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Consecutive No. 2

The State Police Problem in America

Including a Special Study of the Problem in New Jersey

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NEW JERSEY
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The Administration of the "Full-Crew" Laws in the United States

PAUL WILLARD GARRETT *of The Bureau of State Research*

Part I

The Summary and Conclusions

There has been a considerable movement during recent years, fathered primarily by the American Brotherhood of Railroad Trainmen, looking to the enactment of laws regulating the size of train crews. These laws were at once called "full-crew" laws by their proponents, who thought by that name to imply that trains were normally undermanned, and "excess-crew" laws by their opponents who thought by that name to imply that trains were normally adequately manned.

History of "full-crew" movement. There are twenty-two States (Ariz., Ark., Cal., Conn., Ind., Me., Md., Mass., Miss., Neb., Nev., N. J., N. Y., N. D., O., Ore., Penn., S. C., Tex., Wash., Wis. and W. V.) which now have a "full-crew" law of one form or another. The movement had its origin during the period of operation under the old link and pin coupling and hand brake systems, and six laws were enacted between 1842 and 1903. There were the greatest number of "full-crew" laws passed, however, during 1911 and 1913. No effort for a federal law has yet been successful.

Digest of the laws. One of the impressions which inevitably follows upon a cursory examination of the various "full-crew" laws, is that they seem all of a different pattern. The New Jersey law, which is one of the most stringent laws, requires passenger trains of four or more coaches and one baggage car to carry a crew of six trainmen (engineer, fireman, conductor, brakeman, baggageman and flagman), and those of a lesser number of coaches and one baggage car a crew of five trainmen. It requires freight trains of over thirty cars to carry six trainmen, and those of less than thirty cars, five trainmen. But the different laws vary widely as to the number of brakemen required per given number of cars, the minimum number of cars affected, their penalties and methods of enforcement and as to their application to the various kinds of service—whether passenger, freight or switching.

Purpose of the laws. A review of the campaigns for train-crew legislation, from the earliest to the latest, makes clear to any mind that the object which has always been advanced by the proponents has been the reduction of casualties. The expressed object of promoting safety is, indeed, one of the few points on which the laws are not at variance. The only leg, in fact, upon which the state "full-crew" laws regulating crews of interstate trains, can stand under the federal constitution is as an exercise of the police power for the purpose of safety. The merits and demerits, to say nothing of the constitutionality, of the "full-crew" laws must be determined upon their efficacy as a means to reduce railroad casualties. This whole investigation has been devoted to the consideration of that point.

The number of railroad casualties. There does seem to be a just ground for grievance against the railroads, on the part of their employees and the public, in the face of a realization that our railroads are killing 27.8 persons and injuring 479.2 persons every twenty-four hours, or killing and injuring one person every three minutes. These are not chance findings, moreover, but are averages for the last five years. It is not a little distressing to learn that during the period from 1911 to 1915, inclusive, there was an average of 10,173.6 persons killed and 174,941.4 persons injured each year. The public sentiment has been justly aroused, almost to the point of indignation, and has been demanding that this thing not continue. That fact accounts, in a large way, for the ready passage of numerous bills labeled "safety bills." The statement that one person is being killed or injured every three minutes, is so inciting that its mere recital has often served as a sufficient spur to secure the enactment of any measure asserted to be remedial. Thus it is that a large number of laws have been hastily enacted on the assumption that they were solutions or partial solutions to the casualty problem in this country. Some of t e se laws have proved good and some bad. The "full-crew" laws had their origin, largely, in just that procedure. It remains now to be determined, in a scientific way, whether they have been and are, one step in the solution of the railroad casualty problem or whether not.

Causes for casualties. No legislation can be written scientifically by a lawmaker to remedy a particular problem without first analyzing the causes underlying that problem. It may be said that our legislators, by their much guessing, have frequently hit upon laudable solutions without burdening themselves with this scientific procedure; but whether the remedial value of a law is discovered before or after its enactment, it can be found only upon an analytical consideration of the causes to be remedied.

An exhaustive examination has been made of all

the causes for railroad casualties, which occur in this country each year, based upon the records of the Interstate Commerce Commission. All casualties occurring during one typical year (1915) have been classified under one or the other of twenty principal causes and hundreds of sub-causes. These casualties all have been layed upon the table in cause groups, so to speak, for analysis. Each group, which upon examination, was found to have had no conceivable preventative in "full-crew" legislation was brushed off the table as irrelevant. All other groups were left upon the table as conceivably relevant and as meriting still further analysis.

Effect of "full-crew" in United States. The series of analyses of the railroad casualties in this country for any year, shows that each one of those casualties may be classified under one or the other of the following twenty principal classes: Collisions; Derailments; Boiler Accidents; Other Train Accidents; Roadway or Bridge Accidents, such as fires, landslides, explosions; Coupling and Uncoupling Casualties; Casualties occurring while doing other work about Trains not in Shops or Engine Houses or while attending Switches; Contact with overhead or side Obstructions; Falling from Cars or Engines; Getting on or off Cars or Engines; Other Accidents on or around Trains not here named; Being struck or run over by Engines or Cars at Stations or Yards; Being struck or run over by Engine or Cars at Highway Grade Crossings; Being struck or run over by Engines or Cars at other Places; Other Accidents not Train Accidents and not Industrial Accidents; Industrial Accidents on Tracks or Bridges; Industrial Accidents at Stations, Freight Houses, Engine Houses, Coaling Stations, Water Stations; Industrial Accidents in and around Shops; Industrial Accidents on Boats and Wharves; and Industrial Accidents at other Places. There were 170,661 railroad casualties in this country during the year 1915, due to one or the other of the above twenty causes. No better method obtains by which to calculate the need for "full-crew" legislation than a determination whether railroad casualties are due, in the main, to an undermanning of trains or to other causes.

But a careful perusal of the above-mentioned charts, which show the causes for railroad casualties in the United States, reveals the fact that at least eleven of the twenty chief causes have no conceivable relation to the train-crew. First among these eleven are the Industrial Accidents to employees at terminals, on tracks, at wharves and in shops, which alone claim over 100,000 casualties each year. At one stroke, therefore, more than fifty percentum of the whole lot of railroad casualties may be brushed aside as having no conceivable relation to the train-crew. It is likewise necessary to cast aside as wholly irrelevant those casualties due to boiler explosions; roadway and bridge fires; landslides and floods; overhead and side obstructions; being struck by engines or cars at highway grade crossings; and those due to being struck by cars or engines at other places. This means, in brief, that during the last five years an annual average of 117,598.8 casualties, or 63.3% of all, had their origin in causes wholly without the province of a train-crew, and are palpably irrelevant. This leaves the number of casualties still on the table, so to speak, and needing further analysis very much smaller.

A more detailed study of the nine, from the twenty, chief causes still remaining shows clearly that the probability of a reduction through the crew is, as to several of them, very negligible. It cannot be said that, in the main, any decrease could be effected by the train-crew in those casualties known as other work about trains not in shops or while attending switches, falling from cars or engines, getting on or off cars or engines, other accidents on or around trains and other causes.

It would thus seem that at the first two analyses it would be very conservative to reject 16 of the 20 main causes of casualties as wholly, or almost wholly, irrelevant to the train-crew. This at once rids of 94.2% of the present railroad casualties in this country. It is clear, therefore, that "full-crew" legislation not only affords no solution, but has no material relation to at least 94.2% of our present railroad casualties. A more detailed analysis is necessary to determine its remedial value to the remaining 5.8% of all casualties.

Collisions, derailments and coupling casualties. The casualties still left for analysis are those which occur annually by reason of Collision, Derailment and Coupling or Uncoupling accidents. The casualties in these classes, which in 1915 constituted 5.8% of all casualties, would seem to have a very direct relation to the train-crew. They are the only classes which do savor of that relation.

That there is a very direct relation between the causes of 5.8% of railroad casualties and the train-crew, does not mean that all of those causes have a relation to the size of the train-crew. Many of them were due to the ignorance, the carelessness and the oversight of one of the train-crew. But "full-crew" legislation can afford a possible remedy to only those which are related to the size of the train-crew. And this makes it necessary still to sweep aside all Collision, Derailment and Coupling or Uncoupling casualties which, although relevant to the crew, are not relevant to the size of the crew. A more minute sub-division and sub-classification of each of these remaining three chief causes shows that almost one-half of the Collisions were head-on (engine to engine) collisions; that much over one-half of the Derailments were due to defects in the roadway, negligence of signalmen and trainmen and obstruction of the track; and that three-fourths of the Coupling and Uncoupling casualties were due to adjusting coupler with foot, cars accidentally starting, careless manipulation of lever, fingers or hand being caught, uncoupling without using lever when unnecessary, feet being caught, miscalculating speed, engine accidentally starting, lost footing, slipping off car, being struck by objects, mistakes in signals and going between cars unnecessarily. These just-enumerated sub-causes account for a majority of all collision, derailment and coupling or uncoupling casualties and, although bearing rela-

tions to the train-crew, do not bear a relation to the size of the train-crew. They are not such causes, therefore, as could be eliminated by a requirement for a larger train-crew. These analyses wipe off the slate 97.6% of our present casualties (or 165,763 from a total of 170,661 for 1915) as irrelevant. That these 97.6% of our casualties have no material relation to the size of the train-crew makes positive that they could not be reduced by "full-crew" statutes. For the only change effected by "full-crew" statutes is to change the size of the train-crew.

The remaining 2.4% of casualties have a possible relation to the size of the train-crew and represent the highest conceivable per centum of casualties which could be affected through a change in the size of the train-crew. The most radical proponent of the "full-crew" laws could not claim, in the face of these analyses, a greater maximum per centum of the casualties as bearing a direct relation to the principle involved. The most conservative opponent would never consent to such a great maximum. From the standpoint of this impartial investigation it is unfortunate that the rejections cannot cease at this already small percentage. A still further analysis and closer scrutiny of the causes which account for the remaining 2.4% of casualties, would seem almost like a preconceived attempt to analyze away all the powder of the proponents. But no analysist could admit that a "full-crew" law might have prevented even this small residue of casualties, and still remain faithful to his scientific principles. For up and until the present step the study has been brushing off the table all classes of casualties only which had no material relation to the size of the train-crew. It has been found that at least 97.6% of the classes of railroad casualties have no such relation. No more classes can be rejected in whole without running the risk of rejecting a class that contains some casualties which do have that relation. But although no more general classes can be scientifically rejected, it does not follow that individual casualties within these classes cannot be eliminated as irrelevant. It is quite evident upon investigation that at least a part of most of the remaining classes could not have been prevented by a larger crew and are not relevant.

The casualties still on the slate and included in the remaining group of 2.4% of all casualties (4,095 from a total of 170,661 in 1915) contain whole groups, which are known to be irrelevant casualties. In some instances "miscellaneous" classes have been left when it was not possible to know whether any or all were relevant. The classes of casualties, in brief, which are now remaining are all collisions which were caused by trains colliding from the rear, trains separating and miscellaneous; all derailments which were caused by defects of equipment, trains separating and miscellaneous reasons; and all coupling or uncoupling casualties which were due to cars not equipped with automatic coupler, coupler broken, coupling damaged cars, coupling with chain or other emergency appliance on curve too sharp for automatic coupler, coupling with chain or other emergency appliance because of uneven track, coupling or uncoupling safety chains, part of defective coupler falling on foot while opening knuckle, delay in moving parts hard to move, fatal injuries for which there was no witness, and all other causes, and unexplained. It is conceivable that there were casualties in each of the classes enumerated just above which had an origin in a cause relative to the size of a train-crew. But it does not take an expert eye to see that a great majority of these casualties were not such as actually would have or could have been prevented by "full-crew" legislation. All rear-end collisions have been left in this group, although it is obvious that no great reduction could there be effected since all trains carry a rear-end flagman whether required by law or not. All derailments due to defects of equipment, trains separating and miscellaneous, have been left, although one can readily see that an additional brakeman would not have prevented all, or nearly all such. It is presumption to leave the whole lot of casualties due to defects of equipment as having a solution in the law, or to leave all "miscellaneous" derailments. All coupling or uncoupling casualties within twelve different classes have been left as having a possible remedy, and yet it is obvious that a great majority of these did not have their origin in such a cause as would have been modified by a "full-crew" law. It is bold to say that an additional brakeman could have prevented all such casualties occurring on cars not equipped with automatic couplers, or where coupler was broken, or while coupling damaged cars, or while coupling with chain, where coupler cannot be used because of curve or uneven track, or coupling or uncoupling safety chains. It is equally bold to assume that an additional brakeman would have prevented all such casualties due to dropping defective couplers on foot, or delay in moving difficult parts. Particular attention is called to the fact that a desire to be absolutely fair has prompted the inclusion within this group of the whole lot of miscellaneous collisions, all miscellaneous derailments and all coupling or uncoupling casualties which are unclassified and unexplained, and all those which occurred for which there was no witness. There is no statistical data available upon which to base a scientific rejection of any particular numerical portion of the remaining casualties. It would seem, however, that much over a majority of this residue might conservatively be rejected as being due to such causes as a "full-crew" law could not remedy.

A detailed examination of the final causes which account for the railroad casualties in the United States affords a conclusive measure of the remedial value of the "full-crew" laws. It shows that, after several careful analyses, an impartial mind is compelled to sweep at least 97.6% of all those casualties off the board as due to causes irrelevant to the size of a train-crew. The scientific elimination, one by one, of irrelevant classes of casualties must cease at this point because the rejection of more classes in whole might mean the rejection of relevant individual casualties. But it would seem conservative to estimate that at least much over one-half of the remaining 2.4% of casualties are not such as have a conceivable preventive in "full-crew" legislation.

Effect of "full-crew" in New Jersey. There are two methods along which it is quite possible to test out the merits of the New Jersey "full-crew" law as a safety measure. The one involves an exhaustive analysis of the causes for railroad casualties, as they normally occurred in that state prior to the law. The object of this study is to determine whether those causes are such as might conceivably have been prevented by a "full-crew" law. The other involves a comparison of casualties occurring subsequent to the enactment of the law with those occurring previously. In order to effect these two studies special investigators were set to the task of examining the individual cause for each railroad casualty which occurred in New Jersey during the last year without the law (1912) and the first year under the law (1913).

A detailed examination of the cause for each of the eleven hundred and sixty-six (1166) casualties which occurred in New Jersey during 1912 shows that at least 1139 of those 1166 casualties had their origin in such a cause as could not conceivably have been prevented by a "full-crew" law. This makes it clear that at least 97.7% of the New Jersey casualties may be brushed off the board as having no solution in the law. Whether the remaining 2.3% (27 casualties) were relevant or not cannot be said for lack of more definite information. But assuming that they were all relevant there would still be left the tasks of ascertaining whether or not they actually occurred on trains which were manned below the "full-crew" requirements, and if so, whether the additional brakeman would actually have prevented them.

A comparison of the casualties occurring in New Jersey during the year 1912 (ending December 1st), the year just prior to the enactment of the "full-crew" law, with those occurring during the year 1913, the first year under the law, shows that there was a reduction of 147 casualties (1166-1019). It would seem on its face that the "full-crew" law had effected a reduction of 147 casualties during its first year of operation. But the reduction of 124 of these 147 casualties was effected before May 1st, 1913, when the law went into effect. They must, therefore, have been reduced through other media.

Effect of "full-crew" in Pennsylvania. The official statistics of railroad casualties in Pennsylvania show that despite the enactment of an unusually rigid "full-crew" law in 1911 to reduce casualties, that list bounded from 9563 to 12,213 deaths and injuries during the first year under the law. This was for 1912, the year which had been expected to register a sudden reduction since the casualties would have been reduced immediately if ever. The increase, moreover, was real and not explained by mileage and traffic increases. The casualties in Pennsylvania have been steadily higher since the enactment of the law. It is not here intended to attribute the increase in Pennsylvania casualties to the "full-crew" law. It is clear, however, that in so far as the law was enacted as a safety measure designed to reduce the whole number of railroad casualties in Pennsylvania, it has been a conspicuous failure.

Effect of "full-crew" in New York. There was a marked drop in the casualty list of New York just following the enactment of the "full-crew" law. There were 7432 casualties during the year just preceding the operation of the law (year ending June 30, 1913), and 5704 casualties during the year just subsequent (year ending June 30, 1914). It would seem on its face that the law, enacted as a safety measure, had been effective in reducing the list by 1728 casualties, or a part of them. It has been so contended by proponents of the law. But a close study of the three hundred and thirty-four sub-classes in which that net reduction of 1728 casualties appears shows that at least 1696 could not conceivably have been reduced through the agency of the "full-crew" law. They were occasioned by causes known to be quite irrelevant to the size of the train-crew. The remaining 32 casualties have a conceivable relation; but some of the relevant sub-classes, which would be expected to show enormous decreases showed actual increases; and it cannot, moreover, be shown that these few remaining unexplained reductions were wrought by the law. It can not even be shown that they occurred on so-called "full-crew" trains, much less on trains which would have been inadequately manned without the law. It seems impossible to find any reasonable ground upon which to hold that the New York "Full-Crew" law has been a material factor in reducing railroad casualties.

Other States. A study of the casualty lists of other states which have and states which have not "full-crew" laws fails to show any direct relation between the laws and the number of casualties. Some "full-crew" states have had declines and some increases in casualties subsequent to the enactment of the law. Some states which have no "full-crew" law have had declines and some increases in casualties during the same period. The Indiana casualties have had no marked reduction or increase since the passage of the law. California casualties have increased since the enactment of the "full-crew" law. The casualties in Illinois, where there is no law, have been increasing. The casualties in Massachusetts, where the law has not been in operation, have been reducing. The casualties in Michigan, where there is no law, have followed no consistent reduction or increase. The casualties in Connecticut, where there is no law, have been increasing.

The requirement of additional brakemen. A study of the causes for railroad casualties makes it clear that, while there are some exceptions, the great majority of trains have not been undermanned to the hurt of safety. It is also very evident that it is not possible to write arbitrarily into a statute the number of trainmen which any train should carry. The number of cars in a train is the only criterion by which the size of the statutory "full-crew" is determined. But there are many other equally important factors which should enter into that determination—whether a

train is a local or through train, weather conditions, the amount of switching to be done and the condition of the equipment.

Economic aspects. The economic aspects of "full-crew" legislation loom up into considerable portions only because the statutory law does not operate to prevent casualties as was anticipated. The amount expended for the additional trainmen would not be of such significance if their employment meant great decreases in railroad casualties. It has been estimated that New Jersey railroads are required to expend about $359,373 per year for the 421 additional trainmen required by the "full-crew" law, and that railroads throughout the country are required to spend about $5,000,000 annually in view of that law in different states.

Poll of opinions. No stone has been left unturned in an effort impartially to sound the opinions of all classes of citizens in New Jersey upon the merits and demerits of the law. Letters were sent to each engineer, each conductor operating in New Jersey, and to each trainmen lodge, to all labor unions, all railroads, the commercial and civic organizations and the grangers. The attitude of the press and manufacturers has been made clear so many times that they were not addressed. Each one of these letters was forwarded with an expressed attitude of impartiality and inviting a confidential opinion, if preferable, whether favorable or unfavorable to the "full-crew" law.

It would be assumed, naturally, that the members of the Railroad Brotherhoods (engineers, conductors and trainmen) would stand unqualifiedly in favor of their own law. In the face of this presumption it was of especial interest and significance to find that 79.7% (55 of the total 69 received) of the replies from engineers expressed confidentially that as individuals they were not in sympathy with the present law; that 47% (31 of the total 66) of the replies received from conductors expressed confidentially that as individuals they were not in sympathy with the law; and that all of the only three replies from organizations of Railroad Trainmen were in sympathy with the law. The labor unions are favorable to the law. The railroads are all unqualifiedly opposed to the law. The public press is generally opposed to the law. The manufacturers are largely opposed to the law. The State Grange meeting at Atlantic City on December 5, 1916, passed a resolution calling upon the legislature to abolish the "full-crew" law in New Jersey.

Administrative regulation and statutory regulation. The twenty-two "full-crew" laws, with the exception of Massachusetts, Connecticut, West Virginia, and in part of Wisconsin, gauge the number of trainmen which they require entirely by the number of cars in the train. They require so-many trainmen for every so-many cars. The other factors which should be considered in determining the number of trainmen (whether a train is through or local, weather conditions, the amount of switching to be done, the character of the traffic, the condition of the equipment, the preponderance of curves to be made), do not enter into the calculation of these statutory "full-crew" laws. The statutory "full-crew" laws, which attempt to write into the law every detail and anticipate every contingency, are necessarily rigid. But three or four states have substituted administrative regulation for their often times arbitrary statutory regulation. These states do not attempt by law to determine the minimum number of trainmen which trains must carry. They delegate power, merely, to their Public Utility or Public Service Commission, to require that trains be adequately manned in the interest of safety.

Conclusion. It would seem clear, in view of these analyses, that the attempt to increase the size of train-crews by writing an arbitrary minimum number in the law, has not met with its predicted success. A study of the causes for railroad casualties shows that at least 97.6% of them are due to such causes as could not conceivably be prevented by a "full-crew" law. But the only constitutional basis for these laws rests upon their effectiveness as safety measures. These facts would indicate that the present statutory "full-crew" laws should be repealed, and that in their place should be enacted laws empowering state administrative commissions to require that trains be adequately manned, and giving those commissions power, after hearing, to designate how many men should be carried on various trains.

Outline of Investigation on

The Administration of the "Full-Crew" Laws in the United States

I—History of the "Full-Crew" Movement

1. Condition of railroad operation underlying the movement.
   a. Dangers prior to the development of the automatic coupler and air brake.
   b. Safer conditions after installation of automatic coupler and air brake.
2. The growth of the "full-crew" movement from 1842 to 1917.
   a. Adoption of laws in 23 states.
      (1) Lack of uniformity in the laws.
      (2) Differentiation of laws prior to, from those after, 1907.
         (a) Enactment of laws prior to 1907.
         (b) Enactment of laws after 1907.
   b. Agitation for "full-crew" laws in other states.
   c. Attempts to secure a federal law.
3. The movement to repeal "full-crew" legislation.
   a. The Missouri Referendum appeal.
   b. Attempts to repeal in other states.
4. Summary.

II—A Digest of the "Full-Crew" Laws, with a Study of Their Interpretation and Enforcement

1. Digest of the 22 "full-crew" statutes now operative.

Arizona	New Jersey
Arkansas	New York
California	North Dakota
Connecticut	Ohio
Indiana	Oregon
Maine	Pennsylvania
Maryland	South Carolina
Massachusetts	Texas
Mississippi	Washington
Nebraska	Wisconsin
Nevada.	West Virginia

2. The constitutionality of the laws.
3. Some interpretations under the laws.
4. The penalty clauses and their enforcement.

III—The Purpose of the "Full-Crew" Laws to Reduce Casualities

1. Purpose declared by American Brotherhood.
   a. In their official organ, the Railroad Trainman.
   b. By their president, Mr. W. G. Lee.
2. Objects advanced in legislative hearings.
3. The motive of Governor Wilson in New Jersey and Governor Sulzer in New York.
4. Summary.

IV—An Analysis of the Causes for Railroad Casualties in the United States

1. The annual casualty list in this country.
   a. The accident report laws of 1901 and 1910.
   b. Casualties for years 1902 to 1916.
2. The cause of railroad casualties.
   a. A classification of all casualties into twenty principal causes as made by the Interstate Commerce Commission.
   b. Separate analysis for each class of casualties in this country.
      (1) Collisions.
      (2) Derailments.
      (3) Other accidents.
      (4) Bursting of boilers.
      (5) Accident to roadway or bridges.
      (6) Coupling or uncoupling of cars.
      (7) While doing other work about trains.
      (8) Overhead and side obstructions.
      (9) Falling from cars or engines.
      (10) Getting on or off cars or engines.
      (11) Other accidents around trains.
      (12) Being struck by trains at stations.
      (13) Being struck by trains at grade crossings.
      (14) Being struck by trains at other places.
      (15) Other causes.
      (16) Industrial accidents on tracks or bridges.
      (17) Industrial accidents at stations.
      (18) Industrial accidents around shops.
      (19) Industrial accidents on wharves.
      (20) Industrial accidents at other places.
3. Investigation of causes of railroad accidents made by the Interstate Commerce Commission.
   a. Summarized tabulation of causes found by the I.C.C. for all accidents investigated from 1911 to 1916.
4. Conclusions showing whether casualties are due to undermanning of trains.

V—The Effect of "Full-Crew" Legislation on Casualities in Different States

1. The effect upon the country as a whole.
   a. The Wave of "full-crew" laws in 1911.
   b. The Wave of "full-crew" laws in 1913.
2. Casualties in "full-crew" states before and after the law.
   a. New Jersey.
   b. Pennsylvania.
   c. New York.
   d. Wisconsin.
   e. Indiana.
   f. California.
3. Casualties in states which have no "full-crew" laws.
   a. Illinois.
   b. Massachusetts.
   c. Michigan.
   d. Iowa.
4. Conclusion on the Effectiveness of the Laws.

VI—The Need for an Additional Brakeman

1. The standard size of a train crew.
2. The work of a brakeman under present conditions of operation.
   a. The duties under the old hand-brake and link and pin systems.
   b. A survey of the duties of a present-day brakeman.
3. The number of brakemen required.
   a. For the safe operation of a train.
   b. For the expeditious operation of a train.
4. The duties of the "additional" brakeman in the "full-crew" state of New Jersey.
   a. Testimony of conductors and engineers operating in New Jersey.
5. The need for governmental regulation of the size of train-crews.
6. Conclusion.

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X—Summary and Conclusions

Part II

CHAPTER I

A History of the "Full-Crew" Movement in the United States

There are twenty-two states which have laws regulating or providing for the regulation of the number of trainmen on trains operating within the state. These minimum train-crew laws were at once named "full-crew" laws by their proponents, who thought by that name to imply that trains were normally undermanned. The opponents immediately declared this term a misnomer, on the other hand, and contended that the laws operated only to force unnecessary trainmen upon the railroads and should be called "excess-crew" laws. It would seem that since the laws really do not affect any part of the train-crew other than the brakeman, they might properly be called "additional-brakemen" laws. Although the laws have been variously named, they are popularly known today as the "full-crew" laws and will be so-called here. These laws, with varying degrees of requirement, are now found in the following jurisdictions:

Arizona	North Dakota
Arkansas	Ohio
Connecticut	Oregon
California	Pennsylvania
Indiana	South Carolina
Maine	Texas
Maryland	Washington
Massachusetts	Nebraska
Mississippi	Nevada
New Jersey	Wisconsin
New York	West Virginia (*a*).

