - - -	87.000	121.0
	Loss on ignition, - - -	30.000	50.0
	Fixed solids, - - -	57.000	71.0
	Free ammonia, - - -	0.080	0.072
	Albuminoid ammonia, - - -	0.090	0.129
	Nitrogen as nitrites, - - -	0.0007	0.002
	Nitrogen as nitrates, - - -	2.3650	1.18
30	Chlorine, - - -	3.4700	12.27
	Required oxygen, - - -	2.9600	2.12
	Hardness, - - -	5.2000	5.02

EXHIBIT D 1, MAY 16, 1906.

ANALYSES OF SAMPLES OF WATER, SLIME AND
SOIL FROM MORRIS CANAL AND THIRD RIVER.

The analyses, results of which are given below, were made for the purpose of determining the composition of certain samples of water, slime and soil, taken at various points in the Morris Canal and from Third River in the vicinity of the mill of the Diamond Mill Paper Company, at Bloomfield, New Jersey, on April 5th and 6th, 1906. 10

The following is a list of the samples taken:

1. A sample of water taken from the wheel-pit at the foot of plane 11, in the Morris Canal, April 5, 1906. 20
2. A sample of water taken from Third River at the outlet of the waste-pipe from the wheel-pit at the foot of plane 11, Morris Canal, April 5, 1906.
3. A sample of slime taken from the wheel-pit at the foot of plane 11, Morris Canal, April 5, 1906.
4. A sample of water separated by filtration from the slime described in "3." 30
5. A sample of soil taken from the cleaned bottom of Morris Canal, at the head-gate of the Diamond Mill, April 6, 1906.

Accompanying this report are a number of bottles and small vials containing portions of the various samples analyzed, and also samples of the substances separated therefrom by analysis. Each 40

of these bottles is distinctly marked for identification.

Sample No. 1, consisting of water from the wheel-pit at the foot of plane 11, Morris Canal, may be said to consist of concentrated drainage from the Diamond Mill, under the condition which existed at the time the sample was taken. In all probability, its composition (considered as representing the drainage from the mill) was affected by the fact that it was in contact with the slime with which the bed of the canal was covered. The composition of this sample was found to be as follows:

	<i>Parts per Million</i>
20 Total solids.....	333.5
Organic and volatile matter.....	136.5
Fixed mineral matter.....	197.0
Silica.....	7.9
Aluminium and iron oxides.....	15.6
Calcium carbonate.....	69.3
Magnesium, potassium and sodium as sul- phates, chlorides and carbonates.....	62.3
Chlorine.....	65.5

30 The samples which accompany this analysis are marked "No. 1" and including sample of water in a four-ounce bottle and four vials containing the silica, iron and aluminium oxides, calcium carbonate, and magnesium, potassium, and sodium compounds, all of which were separated by analysis as given in the above table.

40 Sample No. 2, consisting of water from Third River at the outlet of the waste-pipe from the wheel-pit at the foot of Plane 11, Morris Canal, after the gate leading from the wheel-pit had been opened, per-

mitting the discharge of the water and of portions of the slime, which had accumulated in the bed, to escape into Third River, yielded the following results upon analysis:

	<i>Parts per Million</i>	
Total solids	380.0	
Organic and volatile matter	188.0	10
Fixed mineral matter	192.0	
Silica	14.6	
Aluminum and iron as oxides	23.2	
Calcium carbonate	79.1	
Magnesium, potassium and sodium as sul- phates, chlorides and carbonates	32.4	
Chlorine	62.0	

Accompanying this analysis is a bottle containing a sample of this water, and vials containing the silica, aluminium and iron oxides, calcium carbonate, and magnesium, potassium, and sodium compounds, which were separated from the water in the proportions shown by the above table, all these samples being properly marked. 20

The third sample taken consisted of slime dipped from the wheel-pit at the foot of plane 11, in the Morris Canal. It was of a gelatinous consistence, and contained considerable vegetable matter in the form of leaves and twigs. 30

Subject to evaporation and dessication, the following results were obtained:

	<i>Per cent.</i>
Water	95.340
Residue, dried at 105° C	4.660
Total	100.000

A portion of the dried residue obtained was next subjected to ignition with the following results: 40