Some of the laws require additional brakemen only in freight crews, some only in passenger crews and some only in switching crews, but the requirements of a majority of the laws obtain as to both freight and passenger crews, or freight, passenger and switching crews. It is very interesting as a background to make a study of the conditions of railroad operation which gave rise to the demand for train-crew legislation, the subsequent growth of the "full-crew" movement and finally the rise of the movement which has already begun for a repeal of those laws.

1—Conditions of Railroad Operation Underlying the Movement

Dangers under the hand-brake and link and pin systems. The "full-crew" movement had its beginning during and because of the hazardous conditions of railroad operation which preceded the installation of the air-brake and automatic coupler. Before the introduction of these comparatively recent safety devices the trainmen were required to brake by hand from the tops of freight or the platforms of passenger cars, and to go in between the cars while coupling. The labor of controlling the train made it necessary for the men to be on the cars the greater part of the time and out in all weather. The icy surface covering the tops of cars and the ground, to mention nothing of the other hazards always present, made the work of braking or coupling especially dangerous.

It was not unreasonable that in the years of such conditions the trainmen should ask for additional brakemen, nor surprising that they were successful in securing the passage of seven "full-crew" laws designed to reduce the dangers of the hand-brake and link and pin systems. The first state to respond to this agitation was Maine, which passed a law requiring a brakeman to every two cars, in 1842 (*a*); Connecticut followed with a similar law in 1853 (*b*), Texas in 1854 (*c*), South Carolina in 1882 (*d*), North Dakota in 1895 (*e*), Ohio in 1902 (*f*), and Arizona in 1903 (*g*). It redounds to the credit of the trainmen of this period that they fought, in the face of strong opposition from the railroads, for not only the employment of additional trainmen but for the installation of safety devices.

This fatalistic period of hand-braking and hand-coupling came to a partial end beginning with the year 1898. Congress enacted a statute in 1893, that was to be operative in 1898, which made it mandatory that all common carrier cars in interstate commerce be equipped with a continuous brake controlled from the engine and making it unnecessary for the brakeman to use the hand-brake, and requiring such carriers to be equipped with automatic couplers such as would make it unnecessary for the men to go between the cars to couple. (*h*). There had been a wide installation of the hand-brake and automatic coupler prior to the above date, but it was not until 1893 that a universal adoption of those devices was required by a federal statute.

The records of the Interstate Commerce Commission do not date sufficiently far back to make possible a comparison of casualties of trainmen under the hand-brake and link and pin coupling systems with those under the present conditions of train operation. The records of the railroads and the expressions from trainmen, however, make it very evident that the installation of these two safety devices have effected nothing short of phenomenal reductions in hazards to brakemen. It is no longer necessary for the brakeman to remain continuously on the top of freight cars or on the platform of passenger cars where he is exposed to all manner of dangers. The speed of the train is normally controlled from the engine and the brakemen have more opportunity to remain within the caboose. It is no longer necessary for the brakemen to carry around pins and go between the cars to couple while the engineman is backing his train. The coupling of cars is effected automatically and seldom necessitates that the brakeman expose himself between moving cars.

An idea of the reduction in casualties to trainmen, which were realized largely through the instrumentality of the installation of these safety devices, may be had from a comparison of casualities to trainmen in 1890 with those in 1913. (*i*)

(*a*) The present "full-crew" laws passed by the twenty-two states which are indicated were enacted as follows: Arizona, sec. 2-3, Act 34, Acts of 1903, and sec. 1-12, ch. 16, Acts of 1912; Arkansas, sec. 1-3, Act 116, Acts of 1907, sec. 1-3, Act 298, Acts of 1909, and sec. 1-4, Act 67, Acts of 1913; California, sec. 1-7, ch. 49 (as amended by ch. 168, 1913), Acts of 1911; Connecticut, sec. 3799, General Statutes, 1902, sec. 1-2, ch. 219, Acts of 1909, sec. 1, ch. 210, Acts of 1913; Indiana, sec. 1-4, ch. 25, Acts of 1909, sec. 1-3, ch. 74, Acts of 1911, sec. 1-3, ch. 232, Acts of 1913, and sec. 1-2, ch. 279, Acts of 1913; Maine, sec. 70, ch. 52, Revised Statutes of 1903; Maryland, sec. 331-325, Act XXIII, Public General Laws, 1911; Massachusetts, sec. 24, ch. 784, Acts of 1913; Mississippi, sec. 1-3, ch. 170, Acts of 1914; Nebraska, sec. 5991, 5996, Revised Statutes of 1913; Nevada, sec. 1-7, ch. 74, Acts of 1913, and sec. 1-5, ch. 86, Acts of 1915; New Jersey, sec. 1-6, ch. 190, Acts of 1913; New York, sec. 54a, ch. 49, Acts of 1913; North Dakota, sec. 4307, Revised Statutes of 1905; Ohio, sec. 12553-12554 (as amended by Act, page 508, Acts of 1911) and sec. 12556, Acts of 1911; Oregon, sec. 1-3, ch. 162, Acts of 1913; Pennsylvania, sec. 1-6, 8, p. 1053, Acts of 1911; South Carolina, sec. 3217, Code of 1912; Texas, Arts. 6571-6576, Revised Civil Statutes of 1911; Washington, sec. 1-5, ch. 134, Acts of 1911; West Virginia, sec. 4, ch. 8, Acts of 1915; and Wisconsin, sec. 1809r, 1809s, 1809t and 1809u, Statutes of 1911, and 1809w (added by ch. 63, Acts of 1913), 1, 2.

(*a*) Maine, sec. 3, ch. 9, Laws of 1842.
(*b*) Connecticut, sec. 4, Public Acts of 1853.
(*c*) Texas, present Art. 6571, R. S. 1911, taken from Act approved Feb. 7, 1854.
(*d*) South Carolina, p. 791, 17 Statutes at Large, Laws of 1882.
(*e*) North Dakota, ch. 94, Session Laws of 1895.
(*f*) Ohio, sec. 1-4, p. 337, Acts of 1902, and secs. 1-4, p. 343, Acts of 1902.
(*g*) Arizona, sec. 1-5, Art. 34, Laws of 1903.
(*h*) Public No. 113, approved March 2, 1893, amended April 1, 1896. See also Public No. 133, approved March 2, 1903.
(*i*) Bureau of Railway Economics, Consecutive Bulletin No. 73, p. 13.

	Total number of Trainmen.	Killed.	Injured.	No. killed for each 10,000 employed.	No. injured for each 10,000 employed.
1890.....	153,235	265	6,073	17	396
1913.....	339,650	184	3,293	5	97

In 1890, ten per cent. of the railroad cars were equipped with automatic couplers, and accidents in the coupling of cars amounted to nearly fifty per cent. of all casualties to trainmen. In 1912, ninety-nine per cent. of the railroads were so equipped and the proportion of accidents from this cause was reduced to about eight per cent. Other safety appliances have been gradually installed, such as air gauges, automatic signals (operators of which virtually become flagmen), interlocking switch protection, and the back-up hose by which the brakeman has control of the train at all times. (*a*)

The installation of these various safety devices has been largely instrumental in making radical changes in the conditions of train operation. Trains which are controlled by air brakes, air gauges, back-up hose, and held together by automatic couplers have greater length and carry heavier and larger loads than could trains controlled by the old system of hand brakes and coupled together with link and pin. Loaded trains contain from forty to one hundred cars, and, as the length of the car varies from thirty-six to forty-five feet, a loaded train may average from eighteen hundred to thirty-six hundred feet. In 1902, the average capacity of a car was twenty-eight tons; in 1912, thirty-seven tons. (*b*) Trains today carry an average of from eleven hundred to six thousand tons as a result of the increase in the capacity and number of cars. The length of passenger trains has not increased correspondingly. On the main lines from twelve to sixteen cars, however, are often pulled by a single engine. (*c*)

These changes in railroad operation have effected a change in the duties of the brakemen in both freight and passenger service. In the freight service there are two classes of trains—through and local. The crew on a through freight train ordinarily is composed of an engineer, fireman, conductor and two brakemen. Numerically, the size of the crew has not been decreased as a result of the changed conditions in train operation, but the number handling a given amount of traffic is proportionately less. The crew that handles the train on the road is no longer responsible for making up and inspecting the train at the point of origin. A switching crew now performs this operation. Hand-brakes are used only in case the air-brakes fail, or in mountainous districts when an extra brakeman is usually employed.

On local freight trains, there is no standard number of brakemen in the crew. There may be one, two or three brakemen, the number depending on the amount of switching to be done and the amount of freight to be handled. The crew of a passenger train varies with conditions. On local trains of two or three cars, the usual crew is composed of an engineer, fireman, a conductor acting as a baggagemaster and a brakeman who serves as a flagman. Two-car trains in the South oftentimes are run with a crew consisting of an engineer, fireman, a conductor and a messenger who cares for both baggage and express and acts as flagman. On trains containing four or five cars, the crew back of the engine is composed of a conductor, baggagemaster, brakeman or flagman. On larger trains, there is usually a second brakeman. In addition to setting switches, transmitting signals and inspecting the train, one brakeman, unless assisted by a porter or second brakeman, must announce the stations, load and unload baggage and assist passengers on and off the cars.

It has been seen that the "full-crew" movement had got well under way during and because of the old hand-brake and link and pin coupling systems. The laws were originally passed as a need under the earlier hazardous conditions of train operation. It will be seen, however, that that movement continued long after the installation of the automatic coupler and air-brake, which ushered out the conditions that had called forth the laws.

(*a*) John R. Commons, "Principles of Labor Legislation," p. 342-349.
(*b*) Bureau of Railway Economics, p. 13, Consecutive Bulletin No. 73, 1915.
(*c*) Ibid, p. 15.

2—The Growth of the "Full-Crew" Movement from 1842 to 1917

It is of no little significance and interest to note the various years in which the twenty-two "full-crew" states passed their initial law regulating the size of train crews. A chronological chart of the dates of the adoption of "full-crew" laws in the states now having them, shows as follows:

1842	Maine	1911	Maryland
1853	Connecticut		Washington
1854	Texas		Wisconsin
1882	South Carolina	1913	Massachusetts
1895	North Dakota		New Jersey
1902	Ohio		New York
1903	Arizona		Nebraska
1907	Arkansas		Nevada
1909	Indiana		Oregon
1911	Pennsylvania	1914	Mississippi
	California	1915	West Virginia

The "full-crew" movement has long been under way in this country and with few exceptions the recently enacted laws are the culmination of an agitation for such legislation dating back into the earlier period of train-operation. The first law was enacted in Maine, in 1842, and the most recent in Mississippi, in 1915. It need not be said that these laws, although given their impetus from the same interests, cover different periods and have been drawn to meet various conditions of train operation.

Lack of uniformity in laws. One of the first and most confusing impressions which inevitably follows upon a cursory examination of the various "full-crew" laws, is that they seem all of a different pattern. Although the laws have been adopted in twenty-two states and were designed by the same proponents, they are not uniform. They vary as to the minimum number of cars affected, the number of brakemen required per given number of cars, in their application to the various kinds of service—whether freight, passenger, mail, express or switching—and as to penalty and methods of enforcement. A "full-crew" law, therefore, does not mean the same in different states. The Maine law, for example, requires passenger trains to carry a brakeman for every two cars; the New Jersey law requires five men for a train of five cars, or more. The Maine law itself provides no penalty for violation; the New Jersey law has a penalty of $100. The North Dakota law requires freight trains which still use hand-brakes to carry two brakemen for forty-five cars and an extra brakeman for every two cars thereover; New York requires all freight cars with less than twenty-five cars to carry five trainmen and all thereover at least six trainmen. The Indiana law regulates five classes of service—passenger, mail, express, freight and switching. Maryland regulates only freight cars. Ohio regulates passenger, freight, switching crews and light engines. The penalties vary from no penalty to one of $1000. The effectivness and significance of the different laws take on every degree of variation and include those toward which the railroads are indifferent and those for the repeal of which the railroads would expend nothing short of hundreds of thousands of dollars.

The laws prior to 1907. Although it is a fact that the "full-crew" laws lack any real resemblance of uniformity, they do permit of a clear grouping by periods. There is an unmistakable distinction between the laws which were passed during the period from 1842 to 1907, to remedy the earlier dangers of train operation and those which have been passed between 1907 and the present time. The laws, which were written during the earlier of the two periods, were all designed to alleviate the hazards

which were involved under the old hand-brake and link and pin coupling systems. The early Maine, Connecticut, Texas, South Carolina, North Dakota, Ohio and Arizona laws are each premised upon these earlier conditions of train operation. (*a*)

Laws after 1907. The gap between 1903, when the last of the older type of "full-crew" laws was passed, and 1907, when the first of the newer type was enacted, makes a clear-cut divisional line of that legislation as it was under the hand-brake and link and pin systems, and as it is under the air-brake and automatic coupler.

The laws passed in 1907 and the years thereafter, were products of the same proponents who had fathered the laws of the earlier period. (*b*). The new laws were modified, however, and patterned to meet the newer and current conditions of train operation. It was no longer possible to base the necessity of the laws upon the time, difficulty and hazards of hand-braking or hand-coupling. The laws were asked, subsequent to 1907 accordingly, on no specific ground other than the general plea of safety. The more recent laws, therefore, having no other particular problem in view, do not indicate the duties of the additional trainmen or stipulate where they shall ride as did the first "full-crew" laws.

The first of the series of later "full-crew" laws was that enacted in Arkansas, in 1907. That law required all roads over fifty miles in length to carry a crew consisting of one engineer, one fireman, one conductor and three brakemen, on freight cars of twenty-five cars or more, under penalty of from $100 to $500 for each violation. In that same year, Indiana enacted her first "full-crew" law. Similar laws were passed, in 1911, in California, Pennsylvania, Maryland, Washington and Wisconsin; in 1913, in Massachusetts, New Jersey, New York, Nebraska, Nevada and Oregon; in 1914, in Mississippi, and in 1915, in West Virginia.

Agitation for laws in other states. Agitation for "full-crew" legislation has been carried on in many states which have not yet adopted such laws. The proponents of train-crew legislation have been attempting to swell their list of "full-crew" states by efforts in Kansas, Iowa, Georgia, Kentucky, Colorado, Delaware, Florida, Michigan, Minnesota, Montana, New Hampshire, New Mexico, North Carolina, South Dakota, Tennessee, Utah, Virginia and Wyoming. In 1912, "full-crew" bills were defeated in Georgia, Kentucky and Massachusetts, and in 1913, in Colorado, Delaware, Florida, Georgia, Illinois, Indiana, Kansas, Michigan, Minnesota, Montana, New Hampshire, New Mexico, North Carolina, North Dakota, South Dakota, South Carolina, Tennessee, Texas, Utah, Virginia and Wyoming. Again in 1914, "full-crew" bills were introduced in twenty states with the result that only Mississippi enacted such a law.

Some idea of the extent of the agitation for "full-crew" legislation, since 1913, can be had from the statistics published by the Special Committee on Relations of Railway Operations to Legislation. These statistics give the number of bills introduced and the number of laws enacted on the subject of "full-crew" legislation in the different state legislatures from 1913 to 1915, inclusive. It must be remembered, however, in studying them that often six or eight bills will have been introduced during one session in one legislature. The average number, however, was usually three. In many of the legislative sessions no bills have been introduced on the subject. In a number of instances bills have been amendments calling for the repeal of the "full-crew" legislation.

	Legislatures in session.	Full-Crew bills introduced.	Full-Crew bills enacted.
1913.....	42	107	14
1914.....	14	10	1
1915.....	43	55	1

In the space of four years, 172 bills were introduced and sixteen passed in ninety-nine legislative sessions.

Efforts for a Federal Law. While the Brotherhood of Railroad Trainmen have been happy to secure laws in scattered states, their ideal has been ultimately to have a federal "full-crew" law. Bills were accordingly introduced in Congress in 1910, 1911, 1912 and 1913 (*a*).

The bills which have been introduced into Congress are in many respects similar to the laws which have already been passed in several of the states. The federal bills have usually fixed a smaller number of cars as a means to determine the size of a train which must carry three brakemen on freight trains or two on passenger trains. There can be no doubt that a federal law, if passed in the form indicated by the bills

(*a*) The Maine law requires a trusty and skillful brakeman to every two cars (Revised Statutes of 1903, ch. 52, sec. 70); the Connecticut law requires one brakeman at the brake of each car (General Statutes, 1902; sec. 3799); the Texas law requires a trusty and skillful brakeman upon the hindmost car (Revised Civil Statutes, 1911; Arts. 6571-6576); the South Carolina law requires one trusty and skillful brakeman to every two cars (Code of 1912, sec. 3217); the North Dakota law requires two brakemen to every 45 cars in trains which have hand-brakes (Revised Code of 1905, sec. 4307); and the Arizona law requires a brakeman to every 600 tons while train is being handled on grades (Acts of 1903, Art. 34, secs. 2-3).

(*b*) The Brotherhood of Railroad Trainmen.

(*a*) The first "full-crew" bill (H. R. 28,379) was introduced February 27, 1909, in the House of Representatives, and required two brakemen and one flagman on freight trains of twenty-five cars or more. This regulation did not apply to wrecking or relief trains. All passenger, mail and express trains were to be manned, back of the engine, with a crew of one conductor, one baggageman (if baggage was carried), one flagman and one brakeman. Light engines were to have a crew of one engineer, one fireman, one conductor and one flagman. The Interstate Commerce Commission was given power to enforce the Act, and to inform the proper district attorney of any violation of the law. The penalty for violation was set at $1000. April, 1909, the second federal "full-crew" bill (H. R. 7553) was introduced in the House of Representatives and endorsed by the Brotherhood of Locomotive Engineers and Brotherhood of Locomotive Firemen and Engineers. This bill was more detailed and specific and more comprehensive in its regulations than the one mentioned above. On passenger trains of three cars or more, a conductor, baggagemaster, flagman and brakeman were required back of the engine; on passenger trains having less than three cars, the brakeman could be omitted. On freight trains of twenty-five cars or more, and on a work, wrecking or mixed train, the crew, back of the engine, was to consist of a conductor, two brakemen and one flagman; on a freight train of less than twenty-five cars, the second brakeman could be omitted. Light engines were to be manned by an engineer, a fireman and a conductor or flagman. The method of enforcement and the penalty for violation were the same as in the former bills. The members of the Brotherhood of Trainmen were urged to give their support to the bill by writing their Senators and the Congressmen of their districts.

Bills H. R. 10688 and H. R. 19795, introduced respectively June 21, 1909, and January 31, 1910, were similar in their requirements to the preceding bills. Hearings were held on H. R. 28379, 7533, 10688 and 19795 before the House Committee on Interstate and Foreign Commerce January 28 and May 17, 1910. The railroads had thirteen witnesses; the Brotherhood, one. The former were unanimous of their disapproval of the proposed "full-crew" legislation. Although the representative of the Brotherhood stated that he believed in the principles contained in these measures, he made no effort to support them. There had been a change in the administration of the Brotherhood the past year, and the new administration, believing that the "full-crew" laws required state rather than federal action, had considered it unwise to press the federal "full-crew" bills in 1910. The bills were not discussed in Congress.

On August 21, 1911, a bill (H. R. 13911) was introduced regulating the size of switching crews. It specified the minimum number of men that must be assigned to each engine or locomotive in handling cars used in interstate commerce or to switching cars in any railroad yard or on any railroad track in the states or territories. Two yard brakemen or switchmen besides the engineer, fireman and yard conductor had to be on each engine engaged in switching cars. The enforcement of the law and the penalties for violation thereof were similar to those in the federal "full-crew" bills mentioned above. Again the Brotherhood was urged to bring pressure to bear on their representatives in Congress. Although neither house acted on the bill, one hearing was held on it, June 8th. Its supporters stated that "in a large portion of the country switch engines are now provided with crews as provided for in this bill. A very few states have laws requiring such a complement of men with every switch engine. Most of the states have no such laws, and several of the railroads take advantage of the fact, and work the engines shorthanded."

Congressman Sabath introduced H. R. bill 21219 on March 2, 1912, requiring three brakemen on freight trains of twenty-five cars or more. The penalty for violation was $100-$500. No method of enforcing the law was mentioned. The *Railway and Engineering Review* obtained statistics from the railroads of the probable cost of compliance with the proposed law. It was estimated that the total cost per annum for 143 railroads operating 195,049 miles of road would be $13,395,617.77; an increase of $11,598,028 over the annual cost of existing state laws. The bill was not acted on by either House.

The last "full-crew" bill introduced in Congress, H. R. 5152, May 15, 1913, was similar to H. R. 13911 of 1911 in regulations, enforcement and penalties for violation thereof. It was referred to the Committee on Interstate and Foreign Commerce, but no hearing was given the Brotherhood owing to the great pressure of business on the Committee during the session.

introduced, would apply more universally and uniformly than the present "full-crew" legislation and would be more rigorous in its requirements.

3—The Movement to Repeal "Full-Crew" Legislation

The movement for "full-crew" legislation which reached its height in 1913 with the passage of six laws in that one year, seems already to have lost its former aggressiveness. Since that year there has been no important law enacted in any state, and no united effort to enact a federal law. The indication is, indeed, that the movement is losing its popularity and its one-time labor sympathy. Already the people of one state, Missouri, have repealed a "full-crew" law enacted by the legislature and other repeal movements directed in several states have gained much headway.

The Missouri Repeal. The Missouri legislature, with a vote of 131 to 13 (and 31 members not voting) enacted and Governor Major signed the "full-crew" law of that state in 1913. The law, which required a crew of six trainmen on freight trains of forty cars or more, and five trainmen on passegner trains of more than six cars, was particularly obnoxious to the railroads. The railroads contended that the additional man, which the law compelled them to place on freight trains, was not necessary and would not contribute to the safe and expeditious operation of the train. They accordingly determined to secure a suspension (*a*) of the application of the law until it could be submitted to the people for final decision.

The interim between the referendum petition in 1913 and the vote by the people in 1914 was a period of much agitation on the part of the railroad interests and the Brotherhood interests. The fight from the first was made a national issue between the railroads and the Brotherhood of Railroad Trainmen. Each side was determined to win its point nationally by submission to a popular vote.

The railroads argued that the law was not in the interest of safety and was not necessary, that the Public Service Commission had been especially created to decide such technical questions as the size of an adequate train-crew, that the real purpose of the bill was to legislate jobs for the members of the Brotherhood, and that the cost of the legislation would be over $500,000 per year and would necessitate an increase in the freight rates. Corporations were not allowed by law to expend money upon the election, but the railroads, through their strong organization, did influence public opinion in their interests. The Brotherhood, on the other hand, contending that the law was essential to the safety of the public, set about to uphold the merits of their law by dodgers, pamphlets, billboards, exhibits and moving pictures of casaulties, and attempted to show that the law was a safety measure and that it would not involve an increase in freight rates. The Brotherhood expended $16,056 in the campaign, of which they collected $14,680 from members and $1,200 from the Order of Railway Conductors, leaving a deficit of $176. (*b*)

The referendum vote on the Missouri "full-crew" law in November, 1914, wrought the repeal of that measure. The "full-crew' measure, together with several other measures submitted at the same time, was the first statute to be submitted to the voters under the referendum provision and was overwhelmingly defeated. The total vote cast was 484,276 and of these 324,384 were for a repeal of the "full-crew" law and 159,892 against. (*a*)

A study of the election returns seems to indicate that Kansas City and St. Joseph carried the opposition to repeal of the law and St. Louis registered 18,417 votes for the repeal. Outside of these three principal cities the opposition to the repeal received about 86,660 votes in the state. It was defeated in 102 and 116 counties. (*b*)

Newspapers like the *New York Times, New York Evening Post, Brooklyn Eagle, Wall Street Journal* and current magazines like the *Railway Engineering Review, Commercial and Financial Chronicle,* the *Literary Digest* and the *Nation,* agreed generally in their interpretation of the significance of the repeal of the Missouri "full-crew" law. It was taken as an indication from the people that the railroads should not be dealt with indiscriminately. The repeal was further interpreted as a proof that the "full-crew" laws were narrow labor union demands and not backed by a great movement as had been claimed. It was also pointed out that the defeat in Missouri should help the "full-crew" repeal movement in the "full-crew" states.

The *Switchmen's Journal* contends that:

> "the word has gone forth by the masters (the railroads) to swat the full-crew monster wherever it exists; their kept press is picking up the refrain everywhere and strong efforts will be made to kill it whenever found. The Journal claims further that it was not surprised at the result of the election because the public press, with a few execptions the controlled mouthpiece of Big Business, did not state the actual conditions to the public in Missouri." (*c*)

The Railroad Trainmen attributed the defeat of the law to the cupidity and self interests of the farmers, manufacturers and merchants, and to the misuse of the Initiative and Referendum rather than to a change of heart toward the railroads:

> "This (the defeat) may be something of a disappointment to those who have implicit faith in the judgment of the people, but it will not so appeal to the remainder of us who have long ago reached the conclusion that the judgment of the people will be based wholly on their own interests, regardless of what the result means to the rest of the people." (*d*)
>
> "The last Missouri election showed fifteen constitutional questions on the ballot; this ballot covered six single columns approximately thirty inches long, that not one voter in 100,000 would read and less than that number would understand if he did read. These propositions placed the cities and the country bitterly against each other; they placed the interests of the farmers against those of the people in the cities; they had a local option amendment, and an amendment authorizing the issue of $50,000,000 bonds for road improvements. Any propositions to increase taxes is almost certain of opposition and this was among the cheap tricks employed to defeat every proposition submitted. Vote 'no' on everything was the advice of the interests, and in fear of making a mistake the vote was 'no' in the face of the fact that the people of Missouri voted against more than one amendment that is badly needed. And this is the vindication of the railroads; this is the evidence they submit to show that there is a trend in public sentiment against further interference with them." (*e*)

The movement for a repeal of the "full-crew" legislation has gained much ground in the State of Pennsylvania. Early in 1915, the Pennsylvania Legislature passed, a bill repealing the present law, and another giving the Public Service Commission power to require railroads to employ an adequate

(*a*) The Constitution of Missouri, adopted in 1909, in sec. 57, Art. IV, and the law enacted under that clause as secs. 6747 to 6756, Chap. 59, of Revised Statutes of 1909, contains an initiative and referendum provision. Under this provision it was made possible for any measure passed by the legislature to be referred to the people upon a petition of at least eight per centum of the legal voters in each of two-thirds of the congressional districts. The operation of any law upon such a petition was suspended until voted upon by the people at the next general biennial election. A measure thus referred to the people could become a law only upon the approval of a majority of the votes cast thereon at the election.

(*b*) Railway Age Gazette, Dec. 4, 1914, p. 1059.

(*a*) Letter from Mr. Cornelius Rooch, Secretary of State, June 19, 1916.

(*b*) Railway Age Gazette, Nov. 20, 1914, p. 980.

(*c*) Switchmen's Union of North America Journal, Jan., 1914, p. 796.

(*d*) Railroad Trainmen, Dec., 1914, p. 1128.

(*e*) Railroad Trainmen, Apr., 1915, p. 387.

number of men on trains. This repeal measure, however, was vetoed by Governor Brumbaugh.

Other and less successful attempts have been made in New Jersey, New York, Washington, Oregon, Indiana and Arkansas to repeal their present laws.

4—Summary

The start of "full-crew" legislation, which is now found in twenty-two states (Arkansas, Arizona, California, Connecticut, Indiana, Maine, Maryland, Massachusetts, Mississippi, New York, New Jersey, Nebraska, Nevada, North Dakota, Oregon, Ohio, Pennsylvania, South Carolina, Texas, Washington, Wisconsin and West Virginia) dates back to the 1842 law in Maine. The six laws, which were passed between that time and 1907 and the many other laws which were urged, were designed to remedy the dangers resulting from the old hand-brake and the link and pin coupling systems. These early laws were made applicable only when these dangerous devices were used and usually required one trusty and skilled brakeman to every two cars. The hazardous conditions of train operation, however, which gave rise to "full-crew" legislation were largely removed by the federal law of 1893 which provided for the ultimate installation of the air-brake and automatic coupler on all cars in interstate commerce.

Although the federal safety appliance law alleviated the conditions which had first occasioned the "full-crew" movement, that movement did not cease. Beginning with 1907, and continuing on down to 1915 inclusive, the "full-crew" laws have been passed by many other states. The laws of this second period are designed to meet the more modern problems of casualty prevention which are peculiar to present day train operation.

CHAPTER II

A Digest of the "Full-Crew" Laws, with a Study of Their Interpretation and Enforcement

The requirements set forth by the twenty-two "full-crew" laws (Ariz., Ark., Col., Conn., Ind., Me., Md., Mass., Neb., Nev., N. J., N. Y., N. D., O., Ore., Pa., S. C., Tex., Wash., West Va., and Wis.) include such variations that it is not easy to explain their provisions in general terms. It may be said, with accuracy, however, that the majority of the laws stipulate the minimum number of trainmen which must be carried on trains of interstate and intra-state commerce, the railroads to which the law applies, the portion of track affected, the exemptions and exceptions, the penalty for violations and the methods of enforcement. Although the different statutes do provide regulations relative to these several phases, those regulations are not uniform as applied to each phase.

The clauses regulating the size of the crew do so almost invariably by setting up an arbitrary scale designating so many trainmen for so many cars. In the passenger service the old Maine law requires one brakeman for every two cars; the California law requires a crew of six trainmen for a train of four cars or more; the Indiana law, five trainmen for five cars or more; the New Jersey law, six for four or more coaches and one baggage car; and the New York law, five trainmen for five cars or more. In the freight service a "full-crew" of six is required in Indiana for a train of more than fifty cars; in Arkansas, for forty cars or more; in New Jersey, for thirty cars; and in New York, for twenty-five cars. In the switching service the Arizona law requires two trainmen; the Arkansas law, six trainmen; the Indiana law, five trainmen; and the Oregon law, three trainmen.

Analysis of New Jersey Law. The New Jersey law, enacted as Chapter 190 at the 1913 session, requires passenger trains of not over three coaches and one baggage car to carry a crew of five trainmen (engineer, fireman, conductor, flagman and baggageman); passenger trains of four or more coaches and one baggage car, a crew of six trainmen (consisting of the above enumeration plus one brakeman); passenger, mail or express trains of four cars or more, a crew of five trainmen (engineer, fireman, conductor, brakeman and flagman); freight trains of less than thirty cars, a crew of five trainmen (engineer, fireman, conductor, brakeman, and flagman); and freight trains of more than thirty cars, a crew of six trainmen (engineer, fireman, conductor, two brakemen and flagman). It will be noticed that a "full-crew" of six trainmen is not required by the above law unless there is a baggage car attached, and that by leaving off that car any railroad may run a passenger train of any length with the regular crew of five men. It is, furthermore, obvious that the law makes no provision for a freight train of thirty cars, that the provision for five trainmen applies only to freights of up to and including twenty-nine cars, and that the provision for six trainmen does not apply until a freight contains thirty-one cars.

The law in New Jersey applies to all railroads in the State and any part of that road, but it does exempt trains of three cars or less carrying passengers and trains owned by manufacturers and carrying hot metal ladles, ingots, slags or table trucks. A penalty of one hundred dollars is provided for each violation, and the enforcement of the law is placed in the hands of the Public Utilities Commission.

1—Digest of the "Full-Crew" Hours now Operative

*A tabulation of all of the important requirements and provisions of the twenty-two "full-crew" laws is here made in graphic form.

—COMPARATIVE TABULATION— by the Bureau of State Research of the New Jersey State Chamber of Commerce.

THE FULL CREW LAWS

	Engineer	Fireman	Conductor	Brakeman	Flagman	Baggage-master	Porter	Foreman	Helper	Pilot	Flagman or Brakeman	Flagman or Conductor	Brakeman or Porter	Conductor or Brakeman	Total	RAILROADS — to which — LAW is APPLIED
-1- ARIZONA (Sec. 2-3, Act 34, Acts of 1903; Sec. 1-12, Ch. 16, Acts of 1912.)																
All Trains '03	A	Brakeman	to	every	600	tons										ALL
Passenger, Mail or Express '12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
- (a) P., M., or E. trains of less than 6 cars -	\	\	\	-	\	\	-	-	-	-	-	-	-	-	5	-40 miles and longer -
- (b) " " " " " " 6 cars or more -	\	\	\	\	\	\	-	-	-	-	-	-	-	-	6	"
Freight '12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
- (a) F. of less than 40 cars	\	\	\	\	\	-	-	-	-	-	-	-	-	-	5	"
- (b) " " 40 cars or more	\	\	\	2	\	-	-	-	-	-	-	-	-	-	6	"
- (c) Local Freight	\	\	\	2	\	-	-	-	-	-	-	-	-	-	6	"
Light Engine '12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
- (a) Single Locomotive and Tender	\	\	-	-	-	-	-	-	-	-	-	\	-	-	3	"
Switching Engine '12	\	\	-	-	-	-	-	-	-	-	-	-	-	-	2	"
Other Trains '12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
- (a) Trains other than above P., M., E., F; L.E. and S.E. -	\	\	\	\	\	-	-	-	-	-	-	-	-	-	5	"
-2- ARKANSAS (Sec. 1-3, Act 116, Acts of 1907; Sec. 1-3, Act 298, Acts of 1909; Sec. 1-4, Act 67, Acts of 1913)																
Passenger '09	\	\	\	-	-	-	\	-	-	-	\	-	-	-	5	100 mi. & longer - 3 cars or over
Freight '07	\	\	\	3	-	-	-	-	-	-	-	-	-	-	6	50 " " " 25 " " "
Switching '13	\	\	-	-	-	-	-	\	3	-	-	-	-	-	6	100 " " " {1st and 2nd class cities
-3- CALIFORNIA (Sec 1-7, Ch. 49 (as amended by Ch. 168, 1913), Acts of 1911.)																
Passenger, Mail or Express '11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
- (a) P., M., or E. of less than 4 cars	\	\	\	\	-	\	-	-	-	-	-	-	-	-	5	Over 4 trains each way per day.
- (b) " " " " " 4 cars or more	\	\	\	2	-	\	-	-	-	-	-	-	-	-	6	"
Freight '11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
- (a) Every freight	\	\	\	2	-	-	-	-	-	-	-	-	-	-	5	"
- (b) Trains on tracks which have over 1/2 mi. of 1% or less grade and carrying 50 cars -	\	\	\	3	-	-	-	-	-	-	-	-	-	-	6	"
- (c) IBID and carrying 76 cars	\	\	\	4	-	-	-	-	-	-	-	-	-	-	7	"
- (d) " " " over 76 cars	\	\	\	4	(& \ additional brakeman for every additional 25 cars)										7+	"
- (e) Trains on tracks which have over 1 mi. of between 1% & 1 1/2%. grade & carrying 50 cars	\	\	\	3	-	-	-	-	-	-	-	-	-	-	6	"
- (f) IBID and carrying over 50 cars	\	\	\	3	(& \ additional brakeman for every 25 cars or fraction over 12)										6+	"
- (g) Trains on tracks which have over 1/2 mi. of over 1 1/2% grade and carrying 50 cars.	\	\	\	3	-	-	-	-	-	-	-	-	-	-	6	"
- (h) IBID and carrying over 50 cars -	\	\	\	3	(& \ additional brakeman for every 15 cars or fraction over 7)										6+	"
Other Trains '11																
- (a) Trains other than above P., M., E. and F.	\	\	\	\	-	-	-	-	-	-	-	-	-	-	4	"
-4- CONNECTICUT (Sec. 3799, Gen'l. Statutes, 1902; Sec. 1-2, Ch. 219, Acts of 1909; Sec. 1, Ch. 210, Acts of 1913)																

PORTION of TRACK AFFECTED	EXEMPTIONS - and - EXCEPTIONS	PENALTY - for - VIOLATIONS	METHODS - of - ENFORCEMENT	-REMARKS-
Grades over 95 ft. to mi	- - - - - - - - - - - -	- - $50. to $100. - -	- State's Attorney -	- - - - - - - - - -
- - - - - - - - - - - -	{Wrecking trains, disa-	- - - - - - - - - - - -	{Attorney General	{Cannot require Bag-
Outside of yard limits	bility of employee.	- Not less than $100.	or County Attorney	gage - Master if no
- - - - " - - - -	- - - - " - - -	- - - " - - -	- - - " - - -	baggage is carried
- - - - - - - - - - - -	- - - - - - - - - - -	- - - - - - - - - - -	- - - - - - - - - - -	- - - - - - - - - -
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- - - - - " - - - -	Helper {Locomotive going	- - - - " - - - -	- - - - " - - - -	- - - - - - - - - -
- Within yard limits	- - {distance of 25 mi.	- - - - " - - - -	- - - - " - - - -	- - - - - - - - - -
- - - - - - - - - - - -	- - - - - - - - - - -	- - - - - - - - - - -	- - - - - - - - - - -	- - - - - - - - - -
Outside of yard limits	{Wrecking trains, dis-	- - - - " - - - -	- - - - " - - - -	- - - - - - - - - -
	{ability of employee.			
- - - - - - - - - - - -	- - - - - - - - - - -	- $100. to $500. -	Prosecuting Attorney	- - - - - - - - - -
- - - - - - - - - - - -	- - - - - - - - - - -	- - - " - - -	- - - - " - - - -	- - - - - - - - - -
- - - - - - - - - - - -	- - - - - - - - - - -	- $50. or more -	- - - - " - - - -	- - - - - - - - - -
- - - - - - - - - - - -	{R.R. strikes - branch line	- - - - - - - - - - - -	- - - - - - - - - - -	{Cannot require Baggage-
- - - - - - - - - - - -	{motors - wrecking trains -	{$500. - 6 mo. imprison-	- District Attorney -	{master if no baggage
- - - - - - - - - - - -	{locomotive without cars	{ment - or both - or less.	- - - - - - - - - - -	{is carried - applies
- - - - - - - - - - - -	- - - - " - - - -	- - - - " - - - -	- - - - - - - - - - -	{to certain electric
- - - - - - - - - - - -	- - - - - - - - - - -	- - - - - - - - - - -	- - - - - - - - - - -	{and gasoline cars -
- - - - - - - - - - - -	- - - - " - - - -	- - - - " - - - -	- - - - - - - - - - -	- - - - - - - - - -
- - - - - - - - - - - -	- - - - " - - - -	- - - - " - - - -	- - - - - - - - - - -	- - - - - - - - - -
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— COMPARATIVE TABULATION — Continued —

— THE FULL CREW LAWS —

	Engineer	Fireman	Conductor	Brakeman	Flagman	Baggage-master	Porter	Foreman	Helper	Pilot	Flagman or Brakeman	Flagman or Conductor	Brakeman or Porter	Conductor or Brakeman	Total	RAILROADS — to which — LAW is APPLIED
-A- -— CONNECTICUT —- Continued																
Passenger '02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-(a) Running over 30 mi. per hour on average and carrying more than 2 passenger cars	1 Brakeman for each car															-
Freight and Passenger '13	Public Utility Commissioners Power to															
-5- -— INDIANA —- (Sec. 1-4, Ch. 25, Acts of 1909; Sec. 1-3, Ch. 74, Acts of 1911; Sec. 1-3, Ch. 232, Acts of 1913; Sec. 1-2, Ch. 279, Acts of 1913)																
Passenger, Mail or Express '09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-(a) P., M. or E. of less than 5 cars "	1	1	1	1	-	-	-	-	-	-	-	-	-	-	4	--- All ---
-(b) " " " " " 5 cars or more "	1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	--- " ---
Freight '09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-(a) F. trains of less than 50 cars	1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	Over 4 F. trains per day
-(b) " " " more " 50 "	1	1	1	2	1	-	-	-	-	-	-	-	-	-	6	-
Light Engine '09	1	1	-	-	-	-	-	-	-	-	-	1	-	-	3	-
Switching '11	1	1	-	-	-	-	-	-	1	2	-	-	-	-	5	Over 25 mi. in length
Electric '13	Railroad Commission Power to Require															
-6- -— MAINE —- (Sec. 70, Ch. 52, Revised Statutes of 1903)																
Passenger '03	One Brakeman for every 2 cars															--- All ---
-7- -— MARYLAND —- Sec. 331-335, Act XXIII, Public General Laws 1911)																
Freight '11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-(a) F. trains of 30 cars or more	1	1	1	2	1	-	-	-	-	-	-	-	-	-	6	--- All ---
-8- -— MASSACHUSETTS —- (Sec. 24, Ch. 784, Acts of 1913)																
All Trains '13	-	-	-	-	Public Service Commission —											
-9- -— MISSISSIPPI —- Sec. 1-3, Ch. 170, Acts of 1914)																
Passenger, Mail, Express or Freight '14	1	1	1	-	1	-	-	-	-	-	-	-	1	-	5	Over 50 mi. in length ---
-10- -— NEBRASKA —- (Sec. 5991-5996, Revised Statutes of 1913)																
Passenger, Mail or Express '13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-(a) P., M. or E. of "regularly" 5 cars or less	1	1	1	-	-	-	-	-	-	-	1	-	-	-	4	--- All ---
-(b) " " " " " " more than 5 cars	1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	-
Freight '13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-(a) Any Freight	1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	--- " ---

PORTION of TRACK AFFECTED	EXEMPTIONS — and — EXCEPTIONS	PENALTY — of — VIOLATIONS	METHODS — of — ENFORCEMENT	— REMARKS —
—	When double-action brake is used, 1 Brakeman for every 2 cars.	—	—	—
—		—	—	—
Regulate Size of	Train Crews	$25. for each day of neglect.	Commission and State's Attorney	—
—	—	—	—	—
—	—	—	—	Trainmen must be regular employees for each position
Outside of yard limits	—	$100. to $500.	State's Attorney	
"	—	"	"	
—	—	—	—	
"	—	"	"	—
"	—	"	"	—
—	—	"	"	—
Within yard limits	—	$100. or more for 1st. $300. " " for 2nd. or $1000. for each after	"	—
Flagman	—	$50.	Railroad Commission may require Flagman.	—
—	—	—	—	—
—	—	—	No provision	No penalty for Violation
—	—	—	—	—
Any part of road	—	$500	Attorney General	Law has never been enforced as to inter. state commerce.
—	—	—	—	—
Power to Regulate Size of	Train Crews	—	Attorney General and Commission	—
—	—	—	—	—
Outside of yard limits	Wrecking trains - disability of employee	$100. to $1000.	State's Attorney	—
—	—	—	—	—
—	—	—	—	—
—	Wrecking trains - disabilities of employees	—	Railway Commission and State's Attorney	—
Outside of yard limits	"	$100. to $1000.	"	—
—	—	—	—	—
"	"	"	"	—

— COMPARATIVE TABULATION — Continued — THE FULL CREW LAWS —

		Minimum Crew: Engineer	Fireman	Conductor	Brakeman	Flagman	Baggage-master	Porter	Foreman	Helper	Pilot	Flagman or Brakeman	Flagman or Conductor	Brakeman or Porter	Conductor or Brakeman	Total	Railroads to which law is applied
-10- NEBRASKA — Continued —																	
(b) Main line Local Freight		1	1	1	3	-	-	-	-	-	-	-	-	-	-	6	Running 100 miles or more & carrying passengers & merchandise & doing local switching
Light Engine	'13	1	1	1	-	-	-	-	-	-	-	-	-	-	-	3	--- All
-11- NEVADA (Sec. 1-7, Ch. 74, Acts of 1913; Sec. 1-5, Ch. 86, Acts of 1915.)																	
Passenger or Freight	'13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	95 mi. or longer & operating 1 train per day each way
(a) P. or F. trains of 2 cars or less	"	1	1	1	1	-	-	-	-	-	-	-	-	-	-	4	
(b) " " " " " 3 to 50 cars	"	1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	--- "
(c) " " " " " more than 50 cars	"	1	1	1	2	1	-	-	-	-	-	-	-	-	-	6	--- "
-12- NEW JERSEY (Sec. 1-6, Ch. 190, Acts of 1913.)																	
Passenger	'13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
(a) P. trains of not over 3 coaches & 1 baggage car		1	1	1	-	1	1	-	-	-	-	-	-	-	-	5	--- All
(b) " " " 4 or more " " " " "		1	1	1	1	1	1	-	-	-	-	-	-	-	-	6	--- "
Passenger, Mail or Express	'13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
(a) P., M. or E. trains of 4 cars or more		1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	--- "
Freight	'13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
(a) F. trains of less than 30 cars	"	1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	--- "
(b) " " " more " " "	"	1	1	1	2	1	-	-	-	-	-	-	-	-	-	6	--- "
-13- NEW YORK (Sec. 54 a, Ch. 49, Acts of 1913.)																	
Freight	'13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
(a) F. trains of 25 cars or less		1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	Over 50 cars in length
(b) " " " more than 25 cars		1	1	1	3	-	-	-	-	-	-	-	-	-	-	6	--- "
Trains other than Freight	'13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
(a) Trains of 5 cars or more		1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	--- "
Light Engine	'13	1	1	-	-	-	-	-	-	-	-	-	-	-	1	3	--- "
-14- NORTH DAKOTA (Sec. 4307, Revised Statutes of 1905)																	
Freight	'05	Two Brakemen to each train & 2 Brakemen & 1 additional for every 10 cars or fraction															Trains which have not complete air equipment in good order
(a) F. trains of 45 cars																	
(b) " " " over 45 cars																	--- "
-15- OHIO (Sec. 12553-12554 (as amended by Act page 508) Acts of 1911) Sec. 12556, Acts of 1911.)																	
Passenger	'11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
(a) P. trains of not over 5 cars - any one of which carries passengers		1	1	1	1	-	-	-	-	-	-	-	-	-	-	4	--- All
(b) IBID - any 4 of which are day coaches		1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	--- "
(c) P. trains of over 5 cars, 3 or more of which are day coaches		1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	--- "
(d) P. trains of over 6 cars, 4 of which are carrying passengers		1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	--- "

PORTION of TRACK AFFECTED	EXEMPTIONS — and — EXCEPTIONS	PENALTY — of — VIOLATIONS	METHODS — of — ENFORCEMENT	— REMARKS —
Outside of yard limits	Wrecking trains & disability of employees	$100. – $1000.	Railway Commission and State's Attorney	
"	"	"	"	
Outside of yard limits	Light engines outside of yard limits	$500.	Attorney General or District Attorney	Act never enforced until 1913
Any part of road	Trains of 3 cars or less carrying passengers, & trains owned by manufacturers to carry hot metal ladles, ingots, slags or table trucks	$100.	Public Utility Commission & State's Attorney	Does not include Porters
"	"	"	"	"
Outside of yard limits		$100. to $500	Public Service Commission & possibly Labor Department	
"	"	"	"	"
	Trains which have enough cars with air-brakes in train to render hand-brake unnecessary in ordinary stoppage	$50	Attorney General & State's Attorney	
"	"	"	"	"
Outside of yard limits	Electric cars-trains picking up a car between terminals	Not less than $25.	Public Utility Commission & State's Attorney	
"	"	"	"	"
"	"	"	"	"

— COMPARATIVE TABULATION — — Continued —

— THE FULL CREW LAWS —

	Engineer	Fireman	Conductor	Brakeman	Flagman	Baggage-master	Porter	Foreman	Helper	Pilot	Flagman or Brakeman	Flagman or Conductor	Brakeman or Porter	Conductor or Brakeman	Total	Railroads to which Law is Applied
-15- OHIO — Continued —																
-(e) P. trains of over 7 cars, 2 or more of which are carrying passengers	1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	--- All ---
-(f) P. trains of 6 or more cars carrying passengers	1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	--- " ---
Freight '11	1	1	1	2	-	-	-	1	-	-	-	-	-	-	5	Running over 4 Freight trains every 24 hours
Light Engine '11	1	1	-	-	-	-	-	-	-	-	-	1	-	-	3	Running over 25 mi. out
Switching '13	1	1	1	-	-	-	-	-	2	-	-	-	-	-	5	---
-16- OREGON (Sec. 1-3, Ch. 162, Acts of 1913)																
Passenger, Mail or Express '13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	---
-(a) P., M. or E. trains of 4 or more cars	1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	---
Freight '13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	---
-(a) F. trains of 40 or more cars ---	1	1	1	2	1	-	-	-	-	-	-	-	-	-	6	---
-(b) Main line of Local Freight ---	1	1	1	2	1	-	-	-	-	-	-	-	-	-	6	---
Light Engine '13	1	1	-	-	-	-	-	-	-	1	-	-	-	-	3	---
-17- PENNSYLVANIA (Sec. 1-6, 8, P 1053, Acts of 1911)																
Passenger, Mail or Express '11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	---
-(a) P., M. or E. of 4 or more cars ---	1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	--- All ---
Passenger '11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	---
-(a) P. trains of not over 3 coaches and 1 baggage car	1	1	1		1	1	-	-	-	-	-	-	-	-	5	--- " ---
-(b) P. trains of 4 or more coaches and 1 baggage car	1	1	1	1	1	1	-	-	-	-	-	-	-	-	6	--- " ---
Freight '11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	---
-(a) F. trains of less than 30 cars --	1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	--- " ---
-(b) " " " more " " " ---	1	1	1	2	1	-	-	-	-	-	-	-	-	-	6	--- " ---
-18- SOUTH CAROLINA (Sec. 3217, Code of 1912)																
Passenger '12	One Brakeman for every 2 cars															--- All ---
Freight '12	One " upon last car of F. train															--- " ---
-19- TEXAS (Arts. 6571-6576, Revised Civil Statutes of 1911.)																
Passenger '11	1	1	1	1	-	-	-	-	-	-	-	-	-	-	4	20 mi. and over in length
All Trains carrying Passengers -- and Merchandise '11	One Brakeman on last car															----- " -----
Freight, Gravel or Construction -- '11	1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	--- " ---
Light Engine '11	1	1	1	-	-	-	-	-	-	-	-	-	-	-	3	--- " ---

PORTION of TRACK AFFECTED	EXEMPTIONS — and — EXCEPTIONS	PENALTY — of — VIOLATIONS	METHODS — of — ENFORCEMENT	-REMARKS-
Outside of yard limits	Electric cars-trains picking up a car between terminals	Not less than $25.	Public Utility Commission & State's Attorney	
"	"	$25. for each offence.	"	
On any railroad track	Disability of employee	$100. to $5000. against R.R. Co., or $300. or 18 mo. imprisonment against individual.	"	
Outside of yard limits	Distances not in excess of 15 continuous mi.	$20. to $100.	District Attorney	Crew cannot perform duties of baggageman or of expressman
"	"	"	"	
"	Helper engines in helper districts	"	"	
"	"	"	"	
Any part of road	Trains owned by manufacturers to carry hot metal ladles, ingots, slags, or table trucks-trains of 3 cars or less carrying passengers.	$100.	Public Service Commission and State's Attorney	Does not include Porter
"	"	"	"	"
"	"	"	"	"
"	"	"	"	
"	"	"	"	
	Where power-brakes are used		Railroad Commissioner, Attorney General & Solicitor	
	"		"	
Outside of yard limits	Disability of employee-switching Crews	$100. to $1000.	Attorney General District or County Attorney	
"	"	$100.	"	
"	"	$100. to $1000.	"	
"	"	"	"	

— COMPARATIVE TABULATION — Continued — — THE FULL CREW LAWS —	Engineer	Fireman	Conductor	Brakeman	Flagman	Baggage-master	Porter	Foreman	Helper	Pilot	Flagman or Brakeman	Flagman or Conductor	Brakeman or Porter	Conductor or Brakeman	Total	RAILROADS — to which — LAW is APPLIED
-20- WASHINGTON (Sec. 1-5, Ch. 134, Acts of 1911.)																
Passenger, Mail or Express ---'11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	----------
-(a) P., M. or E. of 4 or more cars -	1	1	1	1	1	-	-	-	-	-	-	-	-	-	5	Over 2 trains every 24 hr.
Freight ----------'11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	----------
-(a) F. trains of 25 or more cars -	1	1	1	2	1	-	-	-	-	-	-	-	-	-	6	--- " ------
Light Engine ----------'11	1	1	1	-	-	-	-	-	-	-	-	-	-	-	3	--- " ------
-21- WEST VIRGINIA (Sec. 4, Ch. 8, Acts of 1915)																
All ----------'15	-	-	Public			Service										Commission
-22- WISCONSIN (Secs. 1809r, 1809s, 1809t. and 1809u, Statutes of 1911; 1809w, (added by Ch. 63, Acts of 1913) 1, 2.)																
Passenger ----------'11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	----------
-(a) P. trains with 3 cars or less -	1	1	1	1	-	-	-	-	-	-	-	-	-	-	4	--- All -----
-(b) " " " more than 3 cars	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2	--- " -----
Freight ----------'11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	----------
-(a) F. trains of 3 cars or more --	1	1	1	2	-	-	-	-	-	-	-	-	-	-	5	--- " -----
Switching ----------'13	-	-	-	-	-	-	Railroad									Commission

PORTION of TRACK AFFECTED	EXEMPTIONS — and — EXCEPTIONS	PENALTY — of — VIOLATIONS	METHODS — of — ENFORCEMENT	— REMARKS —
Outside of yard limits	Wrecking — Disability of Employees	$100. to $500.	Railroad Commission & Prosecuting Attorney	Crew cannot perform duties of baggageman or of expressman.
Power to	Regulate			
Outside of yard limits	Trains picking up cars between terminals — electric trains	Not less than $50. against roads of more than 25 miles	Attorney General & State's Attorney	Brakeman must not perform duties of baggageman or of expressman.
Power to	Regulate	$50. to $500.	R.R. Commission	

New Jersey

(a) Acts of 1913, Ch. 190, Secs. 1-6, 8-9.