	<i>Per cent.</i>
Organic and volatile matter.....	69.200
Fixed mineral matter.....	30.800
	<hr/>
Total	100.000

The fixed mineral matter thus obtained was then analyzed, and possessed following composition:

	<i>Per cent.</i>
10 Silica and insoluble matter.....	81.831
Iron and aluminium as oxides.....	7.519
Calcium carbonate.....	7.688
Magnesium, potassium and sodium as sul- phates, chlorides and carbonates.....	1.039
Chlorine.....	1.704
Undetermined.....	0.219
	<hr/>
Total	100.00

20 From these results we find the composition of the slime considered as a whole, to be as follows:

	<i>Per cent.</i>
Water.....	95.340
Organic and volatile matter.....	3.224
Silica and insoluble matter.....	1.174
Iron and aluminium as oxides.....	0.108
Calcium carbonate.....	0.110
Magnesium, potassium and sodium as sul- phates, chlorides and carbonates.....	0.015
30 Chlorine.....	0.024
	<hr/>
Total	99.995

Accompany this analysis is a bottle containing a sample of the slime, and vials containing samples of the water, dried residue, mineral residue, silica and insoluble matter, iron and aluminium oxides, calcium carbonate, and magnesium potassium and sodium
40 compounds, separated by analysis. This bottle and

these vials are all marked "No. 3" and properly labeled for identification.

The fourth sample analyzed consisted of water separated by filtration from the slime which formed the subject of the previous analysis. The results of the analysis of this water were as follows:

	<i>Parts per Million</i>	10
Total solids	5,118.2	
Organic and volatile matter	3,283.8	
Fixed mineral matter	1,834.4	
Silica	22.2	
Aluminium and iron oxides	114.0	
Calcium carbonate	1,515.0	
Magnesium, potassium and sodium as sul- phates, chlorides and carbonates	130.2	
Chlorine	31.5	20

A bottle containing a sample of this water, and vials containing samples of the silica, aluminium and iron oxides, calcium carbonate, and the magnesium potassium and sodium compounds, separated by analysis, accompany this report, and are marked "No. 4" and properly labeled.

For purpose of comparison, and in order to determine to what extent the composition of the water 30
in the Morris Canal might be affected by the character of the soil forming the bed of that waterway, a sample of soil was taken from the bed of canal at the headgate of the Diamond Mill. Before taking such sample, the thin coating of slime covering the bottom was carefully removed, after which the sample was taken. Before analyzing, a sample of this soil was dried at 105° C, then ground to a fine powder and sifted. The analysis yielded the following results.

	Moisture	0.345
	Organic and volatile matter	15.300
	Silica and insoluble matter	83.610
	Iron and aluminium as oxides	0.225
	Calcium carbonate	0.300
	Magnesium, potassium and sodium as sul- phates, chlorides and carbonates	0.105
10	Chlorine	0.037
	Undetermined	0.078
	Total	100.00

Vials containing samples of the soil analyzed, and the silica, iron and aluminium, calcium carbonate, and magnesium potassium and sodium compounds, separated by analysis, accompany this report and are marked "No. 5" and properly labeled.

- 20 As regards the two samples first analyzed, the first, taken from the wheel-pit at the foot of plane 11, consisted essentially of the drainage of the Diamond Mill, contaminated by contact with the coating of slime with which the bottom of the canal at this point was covered. Notwithstanding the adverse conditions under which this sample was taken, the results of the analysis prove conclusively, to my mind, that the conclusion I deduced as a result of my former analysis of the water taken from the canal and from the pond at
- 30 Oakes' Mill, were well founded, and that the waste matter entering the canal from your mill is not sufficient, either in amount or character, to seriously contaminate the entire body of water in that portion of the canal, for further manufacturing purpose. There is, of course, no question as to the fact that lime, when added to water, increases the "hardness" of the latter, but the relative quantity of lime which you add to the water of the canal is
- 40 so small as to be negligible.