CHAPTER 190.—*Railroads—Sufficient crews for trains.*

Crew required on freight trains of more than thirty cars. SECTION 1. It shall be unlawful for any railroad company, its officers or agents, receiver, or any person or persons doing business in this State, to run or operate over its road, or any part of its road, or permit to be run or operated over its road, or any part of its road, any freight train consisting of more than thirty (30) freight or other cars, exclusive of caboose and locomotive, with train crew consisting of less than six (6) persons, to wit, one engineman, one fireman, one conductor, one flagman, and two brakemen.

Less than thirty cars. SEC. 2. It shall be unlawful for any railroad company, its officers or agents, receiver, or any person or persons doing business in this State, to run or operate over its road, or any part of its road, or permit to run or operate over its road, or any part of its road, any freight train consisting of less than thirty (30) freight or other cars, exclusive of caboose and locomotive, with a train crew consisting of less than five (5) persons, to wit, one engineman, one fireman, one conductor, one flagman, and one brakeman.

Passenger trains. SEC. 3. It shall be unlawful for any railroad company, its officers or agents, receiver, or any person or persons doing business in this State, to run or operate over its road, or any part of its road, or permit to be run or operated over its road, or any part of its road, any train carrying passengers, consisting of not more than three (3) passenger coaches and one baggage car, with a train crew consisting of not less than five (5) persons, to wit, one engineman, one fireman, one conductor, one baggageman, and one flagman. And further, where such train is operated by electricity, consisting of not more than three (3) electric passenger coaches and one electric baggage car, the train crew shall consist of not less than four (4) persons, to wit, one motorman or motorneer, one conductor, one baggageman and one flagman. The provisions of this section not to include the train porters or Pullman employees, if any.

Exceptions. SEC. 4. Nothing in this act shall be so construed as to make it apply to any train carrying passengers, consisting of three or less cars: *Provided,* That nothing in this act shall be so construed to prevent the increasing of the number of men upon trains as set forth herein.

Five cars or more. SEC. 5. It shall be unlawful for any railroad company, its officers or agents, receiver, or any person or persons doing business in this State, to run or operate over its road, or any part of its road, or permit to be run or operated over its road, or any part of its road, any train carrying passengers, consisting of four (4) or more passenger coaches and one baggage car, with a crew of less than six (6) men, to wit, one engineman, one fireman, one conductor, one baggageman, one brakeman, one flagman. And further, where such train is operated by electricity, consisting of four (4) or more electric passenger coaches and one electric baggage car, the train crew shall consist of not less than five (5) persons, to wit, one motorman or motorneer, one conductor, one baggageman, one brakeman or guard, and one flagman. The provisions of this section not to include the train porters or Pullman employees, if any.

Four cars or more. SEC. 6. It shall be unlawful for any railroad company, its officers or agents, receiver, or any person or persons doing business in this State, to run or operate over its road, or any part of its road, or permit to be run or operated over its road, or any part of its road, any train consisting of four or more passenger, express, or mail cars, with a crew consisting of less than five (5) men, to wit, one engineman, one fireman, one conductor, one brakeman, one flagman; this not to include train porters or Pullman employees, if any.

Violations. SEC. 8. Any railroad company, its officers or agents, officers of the court, receiver, or any person or persons operating a railroad, violating any of the provisions of this act, shall be guilty of a misdemeanor, and liable to a penalty of one hundred dollars ($100) for each and every such violation, to be recovered with costs according to law, for the use of the county in which such violation takes place: *Provided, however,* That nothing in this act shall apply or relate to trains owned or operated by manufacturers, made up of hot metal ladles, ingots, slag, or table trucks.

Enforcement. SEC. 9. It shall be the duty of the Board of Public Utility Commissioners of this State to enforce the provisions of this act.

Pennsylvania

(a) Acts of 1911, Page 1053, Secs. 1-6, 8.

Railroads—Sufficient crews for trains.
(Page 1053.)

Crew for freight trains. SECTION 1. It shall be unlawful for any railroad company, its officers or agents, officers of the court, receiver, or any person or persons doing business in this commonwealth, to run or operate over its road, or any part of its road, or permit to be run or operated over its road or any part of its road, any freight train consisting of more than thirty (30) freight or other cars, exclusive of caboose and locomotive, with a train crew consisting of less than six (6) persons, to wit, one engineman, one fireman, one conductor, one flagman, and two brakemen.

Thirty or more cars.

Less than thirty cars. SEC. 2. It shall be unlawful for any railroad company, its officers or agents, officers of the court, receiver or any person or persons doing business in this commonwealth, to run or operate over its road, or any part of its road, or permit to be run or operate over its road or any part of its road, any freight train consisting of less than thirty (30) freight or other cars, exclusive of caboose and locomotive, with a train crew consisting of less than five (5) persons, to wit, one engineman, one fireman, one conductor, one flagman, and one brakeman.

Passenger trains of not more than four cars. SEC. 3. It shall be unlawful for any railroad company, its officers or agents, officers of the court, receiver, or any person or persons doing business in this commonwealth, to run or operate over its road, or any part of its road, or permit to be run or operated over its road or any part of its road, any train carrying passengers, consisting of not more than three (3) passenger coaches and one baggage car, with a train crew consisting of not less than five (5) persons, to wit, one engineman, one fireman, one conductor, one baggageman, and one flagman. This not to include the train porters or Pullman employees.

Statute construed. SEC. 4. Nothing in this act shall be so construed as to make it apply to any train carrying passengers, consisting of three or less cars: *Provided,* That nothing in this act shall be so construed to prevent the increasing of the number of men upon trains as set forth herein.

Passenger trains of five or more cars. SEC. 5. It shall be unlawful for any railroad company, its officers or agents, officers of the court, receiver, or any person or persons doing business in this commonwealth, to run or operate over its road, or any part of its road, or permit to be run or operated over its road, or any

part of its road, any train carrying passengers, consisting of four (4) or more passenger coaches and one baggage car, with a crew of less than six (6) men, to wit, one engineman, one fireman, one conductor, one baggageman, one brakeman, one flagman; this not to include the train porters or Pullman employees.

Without baggage cars. SEC. 6. It shall be unlawful for any railroad company, its officers or agents, officers of the court, receiver, or any person or persons doing business in this commonwealth, to run or operate over its road, or any part of its road, or permit to be run or operated over its road or any part of its road, any train consisting of four or more passenger, express, or mail cars, with a crew consisting of less than five (5) men, to wit, one engineman, one fireman, one conductor, one brakeman, one flagman; this not to include the train porters or Pullman employees.

Violations. SEC. 8. Any railroad company, its officers or agents, officers of the court, receiver, or any person or persons operating a railroad, violating any of the provisions of this act, shall be guilty of a misdemeanor, and liable to a penalty of one hundred dollars ($100) for each and every such violation, to be recovered with costs as debts are now by law recoverable, by a suit in the name of the commonwealth, for the use of the county in which such violation takes place: *Provided, however,* That nothing in this act shall apply or relate to trains owned or operated by manufacturers, made up of hot metal ladles, ingots, slag, or table trucks.

This act is within the police power of the State, and does not impose a burden on interstate commerce. It does not take property without due process of law, and is constitutional. 88 Atl. 775.

New York

(a) Acts of 1913, Ch. 49, Sec. 54-a.

CHAPTER 49.—*Railroads—Sufficient crews for trains.*

Crew required. SECTION 54-a (added by chapter 146, Acts of 1913). No person, corporation, trustee, receiver, or other court officer, shall run or operate, or cause to be run or operated, outside of the yard limits, on any railroad of more than fifty miles in length within this State, a freight train of more than twenty-five cars, unless said train shall be manned with a crew of not less than one engineer, one fireman, one conductor and three brakemen; nor any train other than a freight train of five cars or more, without a crew of not less than one engineer, one fireman, one conductor and two brakemen, and if the train is a baggage train or a passenger train having a baggage car or baggage compartment without a baggageman in addition to said crew; nor any freight train of twenty-five cars or less without a crew of not less than one engineer, one fireman, one conductor and two brakemen; nor any light engine without a car or cars, without a crew of not less than one engineer, one fireman and one conductor or brakeman. Each separate violation of the provisions of this section shall be a misdemeanor punishable by a fine of not less than one hundred dollars ($100) nor more than five hundred dollars ($500). Each train or light engine run in violation of the provisions of this section shall be deemed to be a separate offense.

2—The Constitutionality of the Laws

The constitutionality of train-crew legislation has been so firmly established and generally accepted, since the decision of the United States Supreme Court in the Arkansas case (*a*) in 1911, that in most of the states the question has never been raised. At the present time there is no state, with the exception of Maryland, in which the operation of its "full-crew" law is being impaired by reason of its questioned constitutionality. In the few cases which have been adjudicated, the courts have invariably upheld the statutes, regulating the number of trainmen on trains, as safety measures.

(*a*) 219 U. S. 453.

The validity of the "full-crew" laws have been attacked, when at all, as an unjustifiable exercise of the police power by the state in the regulation of interstate commerce, and as a violation of the fourteenth amendment. If Congress is given power to regulate interstate commerce, it would be unconstitutional, some have said, for the states to interfere with that power by requiring larger crews on interstate trains. The courts have met this point by declaring that the states have a police power which may often serve as a basis for purely safety regulations, and since Congress has not taken over the power of regulating train-crews that power still remains with the states.

The question of the constitutionality of the "full-crew" laws in Arizona (*a*), California (*b*), Connecticut (*c*), Maine (*d*), Maryland (*e*), Massachusetts (*f*), Mississippi (*g*), Nebraska (*h*), Nevada (*i*), New Jersey (*j*), New York (*k*), North Dakota (*l*), Oregon (*m*), Ohio (*n*), South Carolina (*o*), Texas (*p*), Washington (*q*), or Wisconsin (*r*) has not been decided by any of their respective courts. Although the courts have not passed upon the validity of the Maryland "full-crew" law, the Attorney-General of that state has made a ruling that that law is inoperative as to interstate transportation (*e*). It is difficult to understand why this anomalous opinion has not been disputed by the labor people and pushed by them to a final holding in the court. The courts of Arkansas, Indiana, and Pennsylvania have, however, passed upon the validity of the "full-crew" laws. It is, no doubt, largely due to the decision of the Arkansas Supreme Court in 1908 upholding the constitutionality of the law (*s*) and the affirmation of that holding by the United States Supreme Court in 1911 (*t*), the decisions of Indiana courts in 1909 (*u*), and the like decision of the Supreme Court of Pennsylvania in 1913 (*v*), that the other eighteen state "full-crew" laws have not been questioned in the courts.

The Arkansas case, which was the case of the Chicago, Rock Island and Pacific Railway Company vs. State of Arkansas (*w*), stands today as a constitutional bulwark to the friends of the train-crew laws. The case was first tried by the Arkansas Supreme Court, which affirmed its validity on appeal from the Circuit Court, Pulaski County, and then carried to the Supreme Court of the United States in error.

Justice Harlan, who wrote the opinion which was concurred in unanimously by the remaining justices, said in part:

"The statute here involved is not in any proper sense a regulation of interstate commerce nor does it deny the equal protection of the laws. Upon its face, it must be taken as

(*a*) Letter signed by Geo. W. Harben, Assistant Attorney General, dated June 24, 1916.
(*b*) Letter signed by U. S. Webb, Attorney General, dated June 28, 1916.
(*c*) Correspondence with Connecticut State officials.
(*d*) Letter signed by Oscar H. Dunbar, Assistant Attorney General, dated August 12, 1916.
(*e*) Letter signed by Albert C. Ritchie, Attorney General, dated June 21, 1916.
(*f*) Correspondence with State officials.
(*g*) IBID.
(*h*) Letter signed by Chas. S. Roe, Assistant Attorney General, dated June 23, 1916.
(*i*) Letter signed by Geo. B. Thatcher, Attorney General, dated June 23, 1916.
(*j*) Letter signed by A. B. Barber, Secretary of Board of Public Utilities Commissioners, dated July 14, 1916.
(*k*) Letter signed by L. P. Hale, Counsel for Public Service Commission, Second District, New York, dated June 27, 1916.
(*l*) Letter signed by Henry J. Linde, Attorney General, dated August 13, 1916.
(*m*) Letter signed by Geo. M. Brown, Attorney General, dated June 26, 1916.
(*n*) Letter signed by Freeman T. Eagleson, Attorney General for the Public Utilities Commission, dated July 10, 1916.
(*o*) Letter signed by Thos. H. Peeples, Attorney General, dated June 21, 1916.
(*p*) Letter signed by B. F. Sooney, Attorney General, dated August 14, 1916.
(*q*) Letter signed by Scott Z. Henderson, Assistant Attorney General, dated August 16, 1916.
(*r*) Letter signed by Walter C. Owen, Attorney General, dated August 14, 1916.
(*s*) 111 S. W. 456, 31 Sup. Ct. 275.
(*t*) 219 U. S. 453.
(*u*) 87 N. W. 1034.
(*v*) 88 Atl. 775, 241 Pa. 581.
(*w*) 219 U. S. 453.

not directed against interstate commerce, but as having been enacted in aid, not in obstruction, of such commerce and for the protection of those engaged in such commerce. Under the evidence, there is admittedly some room for controversy as to whether the statute is or was necessary; but it cannot be said that it is so unreasonable as to justify the court in adjudging that it is merely an arbitrary exercise of power and not germane to the objects which evidently the state legislature had in view. It is a means employed by the State to accomplish an object which it is entitled to accomplish, and such means, even if deemed unwise, are not to be condemned or disregarded by the courts, if they have a real relation to that object. And the statute being applicable alike to all belonging to the same class, there is no basis for the contention that there has been a denial of the equal protection of the laws. Undoubtedly, Congress in its discretion, may take entire charge of the whole subject of the equipment of interstate cars, and establish such regulations as are necessary and proper for the protection of those engaged in interstate commerce. But it has not done so in respect of the number of employees to whom may be committed the actual management of interstate trains of any kind. It has not established any regulations on that subject, and until it does the statutes of the State, not in their nature arbitrary, and which really relate to the rights and duties of all within the jurisdiction, must control. This principle has been firmly established, and is a most wholesome one under our systems of government, Federal and state. In addition to the cases above cited, Mobile Co. vs. Kimball, 102 U. S. 691; C. & S. F. Ry. Co. vs. Hefley, 158 U. S. 98;W. U. Tel. Co. vs. James, 162 U. S. 656; Chicago &c., R. R. Co. vs. Solan, 169 U. S. 133; W. U. Tel. Co. vs. Kansas, 216 U. S. 27; Reid vs. Colorado, 187 U. S., 137; and M., K. & T. Ry. Co. vs. Haber, 169 U. S. 613, may be consulted" (*a*).

3—Some Interpretations Under the Law

The laws regulating the size of train crews have been enacted as safety measures, and have, therefore, never given rise to any serious questions of constitutionality. They have, on the other hand, given rise to many perplexing problems of interpretation. There is not any important "full-crew" law but that has thrown the railroad counsels of the various states into a quandary in their attempts to fathom the meaning of the apparently simple provisions.

There could hardly be, on its face, a more simple or clearer requirement than that all railroads carry a crew of six trainmen on trains of five cars or over. But just such statutes have taxed the reasoning powers of the best counsels in Pennsylvania, New York and New Jersey. It is not clear, for example, what the statute means to include under the term five cars—whether a combination passenger and express car should be counted as two cars or one, whether empty and locked baggage cars should be counted, whether several push-engines are cars under the statute or whether additional pick-up cars which cannot be anticipated should be counted. On the other hand, it is not clear what is meant by six trainmen—whether the additional brakeman can also perform the functions of another officer, whether the second fireman can be assigned rightfully to the duties of the additional man, whether in case of emergency a train must be held up when the additional man is sick, or whether the dining car conductor may be assigned to the duties of brakeman.

This problem of interpreting the practices which are legitimate under the "full-crew" provisions is worked out in several ways. It often happens, as it does in New Jersey, that the railroads will agree among themselves to certain interpretations which are agreeable to the Brotherhood of Railroad Trainmen. When that is not possible most questions of interpretation are frequently carried to the Public Service Commission for an opinion. In case there is no access to a Public Service Commission the question may be carried to the courts.

A knowledge of the questions which commonly arise for interpretation under the "full-crew" statutes, and of the substance and method of their settlement may be had by reviewing briefly the situation for Pennsylvania and New Jersey.

Pennsylvania

The "full-crew" law of Pennsylvania does not itself empower the Public Service Commission of that state to interpret or enforce it, but that jurisdiction is given elsewhere in the statutes. Accordingly, it is the practice, in that state, for the Brotherhood of Railroad Trainmen to carry their complaints against the railroads for violation of the law to the Public Service Commission. Since the law has been declared constitutional, the railroads have adhered closely to the requirements of the law as interpreted by them. The various complaints, therefore, involve almost always only a difference of interpretation. It is interesting to review the various complaints which have been made in Pennsylvania and to note the holding which the Public Service Commission has made on each.

Brotherhood of Railroad Trainmen vs. New York, Chicago & St. Louis Railroad Company (*a*).

Complaint was made that the respondent carrier was operating two trains without having thereon a baggageman as required by the Full-Crew Law, and it appeared from the testimony that one of the trains consisted of five cars, one baggage car, two passenger coaches and two sleepers, and the other train carried an additional express car which was sealed and not opened within this state. Both trains had a crew of six men—one engineer, one fireman, one conductor, two brakemen and a joint express and baggageman, the latter being employed by the express company and paid by it and the railroad company. The question before the Commission was whether the joint expressman and baggageman fulfilled the requirement of the law that one of this crew must be a baggageman.

From the testimony the Commission concluded that the employment of the joint expressman and baggageman was a compliance of the Full-Crew Law, and the complaint was dismissed.

Brotherhood of Railroad Trainmen vs. The Pennsylvania Railroad Company (*b*).

Complaint was made that the carrier violated the Full-Crew Law in operating a train consisting of three passenger coaches and a fourth car known as a combination car, one-half of which was used for passengers and the other half for baggage, with a crew of one engineman, one fireman, one conductor, one brakeman and one flagman.

The Commission decided that the combination car should be treated as a baggage car, and that, therefore, the crew provided for the train was a crew required by the Full-Crew Law, and the complaint was dismissed.

Order of Railway Conductors and Brotherhood of Railroad Trainmen, M. T. Robinson vs. The Pennsylvania Railroad Company (*c*).

Complaint was made that the carrier operated a train consisting of an engine and mail car, a combination baggage and passenger car, a day coach, a dining car, a parlor car and five sleeping cars in violation of the Full-Crew Law in that no baggage man was employed.

It appeared that the baggage car was loaded by the station employes at Pittsburgh, who thereupon locked the car and it was not opened again until the train reached Harrisburg, where the station employes opened the car and attended to the baggage.

The carrier contended that the sleeping cars and the parlor car were not passenger coaches within the meaning of

(*a*) 219 U. S., p. 466. This opinion was decided on February 20, 1911.

(*a*) Public Service Commission of the Commonwealth of Pennsylvania,—Complaint Docket No. 71.
(*b*) IBID, Complaint Docket 72.
(*c*) IBID, Complaint Docket No. 488.

the Act, and that no baggageman was required on trains where no service could be rendered by such an employe.

The Commission rejected both contentions, and held that the train in question required a crew of six men, one of whom should be a baggageman.

Order of Railway Conductors and Brotherhood of Railroad Trainmen, S. R. Tarner vs. The Pennsylvania Railroad Company (*a*).

Complaint was made that the carrier violated the Full-Crew Law in operating a train which had at its rear a mail car not equipped with the platform and guard rails mentioned in the Act.

The carrier admitted the allegation, but denied that such an operation was a violation of the law, and maintained that Congress had legislated upon the subject by specifying the manner in which a mail car should be constructed, and that, therefore, the question of the Full-Crew Law relating thereto was void.

The Commission held that the intent of the Full-Crew Law was that the rear car of any train should be equipped in a certain manner, and that its provisions should be enforced.

Order of Railway Conductors and Brotherhood of Railroad Trainmen, S. L. Curry vs. The Baltimore and Ohio Railroad Company (*b*).

Complaint was made that the respondent carrier operated a train consisting of an engine, one express car, one baggage car, two passenger cars, one dining car, two Pullman sleeping cars, and one Pullman parlor car, with a crew of five men. The carrier insisted that the dining car conductor was a brakeman, and that therefore, the crew consisted of six men, and was not in violation of the Act.

The Commission found from the testimony that the dining car conductor was not a brakeman and an order was issued directing the company to man the train with a crew of six men, none of whom should perform the service of dining car conductor.

Order of Railway Conductors and Brotherhood of Railroad Trainmen, G. B. Rowand vs. The Central Railroad Company of New Jersey (*c*).

Upon complaint that the carrier was operating a train in violation of the Full-Crew Law, the Commission found that in order to provide with the provisions of the latter, the carrier had counted its dining car conductor as a brakeman.

It was held that he could not occupy these dual positions, and that the train was operated in violation of the law, and an order was issued directing the company to operate the train with a crew of six men, none of whom should be a dining car or café car conductor.

An appeal as of No. 264, October term 1916, has been taken by the Central Railroad Company of New Jersey to the Superior Court of Pennsylvania from the order here entered by the Public Service Commission in this complaint.

Order of Railway Conductors and Brotherhood of Railroad Trainmen, G. B. Rowand vs. Philadelphia & Reading Railway Company (*d*).

Complaint was made that a train consisting of an engine, one combination baggage and passenger car, two passenger coaches, one combination café and passenger car and one Pullman car was being operated with a crew of five men, the café car conductor qualified to act as a brakeman, which was a violation of the Full-Crew Law.

The Commission held that the law had been violated, and that the dining car or café car conductor could not be counted as one of the required crew.

Order of Railway Conductors and Brotherhood of Railroad Trainmen vs. Pittsburgh & Lake Erie Railroad Co. (*e*).

Complaint was made that the carrier in operating certain freight trains in and near Pittsburgh, was violating the Full-Crew Law, in that the trains were manned by a crew of only five men, and contained more than fifty cars.

The Commission found that the trains complained of were engaged in switching within the yards of the carrier, and recognizing the distinction between the hauling of trains in transit and the assembling and distributing of cars which make up the trains, held that the operations complained of were not covered by the Full-Crew Law, and the complaint was therefore dismissed.

C. A. Yoh Lodge No. 736, Brotherhood of Railroad Trainmen, H. M. Fritz vs. Cumberland Valley Railroad Company. (*a*)

Complaint was made that the carrier operated a train composed of an engine, a combination baggage and smoking car and one passenger coach with a crew of less than five men in violation of the Full-Crew Act.

The Commission decided that inasmuch as the train consisted of three or less cars it was not covered by the Full-Crew Act, and that the evidence did not disclose a situation which would warrant the Commission in deciding that the train was inadequately manned and the complaint was therefore dismissed.

When a complaint is registered with the Public Service Commission, that body thereupon sets a date for a hearing of the complainants and defendants. After the hearing the Commission issues a report which states briefly the facts brought out in the hearing and the holding which was made upon the point at issue. Upon the basis of this report and holding the Commission then issues its order and that order is final unless appealed to the courts.

The only interpretations of the "full-crew" laws of any importance in the various other states which have enacted such legislation have been in Indiana, Wisconsin and California.

The Indiana courts held (*b*) that the words "sent out" did not limit the act to trains originating within the state of Indiana but were used in the sense of "operate" or "run over its road," and making the act applicable to all trains which were being operated within the state, though they originated in another state and passed through Indiana to points beyond. The Wisconsin Railroad Commission and Attorney-General have ruled (*c*) that the expression "a passenger train with three cars or less" (*d*) does not purport to stipulate any particular kind of cars and therefore any train containing more than three cars, whether one or more of them be baggage, express or mail cars, must have two brakemen. The California courts in the case of ex parte Galivan (*e*) held that it is no violation of section 1 of 1911 "full-crew" law (*f*) to operate a train of three cars carrying passengers with only one brakeman, although a baggage car may also be attached thereto.

New Jersey

The New Jersey "full-crew" law does not make provision for switch crews and the only difficulties which have arisen in regard to the interpretation of that law have pertained to the number of trainmen required on a freight train of thirty cars and the number of trainmen required on passenger trains of various numbers of cars.

The law provides that freight trains of less than thirty cars shall carry a crew of five trainmen, consisting of one engineer, fireman, conductor, brakeman, and flagman and that freight trains of more than thirty cars, a crew of six trainmen, consisting of the above enumeration plus one brakeman. The law does not stipulate any minimum crew for freight train of thirty cars and it is entirely within the law for the railroads to man freight trains of thirty cars as they see fit.

(*a*) Public Service Commission of the Commonwealth of Pennsylvania,—Complaint Docket No. 489.
(*b*) IBID, Complaint Docket No. 490.
(*c*) IBID, Complaint Docket No. 491.
(*d*) IBID, Complaint Docket No. 492.
(*e*) IBID, Complaint Docket No. 493.

(*a*) Public Service Commission of the Commonwealth of Pennsylvania,—Complaint Docket, No. 500.
(*b*) 87 N. W. 1034-42,—decided on April 9, 1909.
(*c*) See letter from W. C. Owen, Attorney General, dated August 14, 1916.
(*d*) Statutes of 1911, Section 1809r.
(*e*) 162 Cal. 331-334,—decided March 16, 1916.
(*f*) Stats. 1911, p. 65.

The most puzzling clause of the New Jersey law is that clause which provides that passenger trains of not over three passenger coaches and one baggage car shall carry a crew of five trainmen, consisting of an engineer, fireman, conductor, flagman, and baggagemaster, and that passenger trains of four or more coaches and one baggage car shall carry a crew of at least six trainmen, consisting of an engineer, fireman, conductor, brakeman, flagman, and baggagemaster, and the clause which provides that passenger, mail or express trains of four cars or more shall carry a crew of five trainmen, consisting of an engineer, fireman, conductor, brakeman, and flagman.

It is obvious from a study of the New Jersey law that the only clause which requires additional trainmen in the passenger service (i. e., a crew of more than the usual five trainmen, consisting of an engineer, fireman, conductor, brakeman, and flagman) is that clause which requires passenger trains of four or more passenger coaches and one baggage car to carry a crew of six trainmen. The difficulties which have centered around this clause have been due to an inability on the part of the railroads to determine what is meant by "four or more passenger coaches and one baggage car." An attempt is here made to enumerate the various possibilities of train make-ups which may or may not come within this clause and a suggested interpretation.

1. A passenger train of three coaches and one combination car where passengers occupy the passenger compartment and baggage is carried in the baggage compartment.

It would seem that this should be considered a train of four rather than five cars and that a crew of five trainmen would be sufficient.

2. A passenger train consisting of ten coaches and one combination car where passengers occupy the passenger compartment and no baggage is carried in the baggage compartment.

The New Jersey law does not require a "full-crew" (i. e., a crew of six trainmen for passenger trains consisting of coaches not accompanied by a baggage car). In this instance the baggage compartment of the combination car is not used but the passenger compartment is used. It would seem, therefore, that the proper construction is that this is a passenger train of ten coaches and one passenger combination car and would require only five trainmen.

3. A passenger train of four or more coaches having one baggage car but where no baggage is carried.

Inasmuch as the baggage car is not used it would seem legitimate to interpret this clause to require a crew of five trainmen.

4. A passenger train of four coaches where three coaches are in service, one is locked up (moving deadhead) and one baggage car.

The act would not seem to cover coaches or cars locked except in the make-up of trains under Section 6. There may be a technical violation of the act in ruling that only five trainmen would be required on this train but it is doubtful whether any court would so interpret it. The purpose of the act is for the safety of passengers and crew and it is doubtful whether the court would overlook this ultimate purpose in an attempt to comply technically with the provisions.

5. Three coaches, one combination car (baggage and passenger), where the compartment is being used for the carriage of checked baggage, and one baggage car loaded solid with theatrical baggage.

The additional baggage car in this case has been loaded solid with baggage for a definite destination and requires no handling en route. It would, therefore, seem possible that that car does not come within the technical provisions of the law. In such a case the court would probably hold that the above train would be sufficiently manned under the law with a crew of five trainmen. On the other hand, it would be equally possible for the court to rule that the above train should carry six trainmen under the clause which provides that trains of four or more coaches and one baggage car shall carry six trainmen.

6. Three passenger trains and three coaches and three baggage cars, two of which are carrying theatrical baggage and one of which contains checked baggage.

It is not possible to say whether the court would hold that a train of this sort should carry five or six trainmen.

7. A passenger train of twelve coaches.

A passenger train of twelve coaches and not carrying a baggage car would clearly come within the clause which provides that passenger, mail or express trains of four cars or more shall carry a crew of five trainmen. Under this technicality many of the railroads have reduced their "full-crew" of six trainmen to a crew of five trainmen by leaving off the baggage car.

8. A passenger train consisting of two coaches, one mail car, and two baggage cars.

This train, although consisting of five cars altogether, clearly comes within the clause designating the minimum crew for a train of three coaches and one baggage car and would, therefore, require only five trainmen.

9. A passenger train consisting of three coaches (occupied by passengers), one baggage car and one deadhead parlor car.

It is not probable that a parlor car which is unoccupied and being carried as a deadhead could be considered as a fourth passenger coach under the law, and if not, the above train could legitimately carry a crew of five rather than six trainmen.

10. A passenger train carrying three coaches, one baggage car, and two United States express cars.

This train, although consisting of six cars, comes clearly within the provision of the law requiring five trainmen for a passenger train of three coaches and one baggage car.

11. A passenger train consisting of two coaches, one combination car, one parlor car and one dining car.

It would seem that there are in this train four passenger coaches altogether and that the combination car should be counted as a baggage car. Counting the dining car, therefore, as a passenger coach and the combination car as a baggage car, the above train should carry six trainmen.

12. A passenger train consisting of one combination baggage and passenger car and four or more freight cars.

It is very improbable indeed that a train of this sort would be required by the court to carry six trainmen. It is not possible to classify such a train under the provisions of the law.

13. A passenger train of four coaches and any number of baggage and express cars.

This train would be required under the law to carry a crew of six trainmen.

14. A passenger train of four or more coaches without a baggage car.

This train clearly would not require six trainmen, as it does not carry a baggage car, but would come within the provision stating five trainmen as a minimum.

15. A passenger train of three passenger coaches and one baggage car loaded and locked.

Inasmuch as the baggage car in this train although loaded is locked and requires no attention en route it is probable that one of the trainmen would be allowed to act as baggageman or the baggageman as trainman. In that case the train would be legitimately manned with a crew of five trainmen.

16. A passenger train of three passenger coaches with a deadhead baggage car.

It is not likely that the act would be held to apply to this train.

17. A train of five or six freight cars and no passenger coaches.

This is a freight train of less than thirty cars and requires a crew of five trainmen.

18. A train consisting of two coaches, one combination mail and baggage car, and two express cars carrying messengers.

This train would require a crew of five if the combination mail and baggage car is qualified as "mail car" under Section 6. This train would not come under the act at all if the combination mail and baggage car is interpreted as "baggage car," as such a combination is excepted from the act by Section 4. Such a train would, however, probably require a crew of five trainmen for its expeditious operation entirely irrespective of the law.

19. A passenger train consisting of eleven coaches (picnic train) and one baggage car with baskets of provisions.

Inasmuch as this train has a baggage car it would seem to come within the clause requiring six trainmen, unless the baggageman was also made to fill the capacity of trainman.

20. A passenger train of eleven coaches and one empty baggage car.

It is not probable that an empty baggage car would be counted under the law and if not a crew of five trainmen would be adequate under the law.

21. A passenger train consisting of three coaches, one combination potsal and baggage car (postal clerk on duty), one baggage car, and one chair car in use.

This is a train of four passenger coaches and one baggage car and would therefore require a crew of six trainmen.

22. A passenger train of three coaches, one combination baggage and passenger car, one combination postal and express car carrying postal clerk and express messenger.

This is a train of three passenger coaches and one baggage car and would require a crew of five trainmen.

4—The Penalty Clauses and Their Enforcement

No matter how comprehensive and stringent the provisions of a statute are, that statute is harmless even when under the administration of the most scrupulous officials, unless there is an effective penalty clause as its guardian. The penalty clause is the club, under a threat of which, the significance of a law is determined. This penalty clause need not, and often does not, appear as a part of each statute for the violation of which may be called into play. But a penalty is no less effective by reason of being in the general law and not in a specific law. The penalties for violation of the twenty-one "full-crew" laws vary in their amount from no penalty to one of $1,000, and imprisonment. It is apparent, at first blush, that the laws which they represent cannot be equally effective.

But there is not alone the question of the amount of the penalty to be considered. The penalty is, after all, only the weapon, and as such incites no horror except when properly placed in the hands of conscientious administrators. The penalties of the twenty-one "full-crew" states vary in their real and practical potentialities from one in which there is no means of enforcement, to one which makes it the duty of the Attorney-General, the county prosecutors and the Public Service Commission to enforce.

It would seem, in the face of these two factors, therefore, that a complete understanding of the significance of the various "full-crew" laws in this country, makes necessary, at the outset, a knowledge of their penalty clauses and the methods of their enforcement.

Arizona

The Acts of 1912, Chapter 16, in sections 9 and 10 of the statute law of Arizona, provides the following penalty and method of enforcement for the Arizona "full-crew" law:

"Sec. 10. From and after the taking effect of this act, it shall be unlawful for any railroad company, or for the receiver of any such company, to run upon or over any line of railroad, or any part thereof, within the State of Arizona, any train, locomotive, or engine, which is not equipped with, or does not carry, for use in its operation, a full crew as herein fixed and prescribed; and each and every railroad company or receiver that, after the taking effect of this act, shall run upon or over any line of railroad or any part thereof, within the State of Arizona, any train, locomotive, or engine, which is not equipped with or does not carry, for use in its operation a full crew as herein fixed and prescribed, shall be liable to the State of Arizona for a penalty of not less than one hundred dollars ($100) for every such offense."

"Sec. 11. All suits for penalties under this act shall be brought and prosecuted to judgment in the name of the State of Arizona, as plaintiff, in a court of competent jurisdiction in the county of Maricopa or in any county in said state into or through which the defendant's line or railroad may be operated; and such suits shall be brought and prosecuted by the Attorney-General, or under his direction, or by the county attorney of such county."

The penalty of $100 which is provided for the enforcement of the law is a fixed penalty for each violation and suits for such penalty may be prosecuted in Maricopa county or any county of the state into or through which the defendant's lines may run. These suits are brought in the name of the state by the Attorney-General, or under his direction or by the county attorney of the respective counties concerned, but no jurisdiction over the "full-crew" law is given to the Arizona Corporation Commission (*a*). The law has, however, been effectively enforced by the courts. (*b*)

Arkansas

The Arkansas Acts of 1907, Act. No. 116, sec 3; the Acts of 1909, Act. No. 298, sec. 3, and the Acts of 1913, Act. No. 67, sec. 4, provide the following penalties, respectively:

"Sec. 3. Any railroad company or officer of court violating any of the provisions of this act shall be fined for each offense not less than one hundred dollars nor more than five hundred dollars, and each freight train so illegally run shall constitute a separate offense: *Provided*, The penalties of this act shall not apply during strikes of men in train service of lines involved.

"Sec. 3. Any railroad company or officer of court violating any of the provisions of this act, shall be fined for each offense not less than one hundred nor more than five hundred dollars, and each passenger train so illegally run shall constitute a separate offense.

"Sec. 4. Any railroad company or corporation violating the provisions of this act shall be fined for each separate offense not less than fifty dollars and each crew so illegally operated shall consititute a separate offense."

The power of enforcing the law in the state ofArkansas is delegated to the prosecuting attorneys of the different districts. (*c*) No interpretation of either the law of 1907, 1909 or 1913 has been made and no rulings have been made by the Attorney-General on the statutes. (*d*) The law has, however, been effectively enforced. (*e*)

California

The California Acts of 1911, Ch. 49 (as amended by Ch. 168, Acts of 1913), in Sec. 5, provides the following penalty for violation of the California "full-crew" law:

"Any violation of this act shall be a misdemeanor, and shall be punished by a fine not exceeding five hundred dollars, or by imprisonment in the county jail not to exceed six months, or by both such fine and imprisonment."

This state, which provides a fine not to exceed $500 or imprisonment in county jail or both, is penal in nature and its enforcement is committed to the district attorney of the

(*a*) Letter signed by W. N. Sangster, Secretary-Auditor of the Arizona Corporation Commission, dated August 12, 1916.
(*b*) Statement signed by Geo. W. Harben, Assistant Attorney-General, dated June 24, 1916.
(*c*) Letter signed by Attorney General Wallace Davis, Little Rock, Arkansas, and dated August 10, 1916.
(*d*) IBID.
(*e*) IBID.

county in which an offense is committed. (*a*) A letter from the Office of the Attorney-General declares that "so far as this office is advised the statute is being complied with by the railroad companies of the state (*b*), and another letter from the Commissioner of Labor Statistics states that "to my knowledge no complaint has ever been made for violation of the statutes." (*c*)

Connecticut

The so-called "full-crew" Act of 1913 of Connecticut empowers the Public Utilities Commission to investigate the manning of trains and to make such orders as they deem necessary for purpose of safety, but this act does not provide any penalty for a violation or failure to comply with such orders. Although it would seem that the Commission cannot in any case enforce their orders and that no penalty is provided in the 1913 law, there is a provision in the Acts of 1909, Ch. 219, Sec. 2, for redress by the state's attorney in the county where such offense is committed. The penalty clause is as follows:

"Sec. 2. If any company shall fail to place upon any of its trains the number of brakemen required by the provisions of the General Statutes or in pursuance of the foregoing provisions of this act, it shall forfeit twenty-five dollars to the State for each day of such neglect, to be recovered by the state's attorney in the county where such offense is committed."

Indiana

The Acts of Indiana for 1909, Ch. 25, sec. 4, of 1911, Ch. 74, sec. 3, and Acts of 1913, Ch. 100, sec. 2, and Acts of 1913, Ch. 232, secs. 2 and 3 and the Acts of 1913, Ch. 279, sec. 2 provide the following penalties for violation:

"Sec. 4. Any railroad company violating any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction shall be fined in any sum not less than one hundred dollars ($100) nor more than five hundred dollars ($500) for each offense, and such company shall be liable for any damages caused by the violation of any of the provisions of this act.

Sec. 3. Any person, firm or corporation violating any of the provisions of this act, shall upon conviction thereof, be fined for a first offense not less than one hundred dollars ($100), and for the second offense not less than three hundred dollars ($300), and for any offense thereafter, not less than one thousand dollars ($1,000).

Sec. 2. Any person, firm or corporation, or lessee or receiver of any person, firm or corporation, owning or operating any line or lines of steam railroad in this State who shall violate any of the provisions of this act by failing or refusing to provide such pilot engineer or other person as provided in section one (1) of this act shall forfeit and pay to the State of Indiana the sum of fifty dollars for each and every offense, and each and every day that the violation of any of the provisions of this act shall continue shall be deemed to constitute a separate and distinct offense.

Sec. 2. Any railroad company violating section one (1) of this act shall be guilty of a misdemeanor, and upon conviction shall be fined in any sum not less than fifty dollars ($50) nor more than one hundred dollars ($100) for each offense and such company shall be liable for any damages caused by the violation of any of the provisions of this act.

Sec. 3. It shall be the duty of the railroad commission to enforce the provisions of this act.

Sec. 2. Any person, firm or corporation, of the lessee or receiver of any person, firm or corporation, owning or operating any trolley car or trolley cars, or any motor car or motor cars, of any kind or description, in this State who shall violate any of the provisions of this act shall forfeit and pay to the State of Indiana the sum of fifty ($50) dollars for each and every offense, and each and every day that the violation of any of the provisions of this act shall continue shall be deemed to constitute a separate and distinct offense."

The enforcement of the Indiana law is left to the various prosecuting attorneys of the State. The Public Service Commission, however, which has superseded the Railway Commission in that State could cause, and in some instances has caused, affidavits to be filed for the violation of the passenger "full-crew" act but the prosecution of all such affidavits rests with the prosecuting attorney of the district where the same is filed. (*a*)

In two or three local courts where the company employed one engineer, one fireman, one conductor, one brakeman, and one trainman (who apparently did the work of a flagman and a porter), it was held that the company had complied with the law and the defendant was in each case discharged. (*b*)

The Supreme Court of Indiana in the case of Pittsburg, Cincinnati, Chicago, and St. Louis Railway Company vs. State of Indiana (172 Indiana 147, 87 N. E. 1034) held that the law of 1907 was constitutional. That law was, however, superseded by the Act of 1909. The courts have not passed upon the constitutionality of the other acts nor has the Attorney General rendered any official opinion relative to them. (*c*)

Maine

The Revised Statutes of 1903, Ch. 52, in sec. 70, which is the so-called "full-crew" law of Maine, make no provision whatever for a violation penalty. Mr. Oscar H. Dunbar, the Assistant Attorney General, ventures the statement that although the law "seems to be complied with by railroads operating in this state, there seems to be no penalty provided for its violation" (*a*). The office of the Attorney General does however believe, he says, "that the Public Utilities Commission would have authority to enforce Chapter 52, Sec. 70 of our Revised Statutes." (*d*)

Maryland

The Public General Laws of Maryland, 1911, Art. XXIII, in sec. 332 and 333, provide the following penalty and method of enforcement for the Maryland "full-crew" law.

"Sec. 332. Any such railroad company or any such receiver violating any of the provisions of section 331 shall be liable to a penalty of five hundred dollars for each and every such violation, to be recovered in a civil suit or suits to be brought by the Attorney General of the State of Maryland in the name of this State, and it shall be the duty of such Attorney General without further authorization to bring such suit or suits upon duly verified information being presented to or lodged with him of such violation having occurred, and the affidavits of at least two citizens of the State of Maryland that such violation has occurred shall be taken and deemed to be duly verified information for the purposes of sections 331 to 335."

"Sec. 333. It shall be the duty of the Attorney-General of the State of Maryland to enforce the provisions of sections 331 and 332, and all powers granted to the said Attorney-General for the enforcement of any other act or acts are hereby granted to him for the purpose of the enforcement of said provisions."

The law provides a penalty of $500 for every violation to be recovered in civil suits or suits to be brought by the Attorney General. This law makes it the duty of the Attorney General, moreover, to bring suit upon affidavit of two citizens of the state that such a violation has occurred. Aside

(*a*) Letter from U. S. Webb, Attorney General, dated June 28, 1916.
(*b*) IBID.
(*c*) Letter from John P. McLaughlin, Commissioner of Labor Statistics, dated May 5, 1916.

(*a*) Letter signed by Evan B. Stotsenburg, Attorney General, and dated September 1, 1916.
(*b*) IBID.
(*c*) IBID.
(*d*) Letter signed by Oscar H. Dunbar, Assistant Attorney General, dated August 12, 1916.
(*e*) IBID.

from this the law makes it the duty of the attorney general to enforce the act.

It is interesting and significant to note that although the law has never been before the courts for interpretation, a ruling was made by the Attorney General's office to the effect that the law was unconstitutional as to Interstate Commerce. Along this line a letter from Mr. Albert C. Ritchie, the Attorney General, states:

"The result is that the law has never been enforced with respect to interstate traffic. The law has always been regarded as valid with respect to intra-state traffic, but no question as to its enforcement in this connection has ever arisen, because the intra-state trains comply with the provisions of the law anyhow." (a)

The intrepretation which has been given to the Maryland "full-crew" law seems to be an anomaly. The statute, which has been interpreted by the Attorney-General to be unconstitutional as to inter-state traffic is as follows:

"Sec. 331. It shall be unlawful for any railroad company doing business in the State of Maryland or any receiver of such railroad company to run or operate over its road or any part of the road, or suffer or permit to be run or operated over its road or any part of its road, any freight train consisting of thirty or more freight or other cars, exclusive of caboose and locomotive, with less than a full train crew, consisting of six persons, to wit: One engineer, one fireman, one conductor, one flagman, and two brakemen." (b)

This is precisely the same type of regulation which has been passed by the other states and in which it is held constitutional as to interstate commerce. It would seem that the Attorney General of Maryland is in error on this point and that, until Congress acts on this subject, the Maryland law rightly applies to interstate freight trains.

Massachusetts

The Acts of Massachusetts, 1913, Ch. 784, sec. 24 provide that the Commission may require additional trainmen as it sees fit. The "full-crew" section does not provide a penalty but Ch. 784, sec. 28 has such a provision. As a matter of fact, however, the Attorney General does bring some proceedings upon the request of the Public Service Commission although there may be a question of his obligation to do so. (c) No rulings have been made by the Commission or decision by the court relative to an interpretation of the law. (d)

The Assistant Attorney General writes that so far as is known no applications or important complaints have been made. (e)

Mississippi

The Acts of Mississippi 1914, Ch. 170, sec. 2. The Mississippi law provides a penalty of not less than $100 and not more than $1,000 for each offense.

"Sec. 2. Any railroad company doing business in the State of Mississippi who shall send out on its road, or cause to suffer or permit to be sent out on its road, or any part thereof, outside of the yard limits, any train of the classes enumerated in section 1, which is not manned in accordance with the provisions of that section, shall be guilty of a misdemeanor, and upon conviction thereof, shall be fined not less than one hundred dollars ($100) nor more than one thousand dollars ($1,000) for each offense."

The enforcement of the law is left to the criminal courts and the Grand Juries. (f)

The Attorney General's office writes that the law is regarded as ineffective due to an insertion of the word "or" in next to the last line of sec. 1 following the word "brakeman" and preceding the word "porter." An unsuccessful attempt was made to remedy this technical defect in the law at the last legislature. (a) The Attorney-General has not been called upon to construe the statute nor have any rulings been made by the court. (b)

Nebraska

The Revised Statutes of Nebraska of 1913, in secs. 5994 and 5995 provides the following penalty for violations of the Nebraska "full-crew" law.

"Sec. 5994. The officers or agents of any railroad company doing business in the State of Nebraska who shall send out on its road, or cause or suffer or permit to be sent out on its road, or any part thereof, outside the yard limits, any passenger or freight train which is not manned in accordance with the provisions of this article, shall be guilty of a misdemeanor, and upon conviction thereof shall be fined not less than one hundred dollars nor more than one thousand dollars for each offense and shall stand committed until such fine and costs are paid, and any railroad company in the State of Nebraska, whose officer or officers, agent or agents or any servant or servants shall be found guilty of such misdemeanor, shall be liable for any damages caused by the violation of the provisions of this article."

"Sec. 5995. The penalties prescribed in the next preceding section shall apply to all violations of the next following section hereafter and it shall be the duty of the State Railway Commission to enforce the provisions thereof."

The law provides a penalty of from $100 to $1,000 for violation and stipulates in addition that the road guilty of such violation shall be liable for damages caused by such violation. The law makes it the duty of the State Railway Commission to enforce the provisions of this act. The law seems to be effectively enforced. (c)

Nevada

The Nevada Acts of 1913, in Ch. 74, sec. 7 provides the following penalty for violation:

"Sec. 7. Any railroad company or receiver of any railroad company, and any person, firm, company or corporation engaged in the business of common carriers doing business in the State of Nevada, who or which shall violate any of the provisions of this act, shall be liable to the State of Nevada for a penalty of five hundred dollars for each offense; and such penalty shall be recovered and suit brought in the name of the State of Nevada in a court of proper jurisdiction in any county in or through which such line of railroad may run, by the Attorney General or under his direction, (or) by the district attorney in any county through which such line of railroad may operate."

The law stipulates a penalty of $500 for each offense and provides that the recovery may be made by the Attorney General, or under his direction or by the district attorney in any county in which the railroad may operate.

The Attorney General makes the following statement relative to the enforcement of the law:

"The act of 1911 was never enforced until the early part of the year 1913. At that time I took the matter up with the Southern Pacific Railroad with a request that they comply with the law. The Southern Pacific Company requested that we bring one suit to test the act. This I refused to do, there being some seventy-two violations reported to this office, and stated to the company that if they were going to refuse to comply with the act I would bring action for the penalty for each violation. Shortly thereafter the company notified this office that they would comply with the provisions of the act, and since that time it has

(a) Letter signed by Albert C. Ritchie, Attorney General, dated June 21, 1916.
(b) Public General Laws of Maryland, 1911, Art. XXIII, sec. 331.
(c) Letter signed by H. Ware Barnum, Assistant Attorney General, Boston, dated August 30, 1916.
(d) IBID.
(e) IBID.
(f) Letter signed by Lamar F. Easterling, Assistant Attorney General, Jackson, Mississippi, and dated September 20, 1916.

(a) Letter signed by Lamar F. Easterling, Assistant Attorney General, Jackson, Mississippi, and dated September 20, 1916.
(b) IBID.
(c) Letter from Willis E. Reed, Attorney General, dated June 23, 1916.

been effectively enforced, and we have never had a complaint of the violation of the act." (*a*)

New Jersey

The New Jersey Acts of 1913, in Ch. 90, secs. 8 and 9 provides the following penalty for enforcement of the New Jersey "full-crew" law:

"Sec. 8. Any railroad company, its officers or agents, officers of the court, receiver, or any person or persons operating a railroad, violating any of the provisions of this act, shall be guilty of a misdemeanor and liable to a penalty of one hundred dollars ($100) for each and every violation, to be recovered with costs according to law, for the use of the county in which such violation takes place: *Provided,* however, that nothing in this act shall apply or relate to trains owned or operated by manufacturers, made up of hot metal ladles, ingots, slag, or table trucks."

"Sec. 9. It shall be the duty of the Board of Public Utility Commissioners of this State to enforce the provisions of this act."

The law provides a penalty of $100 which may be imposed upon any railroad company, its officers or agents, officers of the court, receiver, or any person or persons operating a railroad violating this law. This fine is to be recovered with costs for the use of the county in which such violation occurs.

The law specifically makes it the duty of the Board of Public Utility Commissioners to enforce its provisions. It is interesting to note, in this connection, that no attempt has been made to obtain the enforcement of the law by any agency other than the Board of Public Utility Commissioners. (*b*) It seems the clear intention of the statute, moreover, that any action necessary to obtain the enforcement of the law shall be brought by the Board (*c*), although it is quite possible for action to be brought in the courts.

Relative to the enforcement of the New Jersey "full-crew" law the Public Utility Commission says:

"There is, I think no question as to its effective enforcement as the members of the Brotherhood of Railroad Trainmen are alert to note any train operation which appears to be in conflict with the law and they do not hesitate to bring a complaint through their representative. But few such complaints have been received." (*d*)

New York

The New York Acts of 1913, Ch. 49, in sec. 54-a. which is the so-called "full-crew" law of New York, stipulates the following penalty provisions.

"Sec. 54-a. Each separate violation of the provisions of this section shall be a misdemeanor punishable by a fine of not less than one hundred dollars nor more than five hundred dollars. Each train or light engine run in violation of the provisions of this section shall be deemed to be a separate offense."

The law makes each violation a misdemeanor punishable by a fine of from $100 to $500 and makes each train so run a separate offense.