These remarks also apply to the second sample of water which was taken from Third River at the outlet of the waste-pipe leading from the wheel-pit in the canal; but in this case the water contained a greater quantity of solid matter than did the first sample, this being due to the fact that the gate leading to the waste-pipe was opened, and a considerable quantity of slime was carried with the water flowing from the wheel-pit into the river. It is also quite evident that the discharge of so large a quantity of the slime into Third River would affect operation in Mr. Oakes' Mill for a few days, and we must face the fact that he is, without doubt, justified in complaining of this comparatively great pollution of his water supply, notwithstanding the fact that the effects thereof are only temporary. It is to be presumed that Mr. Oakes filters the water which he uses, and it is therefore only necessary to consider the effect of substances which are held in solution by the water. My understanding of the matter is, that Mr. Oakes complains that when the wheel-pit is drawn off and the drainage allowed to flow into Third River, and thence into the pond above his mill, he is unable to properly scour and dye wool for at least several days subsequent to the pollution of his water supply in this manner.

In the sample analyzed, the substances in solution which would deleteriously affect Mr. Oakes' industry are aluminium, iron, calcium and magnesium. Of these bases, iron is by far the most deleterious, because the compounds which it forms with fatty acids are extremely insoluble, and it is a well-known fact that it seriously affects dyeing operation. Referring to the results of the analysis of the slime, it will be seen that this substance contains 0.108 per cent. of iron and aluminium as

oxides, and 0.110 per cent. of calcium as carbonates; and it may be safely stated that if no lime (calcium compounds) were present in the slime Mr. Oakes would still experience trouble when the deposit in the wheel-pit was drawn off into Third River.

The result obtained by the analysis of the slime and of the water separated from the slime by
10 filtration, simply show the character of the solid matter deposited from the drainage from the Diamond Mill, and of the concentrated aqueous extract of this matter.

Attention should be called to the fact that the lime found in the various samples, is not entirely derived from the waste matter deposited in the canal from the Diamond Mill. In the sample of
20 slime examined, several minute shells were observed and, as is well known, these consist essentially of calcium phosphate when they contain living organism, and after the death of these organisms a portion or all the lime is converted into calcium carbonate. The result of the analysis of the sample of soil taken from the bottom of the canal at the headgate of the Diamond Mill, further showed to what extent the presence of lime and iron in this water is due to the character of the soil forming the bed of the canal. As will be noted, the
30 soil contained 0.225 per cent. of iron and aluminum as oxides, and 0.300 per cent. of calcium as carbonate. This calcium is, of course, as compared with the lime which has been allowed to escape from the mill, in a comparative insoluble form, so that it is only very slowly dissolved by the water.

The iron existing in this water is, of course, a natural constituent, being derived from deposits of compounds of this metal in the earth. Its presence along the course of Third River is plainly evident to a casual observer.

EXHIBIT D 2, MAY 16, 1906.

WATER FROM WHEEL-PIT.

	<i>Grains per</i> <i>U. S. Gallon</i>	
Total solids.....	19.455	
Organic and volatile matter.....	7.963	
Fixed mineral matter.....	11.492	
Silica.....	0.460	
Aluminium and iron oxides.....	0.900	10
Calcium carbonate.....	4.042	
Magnesium, potassium and sodium as sulphates, chlorides and carbonates.....	3.634	
Chlorine.....	3.820	

WATER FROM THIRD RIVER.

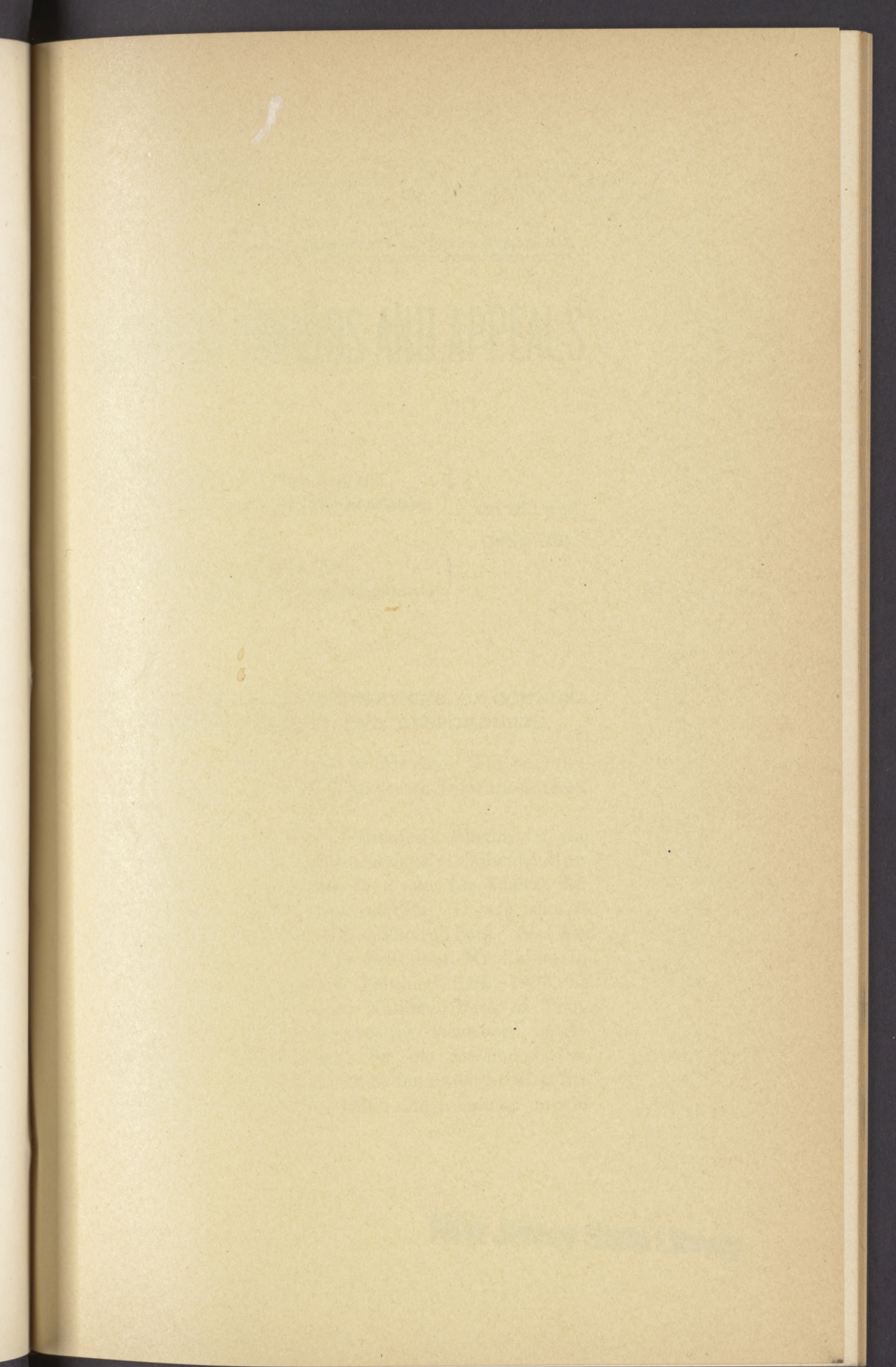
	<i>Grains per</i> <i>U. S. Gallon</i>	
Total solids.....	22.167	
Organic and volatile matter.....	10.967	20
Fixed solids.....	11.200	
Silica.....	0.851	
Aluminium and iron as oxides.....	1.458	
Calcium carbonate.....	4.614	
Magnesium, potassium and sodium as sulphates, chlorides and carbonates.....	1.890	
Chlorine.....	3.616	

WATER FROM SLIME.

	<i>Grains per</i> <i>U. S. Gallon</i>	
Total solids.....	298.569	30
Organic and volatile matter.....	191.560	
Fixed mineral matter.....	107.009	
Silica.....	1.294	
Aluminium and iron as oxides.....	6.650	
Calcium carbonate.....	88.377	
Magnesium, potassium and sodium as sulphates, chlorides and carbonates.....	7.600	
Chlorine.....	1.837	

(Signed) F. C. AXTELL.





THE COURT OF ERRORS AND APPEALS

COURT OF ERRORS AND APPEALS

OF THE STATE OF NEW YORK
IN SENATE
JANUARY TERM, 1885
WILLIAM H. BRANT, CLERK

LIST OF CASES REPORTED
IN THE COURSE OF THE TERM