The law itself does not give any specific methods of enforcement but a letter from the Counsel of the Public Service Commission, Second District, New York, contains the following information relative to this point:

"The "full-crew" law (Sec. 54-a of the railroad law) is a part of the statutory obligations of railroad corporations enforcible by the Public Service Commission as provided in sec. 48 (2) of the Public Service Commission's Law. It is probable also that under the Labor Law the Department of Labor might bring about an enforcement of the statute. Obviously the statute is a part of the labor legislation of the state, and if the Public Service Commission should neglect its statutory obligation to enforce statutory obligations of the railroads, the Department of Labor would be warranted in interfering. This is another instance, of course, of the multiplicity and duplication of New York agencies for law enforcement which has given us, in course of time, one hundred and fifty-odd administrative departments. The constitutional convention of 1915 tried to reduce them to seventeen, but the people of the state, and especially the labor unions, said 'no.' The Commission undertakes to enforce this statute just as it does any other." (*a*)

North Dakota

The North Dakota Revised Codes of 1905, in sec. 4308, provide the following penalty for violation of the North Dakota "full-crew" law:

"Sec. 4308. For each and every violation of the last section the railroad corporation so offending shall be subject to a penalty of fifty dollars to be recovered in a civil action and paid to the State of North Dakota and it is made the duty of the Attorney General upon complaint of any citizen to commence and prosecute this action in his own name as Attorney General on behalf of the State."

The law makes the railroad company liable to a penalty of $50 for each violation recoverable in a civil action and paid to the state, and makes it the duty of the Attorney General to prosecute such action upon complaint of any citizen. Although the statute does not say so, it seems that the state's attorneys of the various counties in the state, in addition to the Attorney General, have the power to bring action for its enforcement. (*b*)

No complaint, so far as may be learned, has been made against the enforcement of the law since its enactment. (*c*)

Ohio

The Ohio Acts of 1911, in secs. 12557-2 (added by act, page 191, Acts of 1913) and 12557-3 (added by act, page 191, Acts of 1913), provide the following penalty for the violation of the Ohio switching law:

"Sec. 12557-2 (added by act, page 191, Acts of 1913). That any common carrier upon conviction of the violation of this act shall be fined not less than one hundred dollars and not more than five thousand dollars in the discretion of the court."

"Sec. 12557-3 (added by act, page 191, Acts of 1913). That any superintendent, assistant superintendent, trainmaster, yardmaster, or any other employee having authority over the movement of any engine or locomotive who shall authorize the violation of this act, or who shall knowingly permit the violation of this act, shall upon conviction be fined not to exceed three hundred dollars or imprisonment not to exceed eighteen months or both at the discretion of the court."

The Ohio law provides a penalty of not to exceed $300. or imprisonment, of not to exceed eighteen months or both for violation. The law does not stipulate that each and every offense shall constitute a separate violation.

The law itself does not indicate any particular method in which suits shall be brought by the court and makes no mention of the vestment of any power for its enforcement in the Public Utilities Commission. It is clear, however, that the Public Utilities Commission does have jurisdiction to bring action to enforce the Ohio "full-crew" law under authority of sections 576, 577, and 578 of the General Code of Ohio. These sections state that the Public Utilities Commission of Ohio shall enforce the provisions of these sections and all other sections relating to the operation of railroads doing business in Ohio. (*d*)

The law, which applies only to switching crews, is effectively enforced in Ohio. The Public Utilities Commission has the following to say relative to their point:

"This law is fully and effectively enforced in Ohio. There is no disposition on the part of the railroads in Ohio, at the present time, to disregard the provisions of this section; and with the Commission's efficient Inspection Department, together with the general and almost universal co-operation by the railroads, the result is the law is complied with." (*e*)

(*a*) Letter signed by Geo. B. Thatcher, Attorney General, dated June 23, 1916.
(*b*) Letter signed by Alfred N. Barber, Secretary to the Board of Public Utility Commissioners of New Jersey, dated July 14, 1916.
(*c*) IBID.
(*d*) IBID.

(*a*) Letter signed by Ledyard P. Hale, Counsel of Public Service Commission, Second District, New York, dated June 27, 1916.
(*b*) Letter signed by Henry J. Linde, Attorney General, dated August 13, 1916.
(*c*) IBID.
(*d*) Letter signed by Freeman T. Eagleson, Attorney for the Public Utilities Commission of Ohio, dated July 10, 1916.
(*e*) IBID.

Oregon.

The Oregon Acts of 1913, Ch. 162, in sec. 3, provide the following penalty for violation of the Oregon "full-crew" law:

"Sec. 3. Any person, corporation, company or officer of court operating any railroad or railway, or part of any railroad or railway, in the State of Oregon, and engaged as a common carrier, in the transportation of freight or passengers, who shall violate any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction thereof, shall be fined not less than twenty dollars ($20) nor more than one hundred dollars ($100) for each offense."

The Oregon law makes any person violating the law guilty of a misdemeanor and liable to a fine of from $20 to $100 for each offense. Although the statute does not state, the district attorneys of the respective attorneys have jurisdiction to bring action to enforce the law (*a*), and it would seem that this same power is extended to the Public Service Commission under their general authority to enforce the railroad law of the state.

Pennsylvania.

The Pennsylvania Acts of 1911, page 1053, in sec. 8 provide the following penalty for violations of the Pennsylvania, "full-crew" law.

"Sec. 8. Any railroad company, its officers or agents, officers of the court, receiver, or any person or persons operating a railroad, violating any of the provisions of this act, shall be guilty of a misdemeanor, and liable to a penalty of one hundred dollars ($100) for each and every such violation, to be recovered with costs as debts are now by law recoverable, by a suit in the name of the Commonwealth, for the use of the county in which such violation takes place. *Provided,* however, that nothing in this act shall apply or relate to trains owned or operated by manufacturers, made up of hot metal ladles, ingots, slag, or table trucks."

The law makes any person violating the statute guilty of a misdemeanor and liable to a penalty of $100 for each violation and such a suit is conducted in the name of the Commonwealth and for the use of the county. It has been held however, in the case of the Pennsylvania Railroad Company vs. Ewing (*b*) that the provision in the act naming its violation a misdemeanor is a mere surplusage and the remedy is by an action in assumpsit instituted at the instance of the Attorney General or instituted by the Public Service Commission. (*c*)

The office of the Attorney General says that there have been no actions instituted for the recovery of such penalty since the law came into force, though there are several cases pending before the Public Service Commission on complaint, asking that the respondents be required to comply with the provisions of the act. These are as yet undisposed. (*d*)

Since the decision of the Pennsylvania Railroad case the railroads have been very careful to comply with the requirements of the law. (*e*)

South Carolina

The South Carolina code of 1912, section 3217, which is the so-called "full-crew" law of that state, provides no penalty whatever for its violation. There are, however, penalties provided for the violation of this law in sections 3308, 3312, and 3313, under which the Attorney General as Solicitor is authroized to bring an action to recover the penalty prescribed by law for violations of the railroad law. It is a provision also, in the general railroad law of the state, that the Railroad Commissioners are charged with the enforcement of this act. (*a*)

Texas.

Revised Civil Statutes of Texas, 1911, Art. 6575 provides the following penalty for violation:

"Art. 6575. Any railroad company, or any receiver of any railroad company, doing business in the State of Texas, which shall violate any of the provisions of the three preceding articles shall be liable to the State of Texas for a penalty of not less than one hundred dollars or more than one thousand for each offense. * * *"

The Texas law stipulates a penalty of not less than one hundred dollars ($100) and not more than one thousand dollars ($1,000) for each offense. Suits for penalties under the law are brought by the Attorney General or by the District or County Attorneys at the direction of the Attorney General (*b*). Although no rulings have been made by the courts on the interpretation of this statute, the Attorney General has ruled that it does not apply to electric cars operated on steam railroads or on electric lines (*c*). The courts have not passed upon the constitutionality of the present law, however, under a prior and similar statute enacted in 1907, the contention was made that the caption of the act was insufficient and that point was sustained in the case of M. K. T. Railway Company of Texas vs. State, 102 Texas 153. The provisions of the 1909 law, however, were made to meet the decision of the court. (*d*)

Washington.

The Acts of 1911 of Washington, Ch. 134, sec. 4, provide the following penalty for violation:

"Sec. 4. Any person, corporation, company, or officer of court operating any railroad or railway, or part of any railroad or railway in the State of Washington, and engaged as a common carrier, in the transportation of freight or passengers, who shall violate any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction thereof shall be fined not less than one hundred dollars ($100) nor more than five hundred dollars ($500) for each offense."

The law of Washington stipulates that a fine of not less than one hundred dollars ($100) nor more than five hundred dollars ($500) shall be imposed for each violation. The railroad commissioners are again given authority to bring action to enforce the "full-crew" law and by sec. 4 of the act a violation of any of the provisions is made a misdemeanor. The prosecuting attorneys, accordingly, are charged with the duty of procedure in their respective counties, against persons or corporations violating any of the provisions (*e*). Up to date of December 20, 1911, the Attorney General ruled that the provisions of Ch. 134, laws of 1911, and known as the "full-crew" law did not prohibit the operation of work trains with such crews as the railroads may deem advisable (*f*). Under date of March 31, 1915, the Attorney General gave an opinion to the Public Service Commission holding that "mixed trains" composed of twenty-five or more freight cars with passenger cars attached on the rear are passenger cars, whether for the accommodation of passengers on the trains referred to, within the meaning of the law (*g*). No former ruling has been made by the Public Service Commission of Washington or by the court on the interpretation of the statute. The Attorney General's office reports that the law is effectively enforced. (*h*)

(*a*) Letter signed by Geo. M. Brown, Attorney General, dated June 26, 1916.
(*b*) 241 Pa. 581.
(*c*) Letter signed by Horace W. Davis, Deputy Attorney General, dated June 28, 1916.
(*d*) IBID.
(*e*) IBID; also letter signed by John P. Dohney, Investigator of Accidents for the Public Service Commission, dated May 2, 1916.

(*a*) Letter signed by Thos. H. Peeples, Attorney-General, dated June 21, 1916.
(*b*) Letter signed by Luther Nickels, Assistant Attorney General, Austin, Texas, and dated August 22, 1916.
(*c*) IBID.
(*d*) IBID.
(*e*) Letter signed by Scott J. Henderson, Assistant Attorney General, Olympia, Washington, and dated August 16, 1916.
(*f*) IBID.
(*g*) IBID.
(*h*) IBID.

Wisconsin

The Wisconsin statutes of 1911, in secs. 1809t, 1809u, 1809w2 and 1809w3 (added by ch. 63, Acts of 1913) provide the following violations and methods of enforcing the Wisconsin "full-crew" law:

"Sec. 1809t. Any superintendent or trainmaster, or their assistants or any other officer, or employee of any railroad company doing business in the State of Wisconsin, operating more than twenty-five miles of road, who shall send out on the road, or cause to be sent out on the road, outside of yard limits, any passenger train or any freight train whose crew consists of less than the number required in sections 1809r and 1809s, shall be guilty of a misdemeanor, and upon conviction shall be fined not less than fifty dollars for each offense."

"Sec. 1809u. The circuit courts of the several counties of this State shall have jurisdiction of offenses under sections 1809r to 1809u, inclusive."

"Sec. 2. It shall be the duty of the railroad commission, and it shall have power, jurisdiction and authority to investigate, ascertain and determine such reasonable conditions of employment, and such reasonable number of employees in each switching crew in or about each switching yard in the State and to issue such lawful orders as may be necessary to comply with the purpose of this section."

"Sec. 3. If any railroad shall violate any provision of this section, or shall do any act herein prohibited, or shall fail, neglect or refuse to obey any lawful requirement or order made by the commission, or any judgment or decree made by any court upon its application, for every such violation, failure, or refusal, such railroad shall forfeit and pay into the State treasury a sum of not less than fifty dollars, or more than five hundred dollars for each offense. In construing and enforcing the provisions of this section, the act, omission or failure of any officer, agent or other person acting for or employed by any railroad, acting within the scope of his employment, shall in every case be deemed to be the act, omission or failure of such railroad."

The law for the enforcement of the statutory requirements for a "full-crew" on passenger and freight trains makes the violation thereof a misdemeanor liable to a fine of not less than $50. for each offense.

The law for the enforcement of the administrative requirements for a sufficient switching crew makes each violation by the railroad liable to a fine of from $50 to $500. It further states that violation by any officer or agent thereof shall be construed as a violation by the railroad.

It will be noted that the law does not provide any particular method for enforcement. Relative to this point the Attorney General of Wisconsin offers the following opinion:

"The law does not provide any specific manner for its enforcement. It is probable that the Railroad Commission has nothing at all to do with the enforcement thereof. It is to be enforced the same as any other criminal statute. I have felt that it was the duty of this department to enforce the same, and what complaints have arisen have been made to this office."

The just preceding analysis of the various "full-crew" penalty provision, attempted nothing further than to find and record the penalty clauses and to show the different methods for their enforcement. It was not considered necessary in each case to say on whom, if anyone, rested the responsibility of complying with the law itself. Such responsibility is fixed when fixed, in the main body of the "full-crew" laws and does not properly come under a study of the penalty clauses,—even though it is understood that a good penalty clause is no weapon unless the law fixes responsibility for its compliance. It may be said, as a point of interest, that most of the statutes place the burden of complying with the laws upon the person operating the trains, the agent and officers of the railroad, or the railroad and make them criminally liable for violation.

CHAPTER III

The Purpose of the "Full-Crew" Laws to Reduce Casualties

It is well, before delving into any discussion of the "full-crew" laws in this country, to get a clear conception of the purpose for which those laws were enacted. There is no way, otherwise, to construct a mental background by which to judge whether the laws have accomplished that for which they were written. The matter of ferreting out the purposes for which specific statutes were enacted is seldom a simple task. Many of our laws are so abstruse and present such a network of objectives, that it is a task, indeed, to comb out the unessentials and leave standing only the fundamental purposes. It is a source of gratification, therefore, to find a law which has but a single expressed purpose, and that, one which proponents and opponents agree shall be the real issue in determining its merits. A review of the campaigns for train-crew laws, from the earliest to the latest, makes clear to any mind that the object which has always been advanced by the proponents has been the reduction of railroad casualties. At no time in the movement do the records show that these laws have been passed with any other ostensible view. The expressed objective of safety is, indeed, almost the only point on which the laws are not at variance.

There is, perhaps, no better way to set forth documentary evidence of the object of the "full-crew" laws than to recount the reasons expressed by the proponents of those laws (*a*) through their official organ (*b*) and president (*c*), the arguments advanced at the various legislative hearings, and the motives of Governor Wilson of New Jersey and Governor Sulzer of New York.

1—Purpose Declared by the Brotherhood of Railroad Trainmen

The Brotherhood of Railroad Trainmen have, from the beginning, fathered the movement to require railroads to place additional brakemen in their freight, passenger and switching crews. The railroads have many times questioned the sincerity of the Brotherhood in asking for this legislation. Their insinuation has been that the Brotherhood's real, if not ostensible, object was the strengthening of its union through the creation of more positions for union men. Whether this has been in the back of minds of the Railroad Trainmen cannot be said. Trainmen are only natural and it would seem impossible that this thought has been altogether

(*a*) The Brotherhood of Railroad Trainmen.
(*b*) The Railroad Trainmen.
(*c*) Mr. W. G. Lee.

without their designs. But it must be said that safety is the only serious object which has ever been advanced by the Brotherhood of Railroad Trainmen in their movement to secure "full-crew" laws in this country.

The official publication. The official organ of the Brotherhood of Railroad Trainmen, has for several years been conducting a propaganda for train-crew laws, and contains many editorial arguments of which those following are quite typical:

"Railroads have been going along at their own gait, so far as the safety of their men is concerned, as is shown by the accident reports of the Interstate Commerce Commission. When we have an employment that kills nine men every twenty-four hours, and either kills or injures one every seven minutes, it is mighty near time some one was held up in some way to stop this record of slaughter. When we know that one man killed for each two hundred and five employed in train and engine work and one is hurt for each nine men so employed it is sufficient to demand a stop in the methods of this business that kills and mains as its right.

"The Brotherhood of Railroad Trainmen loses 16.5 men for each thousand of its members every year, and the railroads get to the public with their statements that safety legislation is unnecessary, that it costs money to meet safety appliance or extra men legislation. What of it? What business have the railroad companies to place their money against the lives of their men and put their dollars first?

"If the public could only realize what the railroad plea means there would go to every legislature a demand that each proposed protective safety law be enacted without further question. The railroads advertise their possible financial woes if better laws are enacted; they tell the people of the enormous cost it will mean to everybody, but they do not tell how hundreds of widows and orphans become public charges through this murderous service that demands public assistance to the end that its right to kill and wound, to burden the public with the care of the widow and orphan, may be interrupted." (*a*)

"The Brotherhood of Railroad Trainmen, in the past fourteen years, have expended $1,215,000 to pay the death and disability claims of its members in Missouri. Approximately two-thirds of these claims paid were due to accident or death received in railway service. The Brotherhood of Railroad Trainmen loses 16.5 men annually for each thousand of its members employed in railway service. It is not unfair to say that the proportion of killed and wounded in the State of Missouri is up to the average. It might also be a matter of interest to know that the railway service kills nine men every twenty-four hours and either kills or injures one every seven minutes. When we know that annually one man is killed for each 205 employed in train and engine work, and one is hurt for each nine men so employed, it should be sufficient to impress the voters of any state with the extreme hazard of the occupation and induce them to give their support to any reasonable measure that would decrease the list of the killed and wounded." (*b*)

"The Pennsylvania Railroad has taken the lead in this movement to repeal a law that was enacted because of the demands of the train and yard service employes for greater safety in their work.

"The Pennsylvania and other railroad companies, refer to the enactment of the 'full-crew' law as an unnecessary waste of money which is not warranted in view of the rapidly increasing cost of railway operation. The plain fact of the matter is this: The railway companies are asking the people of the states to which they have appealed to permit them unnecessarily to maim and kill employes that their cost of operation may be reduced. We take it that no class of employers would dare go before the public and ask that they be permitted even to take a chance of increasing their casualty records without calling down upon their heads the most bitter reproaches from the public and drastic legislation from the law-making bodies." (*a*)

The Railroad Trainmen in its issue for June, 1913, declares that this legislation "is intended not only to protect the public but to add to the safety of the employes, surely needed bad enough if we judge from the reports of the Interstate Commerce Commission which show that for the year ending June 30, 1912, 192 employes were killed and 3,324 employes were injured coupling or uncoupling cars, which might be thought to be impossible with the use of safety devices. Very many of these deaths and disabilities were caused, no one knows how."—

"We find, from the same authoritative source, that within the same period, in train, yard and engine service, 50,079 employes were injured and 3,235 employes were killed. This is a record of casualties not mentioned by railway companies when they appeal to the public for assistance in opposing laws intended to place sufficient men on trains to insure greater safety."—

"The railroad companies in their public appeals point to the possibility of increased freight and passenger rates if 'this unnecessary cost is placed on the railways.' They haven't published their list of killed and wounded; they dare not go to the public and let it be known that back of this demand for increased safety there is a record of one man killed or totally disabled out of each 67 of the members of the Brotherhood of Railroad Trainmen. The railroads do not tell the public that back of this demand for increased safety for the men is a record of disability and death that is not equalled by our war records; that for the most part this record is made because men are asked to perform service under necessarily dangerous conditions." (*b*)

The president. Mr. W. G. Lee, international president of the Brotherhood of Railroad Trainmen, while speaking officially for the 135,000 members of that organization in 1915, and also under authority from the president of the Order of Railroad Conductors, the president of the Brotherhood of Locomotive Firemen and the grand chief of the Brotherhood of Locomotive Engineers (*c*), said in part:

"These trains have increased in length to such an extent that during the stormy or bad weather or foggy weather at street crossings where there are grade crossings, it is absolutely impossible for a conductor, one brakeman and a flagman to properly handle the trains if anything happens. We never hear of the wreck that does not happen. We never hear of the things that are corrected by the men out on the road; at least, if the report is made to the company, as some of the companies require, the company knows of the broken flanges that are found, of the broken beams down and all those things, but the company does not publish that, to my knowledge. So I come to you in the interest of the class of men to whom the organization that I have the honor to represent paid in death and disability claims in the year 1914 for 1805 men. Sixty-one per cent. of those claims were by accidental causes; sixty per cent. of all the claims paid by the organization which I represent were in connection with men less than thirty-one years of age who were killed or totally disabled. The young blood of this country, the choice men of this country, are working for the railroads today, because the railroads today have requirements, physical examinations and such, so rigid that if a man can pass and become eligible for employment, there can be no question as to his getting a position with the government if his age will permit. So I ask you in Pennsylvania to consider carefully the question from a humanitarian standpoint, and leave on the statute book this law that another assembly in this State has carefully in-

(*a*) Editorial Railroad Trainmen for August, 1913.
(*b*) Editorial from Railroad Trainmen for October, 1914.

(*a*) Editorial from Railroad Trainmen of December, 1914.
(*b*) Railroad Trainmen for June, 1913.
(*c*) These four organizations represent about 400,000 members.

vestigated and passed, and that the Supreme Court of this State has given consideration to and sustained."—

"I believe that when you have given it careful consideration, you will conclude that anything that will stop, in a measure, the killing and injuring of men in the service should be left on your statute books and should be a law in this State and in others." (*a*)

2—Objects Advanced in the Legislative Hearings

In almost every state in which the "full-crew" movement has been extended, the legislature has, through its committees, held hearings designed to give the proponents an opportunity of advancing their claims and the opponents of refuting them. In all of these various hearings, safety has been conspicuously the one object expressed for the legislation as is shown by the following typical excerpts from legislative hearings in New Jersey, Pennsylvania, New York, Virginia and Idaho.

New Jersey

At the legislative hearing on the "full-crew" law held in Trenton, New Jersey, on March 22, 1915, Mr. John A. Matthews (*b*), expressed the object of the law very clearly, as follows:

"I have been an interested listener but an unenlightened one as the result of all of the speeches, for I cannot say 'arguments,' that have been educed by the gentlemen of the opposition. Only one speaker got away from the question of money and came down to that of morals in legislation. From the beginning farmer to the closing Senator Edwards it was figures, figures, figures on cost and not one word on safety. I am here today as the representative of the men who are interested because their lives are at stake, and in opening I want to call your attention particularly to that point."—

"We are here in the interest of the safety and the lives of the traveling public and the working trainmen, whose mortality record is fifteen killed every year in every thousand men employed. I want to know which is the higher duty here today. Is it that of the man who stands and asks you, in the interest of safety, when the burden of proof has not been borne by the other side, to keep the law upon the statute books, or that of the man who comes complaining because his lumber has been spoiled in transfer?" (*c*)

Pennsylvania

At the legislative hearing on the "full-crew" law held at Harrisburg, Pennsylvania, on March 30, 1915, Mr. John C. Bell expressed very lucidly the object sought by the law as follows:

"What is this act that all these batteries are turned upon? You didn't hear much about the title at the last hearings; not at all. The title is, in substance, an act to promote the safety of travelers and employes by compelling common carriers (by railroads) to properly man their trains. That is the title to the act, and it clearly expresses its purpose."—

"Do you realize that it is a fact that in the United States today two hundred and seven men are killed and injured every day upon our railroad, or seven every hour. While we are sitting here debating this question this afternoon, during the period of three hours, twenty-five men will have been killed and injured. Doesn't that argue that we need to take every possible step to insure the safety of passengers and employes? It is not so abroad; it is not so in Great Britain or on the continent. The real underlying reason today is that, in the United States, we underman the trains." (*d*)

New York

At Assembly hearing on the "full-crew" law, held at Albany, New York, on February 23, 1916, Mr. Fitzgibbons who conducted the repeal opposition rested the whole case on the casualty question, and said in part:

"I think that in a grand showing for the 'full-crew' bill —no men killed in this State during the year 1914-1915 through the carelessness of the company, or through wrecks or accidents of any kind, but through their own carelessness." (*a*)

Virginia

At a hearing before the Roads Committee of the General Assembly of Virginia, in 1914, the Committee, at the opening of the hearing, asked the proponents of the "full-crew" bill to state its purpose. The question and answer were as follows:

"Mr. H. G. Buchanan: May I ask you a question? I want you to state to the Committee, please, sir, what is the demand for this bill, the reason for it?

"Mr. Cousins: Safety to the employes and the traveling public." (*b*)

Idaho

At the hearing before the Senate Committee held at Boise, Idaho, on the proposed "full-crew" measure, Mr. W. A. Whitney said in part:

"It has been said by the advocates of this measure that the economic side of this question should not be taken into consideration; that the measure concerns safety only. (*c*)

3—The Motives of Gov. Wilson in New Jersey and Gov. Sulzer in New York

Both Governor Woodrow Wilson of New Jersey and Governor William Sulzer of New York were committed, at election, to the principles of the "full-crew" legislation and had each promised their constituents their support toward its enactment in their respective states. It is significant, for that reason, to get at the purpose for which these two most important state "full-crew" laws were enacted as expressed by the two Governors who sponsored them.

Governor Woodrow Wilson, in his annual message to the legislature, dated January 9, 1912, said:

"I recommend, moreover, the passage at an early date of an act requiring the railways operating within this state to provide their trains with adequate crews. Our sister State of Pennsylvania has adopted legislation of this kind, and the railways whose lines cross from Pennsylvania into New Jersey actually carry full crews to the border of this state and then send their trains on through New Jersey with diminished crew, to the jeopardy, as I believe, of life and property, requiring more of the small crew than it can safely and thoroughly do." (*d*)

That recommendation, however, was not adopted in that year, and although Governor Wilson did not sit through the 1913 session, he did urge the adoption of a "full-crew" law before his retirement to the presidency. In his annual message to the legislature, dated January 14, 1913, he said:

"And while I am speaking of railways, permit me to urge another piece of legislation upon you which seems to me essential both to the safety of travel on the railways and to the fair protection of certain classes of railway employes. I refer to the so-called 'full-crew' bill, whose failure to pass the last legislature was so much deplored by all who had noted its introduction and its significance. It is of the highest consequence that railway trains which pass through the state should be manned by adequate crews; and to me, for one, it is a matter of chagrin that they should now

(*a*) Statement made at the Pennsylvania "full-crew" hearing held at Harrisburg, on March 30, 1915.
(*b*) Counsel for the Brotherhood of Railroad Trainmen.
(*c*) Proceeding of "full-crew" hearing held at Trenton, March 22, 1915.
(*d*) Proceedings of "full-crew" hearing held at Harrisburg on March 30, 1915.

(*a*) Proceedings of Assembly "full-crew" hearing at Albany on February 23, 1916.
(*b*) Stenographic report of statements made at hearings before the Roads Committee of the General Assembly of Virginia in 1914.
(*c*) Proceedings of "full-crew" hearing before Senate Committee, held at Boise on February 19, 1915.
(*d*) Legislative Manual for New Jersey of 1912, p. 616.

carry smaller crews through New Jersey than through Pennsylvania, with whom we are linked by so many important lines of railway. This is a matter which we cannot afford to neglect. If it cannot be satisfactorily handled in an act, it might also very well be put in the hands of the Public Utility Commissioners by addition to their powers." (*a*)

Governor William Sulzer, while giving his approval in 1913 of the New York "full-crew" bill, attached a memorandum which gave his views as to the objects which were there sought. The following excerpts from Governor Sulzer's memorandum will show clearly what those expressed motives were:

"This bill provides, in substance, that railroads running through the State of New York shall have their trains suitably manned by a sufficient number of competent men to prevent wrecks, protect property, and conserve human life and limb.

"My judgment is that the conservation of human life and limb is as important to the people as a little additional expense in the operation of these common carriers. The state for its own welfare has a right to demand the employment upon the railroads of every safety appliance, whether mechanical or human, in the interest of life and limb and greater safety standards.

"The inauguration of these reforms in my opinion, will create greater safety, and establish more efficiency in the operation of railway transportation, and in the end prove economical to the railroads by preventing wrecks, with the resultant loss of life and limb, entailing necessarily great financial loss in damages to the railroad companies.

"At all events between the extra cost in dollars and the extra cost in lives, if I err at all in reaching an equitable conclusion regarding official action on this bill, I prefer to err on the side of life and limb and flesh and blood.

"It is amazing to note the number of people killed or injured each year on the railroads. The statistics show that during the year ending June 30, 1911, more than ten thousand persons were killed, and over a hundred and fifty thousand people injured on our railroads, and of these over three thousand, or about thirty-five per cent. of the killed, and over a hundred thousand, or about seventy-five per cent. of the injured, were railroad employes. It seems strange, in view of modern safety devices, that so large a number of employes should be killed and injured each year.

"The bill, in my opinion, is not unjust to the railroads, but simple justice to the railway employes and to the much-concerned traveling public. Their rights must not be overlooked, especially in view of the appalling fact that during the twenty-four years covered by the statistics of the Interstate Commerce Commission, 188,137 persons have been killed, and 1,395,618 persons injured on the railroads of the United States. This is an average of 7,835 persons killed and 58,150 injured each year, or an annual total of nearly 66,000 persons killed and injured. This means that for every day during the past twenty-four years, 181 persons have been killed or injured—nearly eight every hour, or one every seven minutes, with the regularity of clock work. The ravages of war pale into insignificance before these sad and silent indications of the destruction of human life and limb accompanying the peaceful operation of our railroads.

"This bill, I believe, is in the interest of humanity, for the general welfare, will go far to change for the better these deplorable statistics in the future, and once upon the statute books will meet with popular approval and never be repealed.

"Hence, all things considered, I shall sign the bill for the good of the state." (*a*)

Summary

A review of the campaign statements of the American Brotherhood of Railroad Trainmen as made in their official organ and by their international president; a study of the objects advanced in the various state legislative hearings of the county; a particular reference to the motives which prompted Governor Wilson to urge the law in New Jersey and Governor Sulzer the one in New York, and a general perusal of all existing data on that subject, reveal conclusively that the expressed purpose of every "full-crew" law has been the reduction of casualties on railroads. If more official and final evidence be required to establish that this is the alleged object of the laws, it may be found in the very titles of the statutes themselves and in the fact that their sustained and accepted constitutionally rests entirely upon their claim as safety measures. It would therefore seem that the merits of the law must be judged absolutely upon the effectiveness as a casualty preventative.

CHAPTER IV

An Analysis of the Causes of Railroad Casualties in the United States

There does seem to be a just ground for grievance against the railroads, on the part of their employes and the public, in the face of a realization that our railroads are killing 27.8 persons and injuring 479.2 persons every twenty-four hours, or killing and injuring one person every three minutes. These are not, moreover, findings for a chance or particular period, but are drawn from averages of railroad casualties for the last five years. It is not a little distressing to learn that a yearly average for the years from 1911 to 1915, inclusive, shows that there were during that period 10,173.6 persons killed and 174,941.4 persons injured each year. (*b*) The public sentiment has been justly aroused, almost to the point of indignation, and has been demanding that this thing not continue. It is not difficult to understand why there have been introduced, in recent years, so many measures designed to promote safety on railroads. That fact accounts, in a large way, for the ready passage of numerous bills labeled "safety bills." The statement, that one person is being killed or injured every three minutes, is so inciting that its mere recital has often served as a sufficient spur to secure the enactment of any measure asserted to be remedial. Thus it is that a large number of laws have been hastily enacted on the assumption that they were solutions or partial solutions to the casualty problem in this country. Some of those laws have proved good and some bad. The "full-crew" laws had their origin, largely, in just that procedure. It remains now to be determined, in a scientific way, whether they have been, and are, one step in the solution of the casualty problem or whether not.

1—The Annual Casualty List in United States

Before attempting to determine the expediency of "full-crew" legislation as a safety measure, it will be valuable to note the general movement of railroad casualties during the entire period for which accident statistics are available.

(*a*) Reprint in the Railroad Trainmen for May, 1913.

(*a*) Legislative Manual for New Jersey of 1912, p. 616.

(*b*) Accident Bulletins of the Interstate Commerce Commission, Nos. 40, 44, 48, 52 and 56.

Accident Report, Law of 1901. The railroads were not required to report accidents to the Interstate Commerce Commission prior to the Act of March 3, 1901. That Act made it the duty "of the general manager, superintendents, or other proper officer of every common carrier engaged in Interstate Commerce by railroad to make to the Interstate Commerce Commission a monthly report, under oath, of all collisions of trains or where any train or part of a train accidentally leaves the track, and of all accidents which may occur to its passengers or employes while in the service of such common carrier and actually on duty, which report shall state the nature and causes thereof, and the circumstances connected therewith." (*a*)

Prior to this act of 1901, the only statistical information which the commission received in connection with railway accidents was that contained in the annual reports of the railway companies. (*b*) This data was very rudimentary and confined to a part of the casualties segregated into a few classes only. No information was furnished in these carrier reports regarding the causes of accidents, and for this reason no attempt has been made in this study to cover the period prior to 1901.

Law of 1910. During the period from 1901 to 1910, inclusive, therefore, all railroads made reports monthly to the Interstate Commerce Commission under the provisions of the Act of March 3, 1901, which are set forth above. But since 1910 they have been reporting accidents by the requirements of the Act of May 6, 1910. This act, besides giving the Commission authority to make impartial investigations of accidents, made it "the duty of the general manager, superintendent, or other proper officer of every common carrier engaged in interstate or foreign commerce by railroad to make to the Commerce Commission, * * * a monthly report, under oath, of all collisions, derailments, or other accidents resulting in injury to persons, equipment, or roadbed arising from the operation of such railroad under rules and regulations as may be prescribed by the said Commission, which report shall state the nature and causes thereof and the circumstances connected therewith." (*c*)

It will be noted that the act of 1910 gave the Interstate Commerce Commission wider powers and provided that a broader scope of accidents be reported. This factor accounts for the apparent discrepancies which show in the following table between the period prior to 1911 and that after. The following tables, which exhibit the number of casualties for each of the last fourteen years beginning with the year ending June 30, 1902, were taken from the Annual Accident Bulletins of the Interstate Commerce Commission. (*d*)

RAILROAD CASUALTIES.

Year Ending June 30.	Killed.	Injured.	Total.
1902	2,819	39,800	42,619
1903	3,554	45,977	49,531
1904	3,787	51,343	55,130
1905	3,798	55,466	59,264
1906	4,225	66,709	70,934
1907	5,000	76,286	81,286
1908	3,764	68,989	72,753
1909	2,791	63,920	66,711
1910	3,804	82,374	86,178
1911	10,396	150,159	160,555
1912	10,585	169,538	180,123
1913	10,964	200,308	211,272
1914	10,302	192,662	202,964
1915	8,621	162,040	170,661

This tabulation shows a steady increase in the annual casualty list up to 1913, when there began a decline. It would not be logical to conclude from this that the railroads had been growing more dangerous until 1913, and that they have been growing safer since that time. Nor would the reverse of that conclusion follow. There are many other factors, such as mileage of road, number of passengers carried, and tonnage which demand consideration in such a calculation, that no conclusion can be drawn. Furthermore, such a determination would be, even if made, quite beside the point. Whether there are fewer or more accidents proportionately now, than a few years back, does not affect the need for more safety. The significant fact, and the one which challenges a solution, is that the casualties on our railroads still amount to considerably over 150,000 each year. No effort should be spared to discover, and no local interest considered in adopting, an expedient remedy for this problem.

(*a*) Sec. 1 Public—No. 171, approved March 3, 1901.
(*b*) Letter from Interstate Commerce Commission, dated May 13, 1916, and signed by Geo. B. McGinty, Secretary.
(*c*) Public—No. 165 (H. R. 3649), approved May 6, 1910.
(*d*) Accident Bulletins of I. C. C., Nos. 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52 and 56.

2—The Causes of Railroad Casualties

A clear conception of the causes of railroad casualties in the United States is the only root upon which may be worked out any sound preventive plan. No scientific legislation can be built up to remedy any particular problem, without first analyzing the causes underlying that problem. It may be said that our legislatures, by their much guessing, have frequently hit upon laudable solutions without burdening themselves with this scientific procedure. But whether the remedial value of a law is discovered before or after its enactment, it can be found only upon an analytical consideration of the causes to be remedied. At the present time there are twenty-two states which are attempting to solve, or partially to solve, their railroad casualty problem through laws requiring larger crews on freight and passenger trains. It remains in this investigation to determine whether these so-called "full-crew" laws are really, by their nature, one such solution. This may be determined approximately by setting forth in detail all of the causes for railroad casualties, and checking those causes, if any, which might conceivably have been removed had there been an additional brakeman on the train.

The twenty causes given by I. C. C. The Interstate Commerce Commission in all of its Quarterly and Annual Accident Bulletins makes an official classification of the various causes of railroad casualties into twenty distinct classes or groups. Every accident reported is classified under one of the following twenty main causes—collisions; derailments; accidents to trains, cars, or engines, except collisions, derailments and boiler explosions; bursting of, or defects in, locomotive boilers or boiler attachments; accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc.; coupling or uncoupling cars, exclusive of accidents with air or steam hose; while doing other work about trains not in shops or engine houses or while attending switches; coming in contact while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structure above or at the side of the track; falling from cars or engines; getting on or off cars or engines; other accidents on or around trains not here named; being struck or run over by engine or cars at stations or yards; being struck or run over by engines or cars at highway grade crossings; being struck or run over by engines or cars at other places; other causes for other than train accidents; industrial accidents to employes while working on tracks or bridges; industrial accidents to employes at stations, freight houses, engine houses, coaling stations, water stations, etc., where not involving train operations; industrial accidents to employes in and around shops; and industrial accidents to employes on boats and wharves, and industrial accidents to employes at other places.

The table following was prepared for the year ending June 30, 1915, and shows first, the total train accidents and their four chief causes; second, the total other than train accidents and their eleven chief causes; and third, the total industrial accidents and their five chief causes.

Annual Table No. 1b.—Casualties to passengers, employees, and other persons—Steam railways—Year ended June 30, 1915.

No.	Causes	Passengers (a)		Passengers on freight trains (b)		Persons carried under agreement or contract (bb)		Total (a, b, and bb)		Trainmen (c)		Trainmen in yards (cc)*		Yard trainmen (d)		Switch tenders crossing tenders, and watchmen (e)		Trackmen and bridgemen (f)		Other employees (g)		Total employees on duty (c, cc, d, e, f, and g)		Employees not on duty (h)		Other persons not trespassing (i)		Trespassers (j)		Total persons	
		Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
	Train accidents.																														
1	Collisions	39	1,689	..	84	2	214	41	1,987	35	584	9	293	16	322	..	2	7	63	9	105	76	1,369	1	32	3	76	13	29	134	3,493
2	Derailments	41	2,113	1	132	3	284	45	2,529	94	888	7	122	13	164	1	1	3	62	9	111	127	1,348	4	27	4	33	68	124	248	4,061
3	Accidents to trains, cars, or engines, except collisions, derailments, and boiler explosions	3	116	..	2	..	14	3	132	3	155	...	25	1	23	..	...	...	3	1	5	5	211	...	11	....	1	6	8	14	363
4	Bursting of, or defects in, locomotive boilers or boiler attachments	...	.....	..	...	..	....	...	.....	11	269	2	91	...	69	..	...	...	....	...	14	13	443	...	2	....	....	1	....	14	445
	Total	83	3,918	1	218	5	512	89	4,648	143	1,896	18	531	30	578	1	3	10	128	19	235	221	3,371	5	72	7	110	88	161	410	8,362
	Other than train accidents.																														
5	Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc.	...	.....	..	...	..	....	...	.....	...	.....	...	....	...	.....	..	..	...	....	...	....	....	.....	...	1	....	....	....	....	....	1
6	Coupling or uncoupling cars, exclusive of accidents with air or steam hose	...	.....	..	...	..	....	...	.....	25	413	19	366	44	1,170	..	...	...	2	2	42	90	1,993	...	1	....	....	....	....	90	1,994
7	While doing other work about trains not in shops or enginehouses or while attending switches	...	.....	..	...	..	....	...	.....	31	9,120	16	3,686	29	4,964	..	96	...	....	...	1	76	17,867	...	...	....	....	....	....	76	17,867
8	Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structure above or at the side of the track	3	19	..	...	3	9	6	28	27	376	11	241	6	422	..	6	...	7	1	31	45	1,083	...	10	....	6	68	124	119	1,251
9	Falling from cars or engines	18	162	..	6	8	39	26	207	97	1,425	54	915	100	1,785	..	10	17	88	19	159	287	4,382	12	40	13	68	475	671	813	5,368
10	Getting on or off cars or engines	57	2,293	1	67	4	62	62	2,422	16	2,115	12	1,289	25	2,521	2	54	8	121	18	266	81	6,366	33	247	6	109	627	2,370	809	11,514
11	Other accidents on or around trains not here named	...	2,962	..	342	2	558	2	3,862	...	4	...	3	...	4	..	109	17	480	47	947	64	1,547	3	161	8	742	58	449	135	6,761
12	Being struck or run over by engines or cars at stations or yards	32	91	1	2	1	7	34	100	27	42	45	123	64	222	27	82	104	195	144	305	411	969	63	78	73	221	987	1,071	1,568	2,439
13	Being struck or run over by engines or cars at highway grade crossings	...	.....	..	...	..	....	...	.....	...	.....	...	....	...	.....	..	...	...	....	...	.....	....	.....	6	11	997	2,898	83	72	1,086	2,981
14	Being struck or run over by engines or cars at other places	3	3	..	...	..	....	3	3	42	36	...	....	...	2	28	7	203	255	38	46	311	346	83	50	29	67	2,598	1,222	3,024	1,688
15	Other causes	...	831	..	...	..	9	...	840	1	17	1	8	1	27	4	30	...	10	1	44	8	136	10	169	30	1,169	100	308	148	2,622
	Total	113	6,361	2	417	18	684	133	7,462	266	13,548	158	6,631	269	11,117	61	394	349	1,158	270	1,841	1,373	34,689	210	768	1,156	5,280	4,996	6,287	7,868	54,486
	Industrial accidents to employees																														
16	While working on tracks or bridges	...	.....	..	...	..	....	...	.....	..	.....	...	....	...	.....	..	...	...	....	...	....	146	24,867	...	...	....	....	....	....	146	24,867
17	At stations, freight houses, engine houses, coaling stations, water stations, etc., where not involving train operation	...	.....	..	...	..	....	...	.....	...	.....	...	....	...	.....	..	...	...	....	...	....	69	23,533	...	...	....	....	....	....	69	23,533
18	In and around shops	...	.....	..	...	..	....	...	.....	...	.....	...	....	...	.....	..	...	...	....	...	....	63	45,029	...	...	....	....	....	....	63	45,029
19	On boats and wharves	...	.....	..	...	..	....	...	.....	...	.....	...	....	...	.....	..	...	...	....	...	....	26	1,731	...	...	....	....	....	....	26	1,731
20	At other places	...	.....	..	...	..	....	...	.....	...	.....	...	....	...	.....	..	...	...	....	...	....	39	4,032	...	...	....	....	....	....	39	4,032
	Total	...	.....	..	...	..	....	...	.....	...	.....	...	....	...	.....	..	...	...	....	...	....	343	99,192	...	...	....	....	....	....	343	99,192
	Grand Total	196	10,279	3	635	23	1,196	222	12,110	409	15,444	176	7,162	299	11,695	62	397	359	1,286	289	2,076	1,937	137,252	215	840	1,163	5,390	5,084	6,448	8,621	162,040

Separate analysis for each class. A cursory reading of the twenty classes of casualties into which the Interstate Commerce Commission groups all railroad casualties is instructive in showing that the various causes do not bear the same relation to a train-crew. There are some of those causes which obviously have no relation whatever to the size of a train-crew, and others which have a possible relation. Then there are still others which seem to have a very decided relation. There can be no more accurate test made of the merits and demerits of the so-called "full-crew" laws as safety measures, than to consider, each in turn, the causes of every class of casualties for which a preventive is sought. An attempt, is here made, therefore, to give a complete and separate analysis of each of the twenty classes of casualties, and thus make possible a scientific determination of which, if any, would diminish under the guardianship of a "full-crew" law. The separate analyses follow.

COLLISIONS.

Collision accidents have been one of the most formidable causes for railroad casualties during the last fourteen years. No more adequate conception of the enormous number of persons who are killed and injured each year, by reason of trains running into each other, can be had than is given by glancing at the totals for a period of years. The following table shows the annual casualties (killed and injured) and the percentage of collision casualties to all railroad casualties which have been reported to the Interstate Commerce Commission since 1902. (*a*)

Year ending June 30.	Collision Casualties.	Per cent. of all Casualties.
1902	5,918	13.8%
1903	7,351	14.8%
1904	7,713	13.9%
1905	7,719	13.0%
1906	8,518	12.0%
1907	10,317	12.6%
1908	8,126	11.1%
1909	5,737	8.5%
1910	8,194	9.5%
1911	7,430	4.6%
1912	8,327	4.6%
1913	8,488	4.0%
1914	6,163	3.0%
1915	3,627	2.1%

It is apparent that although the number of persons killed and injured each year by collisions has remained comparatively uniform for the last fourteen years, the percentage of collision casualties to all railroad casualties has been steadily declining from an original fourteen per centum, until in 1915 only two per centum of casualties were caused by collisions.

It is of some significance, in connection with this analysis, to note that this conspicuous decline in the percentage of collsions really began in 1908 before the more important "full-crew" laws of California, Maryland, Massachusetts, Mississippi, Nebraska, Nevada, New Jersey, New York, Ohio, Oregon, Pennsylvania, South Carolina, Texas, Washington and Wisconsin had been enacted. It would thus seem reasonable to conclude that, since the decline in the percentage of collision casualties to all casualties from 14.8 in 1903 to 2.1 in 1915 began and continued a number of years before the "full-crew" legislation was really under way, there must have been other very material factors working toward and effecting a reduction in collision casualties beside the "full-crew" legislation. But inasmuch as the "full-crew" laws have been in operation during the last few years of this decline, it is possible that they have also been making toward and hastening that same end. It is not possible to dismiss the "full-crew" legislation altogether, therefore, as a factor in reducing collisions upon this finding that collisions have been reduced partially, at least, through other means. It is not the intention, however, in these studies of the twenty classes of casualties to attempt to interpret the yearly increases or decreases in terms of existing "full-crew" legislation. The figures given are for the country as a whole and are valuable primarily in showing only the nature of causes which need remedying.

(*a*) Accident Bulletins of I. C. C., Nos. 4, 8, 12, 16, 20, 24, 28, 32, 36, 42, 48, 52 and 56.

The number and cost of collisions. A comparative table of collision accidents which was recently made by the Interstate Commerce Commission shows that from the year 1910 to 1915, inclusive, the total number of collisions for each year was 5,861, 5,605, 5,483, 6,477, 5,241, and 3,538, respectively. (*a*) The various yearly totals of the amounts of damage to road and equipment and cost of clearing wrecks were $4,629,279, $4,302,056, $4,330,206, $4,768,772, $3,775,279, and $2,152,766 for the years beginning with 1910 respectively. (*b*) But the proponents of the "full-crew" movement have been not primarily concerned in reducing the number of accidents or the tangible cost to the railroads resulting from such accidents. Their more direct object has been the reduction of casualties to the trainmen and the public. For that reason it is much more important in this study to hold the attention to an analysis of the previous table of the casualties resulting from collisions.

The causes of collisions. The only final test which can be made to show whether "full-crew" legislation will materially reduce collision casualties is to review their causes. Such a study should reveal whether our enormous number of collision casualties result by reason of the railroads attempting to underman their trains, or by reason of some other wholly irrelevant cause.

A very general, and for many purposes satisfactory, classification of collisions is made by the Interstate Commerce Commission to include the four following sub-heads—rear, butting, trains separating and miscellaneous. An idea of the proportion of casualties occurring in each of these divisions may be had from the following table which gives for each the number of collisions in 1915, the casualties resulting therefrom and the damage to the road and equipment and the cost of clearing such wrecks. (*c*)

COLLISIONS IN 1915.

	Number.	Casualties.	Damage.
Rear	435	859	$ 502,578
Butting	282	1,330	439,794
Trains separating	303	80	131,541
Miscellaneous	2518	1,358	1,078,853
Total	3538	3,627	$2,152,766

For the purpose of a superficial investigation the grouping of all collision casualties under one of the above four causes is quite sufficient. It shows that 1,330 of the 3,627 casualties, for example, were head-on collisions, and such therefore as owe their occurrence largely to other factors than the lack of an additional brakeman; that there were 859 rear-end, 80 trains separating and 1,358 miscellaneous collisions which may have or may not have owed their occurrence to the lack of that extra man. But for a more accurate conclusion it is mandatory that a detailed chart be drawn showing the particular and immediate cause of all collision casualties.

A study has been made, therefore, of the so-called final causes of collisions for the last ten years. A careful re-

(*a*) Accident Bulletin, No. 56, p. 30-1.
(*b*) IBID.
(*c*) Accident Bulletin, No. 56.

view of these causes is a most conclusive method to determine whether collision casualties have been occasioned by a too small train-crew. It would not here be expedient to print a complete list of these causes for ten years back. Tables have been prepared, however, to show all causes for different typical periods. These tables show the specific causes for all prominent collisions for a quarter of 1907, the same for 1911 and for all collisions which the Interstate Commerce Commission investigated during 1915.

The following table, taken in whole from Accident Bulletin No. 24, shows the immediate or final causes of all of the prominent collisions for April, May and June of 1907:

Causes of the Prominent Collisions for 1907 (Quarter Period)

Killed.	Injured.	Damage to engines, cars and roadway.	Reference to record.	Cause.
8	37	$695	91	Disregard of telegraphic orders.
..	..	2,100	42	Collision on side track. Train moving only one mile an hour, but engineman fell asleep and slept two minutes; had been on duty 21 hours.
..	13	6,800	11	Eastbound breight encroached on time of westbound passenger train, 1 a. m. Engineman did not know road; had taken this run by making misrepresentation. Conductor and two brakemen asleep.
1	4	7,000	16	Runaway on steep grade, 3 a. m.
4	33	8,000	68	Engineman of westbound freight (who was killed) evidently forgot regular eastbound passenger train. Passenger train scheduled for only two days in the week, Saturday and Sunday.
..	2	10,000	7	Flagman of pushing engine failed to signal following train.
..	5	10,000	45	Operator, 20 years 10 months of age, neglected to deliver meeting order. Cleared signal for another train and forgot to restore it to the stop position.
..	2	10,220	1	Operator, 17 years of age, accepted order after train had left.
4	5	10,400	36	Flagman failed to signal following train; 5 a. m.; foggy.
..	4	10,600	72	Freight train entered yard 1 a. m. with speed not under control.
1	2	10,935	33	Butting collision at water station; engineman asleep.
2	21	12,000	5	Failure of block signaling and flagging.
..	2	13,000	9	Runaway, due to failure of air pump; neglect to slacken speed on passing over summit, and failure to apply hand brakes.
1	7	13,000	12	Empty engine encroached on time of passenger train. Engineman's watch slow, not having been wound; engineman's experience as a runner, six months.
..	1	16,000	18	Signal given when track was not clear. This was made possible by the breakage of a connection at an interlocking cabin. Signalman held negligent.
6	4	36,670	14	Operator accepted order after train had passed.
..	2	56,889	6	Rear collision of freight trains in tunnel. A comparatively light train overtook a heavier one. Time interval at last station, 10 minutes. Leading train held blameworthy for not signaling by fuses, and the following train for running too fast. Tunnel lining took fire and was damaged $50,000.
27	144	$234,309		

The following table, taken in whole from Accident Bulletin No. 40, shows the causes of all the prominent collisions for April, May and June of 1911:

Causes of the Prominent Collisions for 1911 (Quarter Period)

Killed.	Injured.	Damage to engines, cars and roadway.	Reference to record.	Cause.
1	3	$1,665	1	Exceeding speed limit at point of collision, engineman held responsible. Was dismissed from the service.
..	8	11,533	2	Freight crew held to blame for not looking at time card or making inquiry of each other as to the movement of passenger train. No train orders involved.
1	24	7,512	3	Train No. 2 ran by meeting point.
2	8	4,251	4	Failed to protect train with flag.
..	11	3,200	5	Delay in flagging passenger train.
..	17	8,900	6	Disobeying orders.
2	2	9,204	7	Misunderstanding of dispatcher's orders.
1	2	3,994	8	Engineman with meeting orders pulling through siding and fouling main track.
1	2	4,935	9	Not protecting train by flag.
14	28	32,200	10	Failure of train No. 12 to receive order No. 19.
4	4	10,700	11	Dispatcher overlooking orders.
4	4	22,000	12	Caused by bad condition of lights and failure of engineman to observe them.
2	18	3,700	13	Conductor, thinking he had plenty of time, remained out on main track too long, and neglected to send out flag.
32	131	$123,794		

The following table, taken from Accident Bulletin No. 56, shows the causes found by the Interstate Commerce Commission for all collisions investigated during the year ending June 30, 1915:

Summary of Causes of All Collisions Investigated During the Year Ended June 30, 1915

Date. 1914.	Name of road.	Persons Killed.	Persons Injured.	Causes.	Remarks.
July 1	Detroit, Jackson & Chicago Ry.....	2	38	Dispatcher issued a lap order.	
July 17	Virginian Ry.....	7	91	Failure of motorman of electric street railway to observe and be governed by stop signals at crossing.	Motorman was asleep, due to working conditions not affording oportunity for adequate rest.
Aug. 5	Kansas City Southern Ry.....	43	34	Failure of crew of gasoline motor passenger car to obey train order fixing meeting point.	Burning gasoline responsible for many casualties.
Aug. 27	Chicago, St. Paul, Minneapolis & Omaha Ry.....	1	52	Failure of crew of light engine to keep clear of superior train.	
Sept. 14	St. Louis, Iron Mountain & Southern Ry.	1	3	Failure of crew of work train to keep clear of superior train; failure of operator to copy train order correctly; failure of dispatcher to obey rules governing handling of train orders.	Work extra had about 15 minutes in which to travel 8 miles, pushing 32 cars; with about 85 or 90 pounds steam pressure.
Oct. 18	New York Central & Hudson River R.R.	2	1	Failure of conductor and flagman properly to protect their train.	Block 66 miles long; manner of operating block system inadequate to provide proper protection.
Nov. 10	Missouri, Kansas & Texas Ry. of Texas	..	3	Failure of conductor and enginemen to keep their train clear of superior train.	
Nov. 24	Alexandria, Va.....	1	..	Failure of engineman properly to control speed of train within yard limits.	

Date. 1915	Name of Road.	Persons Killed.	Persons Injured.	Causes.	Remarks.
Dec. 9	Philadelphia & Reading Ry.....	2	4	Failure of engineman and head brakeman to keep their train clear of superior train.	Rules governing operation of trains and signals apparently not understood by all employees.
Dec. 13	Illinois Central R. R.	1	5	Failure of conductor and engineman to keep their train clear of superior train.	
Dec. 17	Chicago Great Western R. R....	3	8	Failure of conductor and flagman properly to protect train occupying main track on time of superior train.	Rules not properly obeyed by employees, nor enforced by officials.
Jan. 1	Chicago, Burlington & Quincy R. R...	..	16	Failure of conductor and engineman to keep their train clear of superior train; failure of engineman of other train to obey block signal in stop position.	
Jan. 30	Pennsylvania R. R..	1	4	Train ran away on mountain grade, account brakes not in proper condition for use on mountain grades, and train starting down hill at too high rate of speed.	Weather unusually cold; after colliding with light engine, momentum caused collision with train standing ahead of light engine.
Feb. 1	Cincinnati, Georgetown & Portsmouth R. R.....	3	10	Failure of engineman and conductor to keep their train clear of superior train; superior train left station in advance of schedule leaving time.	Operating rules habitually disregarded, both by officials and employees.
Feb. 2	Pennsylvania R. R..	1	6	Failure of conductor and flagman properly to protect train; failure of engineman properly to control speed after exploding torpedoes.	
Feb. 23	Nevada-California-Oregon Ry.....	1	..	Failure of conductor to protect train while stopping to take water.	
Mar. 5	Wabash R. R.....	1	10	Failure of crew of extra, together with dispatcher, to keep train clear of main track on time of superior train.	Wires down on part of road; dispatcher sent message to crew of extra to run carefully, prepared to stop if any opposing trains appeared.
Apr. 4	Atchison, Topeka & Santa Fe Ry....	..	90	Dispatcher violated rules by issuing train order at meeting point; engineman failed properly to control speed.	
Apr. 8	Great Northern Ry..	2	..	Train backed down main track without signal having been given from rear end.	
Apr. 29	Lake Shore Eelectric Ry.....	..	37	Failure of conductor and motorman to obey and be governed by train order fixing meeting point.	
May 7	Atchison, Topeka & Santa Fe Ry....	5	41	Crossing flagman gave proceed signal to eastbound trolley car in such a manner that it was misinterpreted and acted upon by a car moving in opposite direction; failure of motorman properly to control speed approaching steam railroad crossing.	Freight train struck electric street car on crossing.
May 17	San Pedro, Los Angeles & Salt Lake R. R.....	..	4	Failure of yard crew to keep locomotives clear of main line within yard limits on time of first-class train without having proper authority, and their failure to observe and be governed by automatic signal indications.	
June 24	Western Maryland Ry.	6	44	Error of dispatcher in assuming that a train order, after being superseded, could be restored by annulling the superseding order.	
June 27	Chicago, Rock Island & Pacific Ry.....	4	1	Failure of conductor and engineman to keep their train clear of main track on time of superior train; failure of two operators to comply with manual block rules.	
June 29	Mobile & Ohio R. R.....	1	12	Engine crew of light engine overlooked superior train.	

Conclusion. It would seem on its face that an additional brakeman would not be a significant factor in reducing head-on collisions because it is not ordinarily the duty of a brakeman to guard against trains rushing on from the front. That function belongs more to the enginemen and train operators and conductors. A brakeman might conceivably be valuable in reducing collisions from the rear by signaling and acting as the engineer's "eye" of the rear end of the train. But passenger and freight trains have always carried a flagman or brakeman in the rear, and this irrespective of any legislation.

A detailed examination of the causes of collisions in 1907, 1911 and 1915, as well as a general study of the causes for all collisions since 1901, seems to make clear that collisions happen usually because of the negligence or ignorance of an operator, engineer or conductor, or failure upon the part of some trainman to perform his duty, and it is only occasional that one can find that a collision was due to such a cause as might have been prevented by "full-crew" legislation.

DERAILMENTS.

Derailment accidents, which are those that result from a car leaving the rail, is a second of the group of twenty chief causes for railroad casualties. Although derailment accidents have not constituted as large a proportion of railroad casualties as have collisions, they do appropriate that ratio and account for an enormous number of casualties each year. The following table shows the total number of casualties resulting from derailment accidents for each year that they have been reported, and also the relation by percentage which derailment casualties bear to all railroad casualties: (*a*)

Year ending June 30.	Derailment casualties.	Percentum of all casualties.
1902	2,840	6.6%
1903	3,480	7.0%
1904	3,549	6.4%
1905	5,294	8.9%
1906	5,145	7.2%
1907	7,210	8.8%
1908	5,436	7.4%
1909	4,429	6.6%
1910	5,154	5.9%
1911	5,348	3.3%
1912	7,441	4.1%
1913	6,868	3.2%
1914	5,879	2.8%
1915	4,309	2.5%

The percentage of derailments do not begin any decided decline until after 1909. Inasmuch as the more important

(*a*) Accident Bulletins of I. C. C., Nos. 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52 and 56.

and the greater part of the "full-crew" bills were put into law after that date their operation would seem, on the face, to have quickened the reduction of derailment casualties. It must be granted, however, that the almost three per cent. drop in 1911 was due to the increase in the kinds of accidents required to be reported by the new law of 1910. But the important point to note is that, irrespective of the decrease in percentage, derailment accidents are still causing about 5,000 casualties each year.

The number and cost of derailments. The comparative table of derailment accidents which was recently made by the Interstate Commerce Commission shows that for the six years beginning with 1910, and running to 1915, inclusive, the total number of derailments for each year was 5,918, 6,260, 8,215, 9,049, 8,565, and 6,849, respectively. (*a*) The various yearly amounts of damage to road and equipment and the cost of clearing wrecks were $5,794,679, $5,549,724, $7,197,252, $8,280,442, $7,189,902, and $5,648,132, respectively. (*b*) But the purpose of "full-crew" legislation is not relevant particularly to the number and cost of derailment accidents, only to the casualties which result therefrom. It is well, therefore, to hold strictly to derailment casualties.

There is no more conclusive method of determining to what extent, if at all, a larger train-crew would be effective in reducing derailment casualties than to make a review of their causes.

A very general grouping of the causes for derailment casualties is made by the Interstate Commerce Commission into the following six sub-heads: defects of roadway, defects of equipment, negligence of trainmen and signalmen, unforeseen obstruction of the track, malicious obstruction of the track and miscellaneous. The following table shows the number of derailments for each of these sub-classes for 1915, the casualties resulting therefrom, the damage to the road and equipment and the cost of clearing such wrecks. (*a*)

DERAILMENTS IN 1915.

Cause.	Number.	Casualties.	Damage.
Defects of roadway	1,507	1,583	$1,120,583
Defects of equipment	3,416	820	2,648,133
Negligence of trainmen, signalmen, etc.	297	324	176,453
Unforeseen obstruction of track	244	544	320,190
Malicious obstruction of track	70	149	202,682
Miscellaneous	1,315	889	1,180,091
Total	6,849	4,309	$5,648,132

The above general classification of the causes for derailment casualties does go a long way in enabling the student to judge of the merits of "full-crew" legislation as a preventative of derailment casualties. It enables him at once to reject, at least, the greater part of those which were due to defects of roadway, negligence of trainmen and signalmen and malicious obstruction of the track. It leaves quite unsettled any judgment relative to the remaining derailment casualties. A detailed study, therefore, of the specific causes for derailment casualties has been made for the last ten years. The following tables show the causes of all prominent derailment casualties for a quarter of 1907, the same for 1911, and a summary of the causes found by the Interstate Commerce Commission for all derailments investigated during 1915.

The following table, taken from Accident Bulletin No. 24, shows the causes of all of the prominent derailment accidents for April, May and June of 1907:

(*a*) Accident Bulletin No. 56, pages 30 and 31.
(*b*) IBID.

(*a*) Accident Bulletin No. 56, pages 30 and 31.

Causes of Prominent Derailments for 1907 (Quarter Period)

Killed	Injured	Damage to engines, cars and roadway.	Reference to record	Cause.
2	..	$5,400	31	Excessive speed; engine running tender first.
1	2	11,000	52	Spreading of rails; roadbed softened by rain.
..	26	11,000	86	Unknown.
1	20	13,000	51	Track distorted by solar heat.
..	..	14,000	82	Broken flange. Derailed cars wrecked a bridge.
33	19	14,200	63	Unknown.
..	1	15,900	88	Unknown. Damage due mainly to explosion of naphtha and gunpowder.
1	1	19,930	59	Failure of bridge; bridge damaged by blasting nearby at the moment the train entered upon it.
..	26	20,032	62	Rails maliciously loosened.
1	1	25,000	28	Landslide in the night. Inspector had detected no indication of trouble.
2	26	30,000	23	Roadbed undermined by water from springs not before known to exist.
2	5	32,000	30	Switch maliciously misplaced.
1	10	34,000	58	Rock slide. This occurred in an old railroad. It is believed that blasting 1,000 feet distant had fractured the rock so as to permit vegetation to disintegrate it.
..	35	61,224	75	**Defective track.**
3	21	84,500	32	Unknown.
Total.. 47	193	$391,186		

The following table, taken from Accident Bulletin No. 40, shows the causes of all of the prominent derailment accidents for April, May and June of 1911:

Causes of Prominent Derailments for 1911 (Quarter Period)

Killed	Injured	Damage to engines, cars and roadway.	Reference to record	Cause.
1	2	$3,915	1	Excessive speed over skeleton track.
1	3	3,493	2	Broken rail.
2	1	6,068	3	Explosion of locomotive boiler caused by low water.
..	10	15,867	4	Excessive speed on curve.
12	101	30,000	5	Defective track; error in judgment of section foreman in not flagging.
3	2	4,500	6	Trestle gave way.
1	10	3,482	7	Broken rail.
2	1	13,615	8	Defective track; error in judgment of track foreman in not having sufficient ballast on track and at the heads of the ties on the outside curve to hold it.
1	32	5,700	9	Spreading rails.
1	2	5,200	10	Washout; breaking of dike of irrigating ditch.
2	6	40,000	11	Excessive speed on sharp curve.
1	5	2,950	12	Excessive speed.
3	..	3,000	13	Section foreman neglected to get a right-hand switch point. "Feather rail" used as a temporary splice to make connection.
Total.. 30	175	$137,790		

The following table, taken from Accident Bulletin No. 56, shows a summary of the causes of all derailments reported for the year ending June 30, 1915:

DERAILMENTS FOR 1915.

Defects of roadway		1,507
Broken rail	272	
Spread rail	90	
Solt track	354	
Bad ties	61	
Sun kink	32	
Irregular track	415	
Broken or defective switch or frog	202	
Miscellaneous	81	
Defects of equipment		3,416
Defective wheels:		
Broken or burst	335	
Broken flange	346	
Loose wheel	100	
Miscellaneous	86	
Broken or defective axle or journal	367	
Broken or defective brake rigging	390	
Broken or defective craft gear	280	
Broken or defective side bearings	141	
Broken arch bar	222	
Rigid trucks	177	
Failure of power-brake apparatus, horse	353	
Failure of couplers	219	
Miscellaneous	400	
Negligence of trainmen, signalmen, etc.		297
Unforeseen obstruction of track, etc.		244
Malicious obstruction of track, etc.		70
Miscellaneous		1,315
Total		6,849

In addition to the above classification, which summarizes the direct causes of all derailment accidents for the year ending June 30, 1915, the following table shows the final causes found by the Interstate Commerce Commission for all derailments investigated in 1915:

Summary of Causes of Derailments Investigated During the Year Ended June 30, 1915

Date 1914	Name of road.	Persons Killed.	Persons Injured.	Causes.	Remarks.
July 23	Pennsylvania R. R.,	1	2	Not definitely determined; believed to have been due to excessive speed in view of existing track conditions.	Curve of 9°; superelevation 5¼ inches; speed probably 35 miles per hour; no speed restriction on curve.
Aug. 12	Southern Ry.	1	10	Broken rail, believed to have been in overturned or partially overturned position at time of rupture.	
Aug. 13	Tennessee Central R. R.	..	29	Tender derailment; cause not definitely ascertained.	
Aug. 14	Denver & Rio Grande R. R.	..	1	Train broke in two on heavy descending grade; conductor failed to have sufficient hand brakes set on cars while forward portion was being taken to next station; 53 cars ran away, those on rear being derailed on curve, while balance continued to next station, colliding with part of head-end which had been taken to that point.	
Aug. 21	Chicago, Rock Island & Pacific Ry.	2	25	Sun kink.	Hot weather expanded rails.
Sept. 15	St. Louis & San Francisco R. R.	27	27	Track, undermined by high water, slid into creek under weight of train.	
Sept. 16	Missouri, Kansas & Texas Ry. of Texas	..	10	Not definitely determined; believed that uneven track caused locomotive to rock sufficient to unseat male engine truck castings and derail driving wheels.	
Sept. 18	Alabama Great Southern R. R.	10	41	Open facing point switch; switch had been opened with malicious intent after train entered block.	
Sept. 19	Baltimore & Ohio R. R.	1	38	Broken tender axle.	
Sept. 22	St. Louis, Iron Mountain & Southern Ry.	1	13	Rail joint removed and rail moved out of place, with malicious intent.	
Oct. 17	Delaware, Lackawanna & Western R. R.	1	9	Open facing point switch had been opened with malicious intent.	
Oct. 19	Missouri, Kansas & Texas Ry. of Texas	3	13	Spread rails.	
Oct. 19	Kansas City Southern Ry.	1	1	Spread rails.	Track in very bad condition.
Oct. 28	Chesapeake & Ohio Ry.	..	33	Spread rails.	
Oct. 31	Delaware, Lackawanna & Western R. R.	..	22	Broken rail.	Transverse fissures.
Nov. 12	Lehigh Valley R. R.	2	27	Not definitely determined; thought to have been obstruction on track.	
Nov. 27	Chicago & Alton R. R.	..	13	Not definitely ascertained.	
Dec. 10	St. Louis & San Francisco, R. R.	..	16	Tender derailment due to uneven and irregular condition of track.	
Dec. 18	Southern Ry.	1	20	Tender derailment; locomotive being operated backing up; cause not definitely ascertained, but believed to have been a low place in track.	
1915 Jan. 3	St. Louis & San Francisco R. R.	4	..	Switch opened with malicious intent after train entered block.	
Jan. 4	Minneapolis & St. Louis R. R.	..	14	Broken brake lever fulcrum, allowing brake rigging to drag and break off bolts holding facing point switch point, resulting in misplaced switch.	
Jan. 15	Wabash R. R.	1	25	Spread rails.	Rail shimmed 1 inch and not adequately braced.
Jan. 19	Seaboard Air Line Ry.	1	9	Switch improperly secured, or left partially open, with malicious intent.	

Date 1915	Name of Road.	Persons Killed.	Persons Injured.	Causes.	Remarks.
Jan. 23	Erie R. R.....	3	..	Failure of engineman to observe and obey stop indication of dwarf signal at derail.	Engine crew had no sleep since previous trip.
Jan. 30	Atlantic Coast Line R. R.....	..	29	Failure of section foreman properly to protect track while making repairs.	
Jan. 30	Chicago, Milwaukee & St. Paul Ry.	..	21	Broken wheel.	Built-up wheel.
Feb. 5	Oregon Short Line R. R.....	1	..	Failure of section foreman to protect track while changing rails.	Rails were being forced into position and tight connection allowed automatic signals to remain in clear position.
Feb. 9	Chicago, Milwaukee & St. Paul Ry.	..	..	Broken wheels.	Three defective wheels in four-wheel truck; worn threads.
Feb. 19	Baltimore & Ohio R. R.....	1	3	Broken arch bar on tender truck, allowing column bolt to come in contact with riser rail of defective switch, resulting in switch point being thrown.	Switch known to be defective for some time.
Feb. 22	Chicago, Great Western R. R.....	2	20	Broken rail, due to deficiency in strength of track fastenings, allowing rail on outside of curve to spread and break under engine.	
Feb. 22	Denver & Rio Grande R. R....	2	12	Believed to have spread rails.	
Mar. 2	Denver & Rio Grande R. R.....	1	3	Broken rail, due to rock falling on track.	
Mar. 5	Atchison, Topeka, & Santa Fe Ry.....	1	16	Believed to have been defective and insecure condition of track.	Gauge 1 inch wide; loose spikes allowed additional spread of 5/8-inch under train; frog settled 1/2 to 3/4-inch.
Mar. 14	Chicago & Eastern Illinois R. R.....	1	16		Joints on one side of track 1 inch low; speed 60 miles per hour.
Mar. 16	Wabash R. R..... Ahnapee & Western	1	2	Low spot in track, coupled with high speed. Not definitely ascertained.	Caboose and last car of 21 car train derailed.
Mar. 29	Ry.	1	1	Uneven and irregular track conditions, and speed inconsistent with safety while being hauled by locomotive, backing up.	
Mar. 30	Baltimore & Ohio R. R.....	1	4	Broken rail.	
June 3	Chicago & Alton R. R.....	..	25	Tender derailment, due to uneven condition of track.	
June 7	Southern Ry.....	1	1	Broken axle.	
June 9	Seaboard Air Line Ry.	3	20	Rail removed from track with malicious intent.	Two of three men arrested, confessed, implicating the third man.
June 15	Southern Pacific Ry.	2	1	Broken bottom brake road on freight car caught under wheel, derailing it.	

Conclusion. The above tables indicate that by far the greater part of derailment casualties are caused by defects of roadway and defects of equipment. On its face it is apparent that an additional brakeman on a moving train could have no possible means of reducing derailments caused by defects of roadway. There are some classes of accidents due to defects of equipment which, on the other hand, might be reduced by a train-crew sufficiently large to perform adequately the inspection while en route. Although the contention of the railroads that inspectional functions are performed at terminals, and not by train-crews, is largely true, yet the crew is somewhat responsible to watch for emergencies while the train is on the road. There is no doubt but that a diligent train-crew, if sufficiently large to make thorough inspections, can prevent many of that sub-division of derailment casualties which are caused by defects of equipment.

BURSTING OF OR DEFECTS IN LOCOMOTIVE BOILERS OR BOILER ATTACHMENTS AND MISCELLANEOUS TRAIN ACCIDENTS.

Under the administration of the law of 1901, and prior to 1910, the Interstate Commerce Commission did not make a segregation of boiler accidents and other miscellaneous train accidents. For that reason, and in view of the fact that the greater part of the accidents in this group are due to boiler explosions, that same heading is maintained in the analysis throughout. The number of casualties which have resulted from this type of railroad accidents, as well as the percentage which they bear to all casualties, is set forth in the following table: (a)

Year ending June 30.	Boiler casualties.	Percentum of all casualties.
1902	738	1.7%
1903	1,091	2.2%
1904	1,687	3.0%
1905	1,685	3.0%
1906	1,659	2.3%
1907	1,888	2.3%
1908	1,489	2.0%
1909	1,227	1.7%
1910	1,891	2.1%
1911	2,102	1.3%
1912	2,064	1.1%
1913	1,490	.6%
1914	851	.4%
1915	836	.4%

Conclusion. In spite of the fact that there happens to be a marked reduction in the percentage of casualties resulting from boiler explosions, during the particular years when the "full-crew" laws have been in operation, there can be found no just explanation of that reduction in the administration of those laws.

Accidents which are occasioned by the bursting of the boiler or boiler attachments in the engine are so obviously such as would not be affected, either one way or another, by the employment of an additional brakeman on the train that it calls for no further analysis.

(a) Accident Bulletins, I. C. C., Nos. 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52 and 56.

ACCIDENTS TO ROADWAY OR BRIDGES, NOT CAUSING DERAILMENT, SUCH AS FIRES, FLOODS, LANDSLIDES, EXPLOSIONS, ETC.

Casualties resulting from roadway and bridge accidents were not listed as a separate group until 1911. Since that time there have been the following casualties:

Year ending June 30.	Casualties from fires, floods, etc.	Percentum of all casualties.
1911	135	.08%
1912	45	.02%
1914	None	.01%
1915	1	.0005%

Conclusion. It would seem obvious upon a first thought that an additional brakeman on trains could have no means to prevent accidents to the roadway or bridges such as are caused by landslides, fires on land, floods and explosions.

COUPLING OR UNCOUPLING.

There are still, despite the good strides that have been made through legislation requiring installation of automatic couplers, many hundreds of men injured each year while coupling or uncoupling cars. The following table will show just the number of casualties which have been attributed to this type of accidents during the last fourteen years and the percentage which they bear to all casualties: (*a*)

Year ending June 30.	Coupling casualties.	Percentum of all casualties.
1902	2,256	5.2%
1903	3,041	6.1%
1904	3,719	6.7%
1905	3,353	5.6%
1906	3,814	5.3%
1907	4,250	5.2%
1908	3,360	4.6%
1909	2,514	3.7%
1910	3,191	3.8%
1911	3,175	1.9%
1912	3,428	1.8%
1913	3,556	1.6%
1914	2,865	1.3%
1915	2,083	1.2%

In order to aid in the determination of whether the annual coupling casualties are such as might find remedies in "full-crew" legislation, an analysis of the causes of all of the 1915 casualties is here set forth. (*b*)

Causes of all Casualties in Coupling and Uncoupling Cars for the Year Ending June 30, 1915.

Causes.	Total Killed.	Total Injured.
Adjusting coupler with foot	..	177
Adjusting coupler, cars accidentally started	5	61
Careless manipulation of uncoupling lever	..	39
Cars not equipped with automatic coupler	..	4
Coupler broken, using link and pin or chain	5	37
Coupling damaged cars	2	43
Coupling with chain or other emergency appliance on curve too sharp for automatic coupling	..	16
Coupling with chain or other emergency appliance because of uneven track	..	..
Coupling or uncoupling safety chains	2	32
Fingers or hand caught between uncoupling lever and body of car	..	312
Uncoupling without using lever (unnecessary)	..	39
Uncoupling without using lever, uncoupling lever not in working order	4	107
Foot caught in frog, switch, or guard rail	4	23
Opening or closing knuckle when cars were near together, miscalculated speed	15	168
Opening knuckle when cars were near together, engine accidentally started	9	99
Opening knuckle, part of defective coupler fell on foot	..	54
Opening knuckle, lost footing	4	69
Riding on car to uncouple, slipped off	4	46
Struck by object at side of track	1	44
Caught by unexpected movement of car due to slack running in	12	157
Caught by unexpected movement of car due to mistake or misunderstanding in giving hand signals	3	28
Uncoupling moving cars and lost footing	6	125
Parts hard to move, causing delay	1	45
Went between cars unnecessarily and contrary to rule	9	85
Hand caught between projecting load and end of next car	..	9
No witness (fatal injury)	4	..
Other causes	..	113
Unexplained	..	61
Total	90	1,993

(*a*) Accident Bulletins Nos. 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52 and 56.

(*b*) Accident Bulletin No. 56, page 33.

Conclusion. There are between two and three thousand casualties each year which are received by trainmen while coupling or uncoupling cars. These casualties are comparatively seldom fatal, but are often serious injuries. The fact that extraordinary reductions in the casualty list have been occasioned through the introduction of legislation requiring automatic couplers, does not preclude the expediency or further measures such as "full-crew" legislation. But a study of the causes for coupling and uncoupling casualties for the last ten years in general, and for 1915 in particular, shows that most of these casualties were occasioned while adjusting coupler with foot, cars accidentally starting, careless manipulation of lever, coupling damaged cars, by catching fingers or hands between uncoupling lever and body of the car, uncoupling without using lever, miscalculating speed, engine accidentally started, by defective couplers falling on foot, by losing footing, by slipping off cars, by being struck by object at side of car, caught by unexpected movement of car, delay in moving difficult parts, going between the cars unnecessarily and contrary to rule and by other causes. And it seems conservative to say that not over four of these causes have a material relation to the size of the train crew. If a train had been undermanned before, it is quite possible that a "full-crew" law would be beneficial in reducing the following four of the above groups—casualties due to unexpected movement of cars, defective couplers falling on foot, coupling damaged cars and delay in moving difficult parts. A careful perusal, therefore, of the most conspicuous of the whole group of twenty-eight causes for railroad casualties shows that there are four of those causes which have a relation to the size of the train crew and which, in case the train was undermanned, might be reduced through a larger train crew.

WHILE DOING OTHER WORK ABOUT TRAINS NOT IN SHOPS OR ENGINE HOUSES OR WHILE ATTENDING SWITCHES.

The very considerable number of casualties which have resulted while doing other work (than coupling or uncoupling) about trains not in shops or engine houses or while attending switches is set forth in the following table, together with the percentage which such casualties bear to all casualties: (*a*)

Year ending June 30.	Casualties from other work.	Percentum of all casualties.
1902	3,650	8.5%
1903	5,687	11.4%
1904	10,869	19.7%
1905	12,856	21.6%
1906	16,122	22.7%
1907	18,021	22.1%
1908	16,197	22.8%
1909	14,408	21.5%
1910	18,397	21.3%
1911	18,329	11.4%
1912	19,653	10.9%
1913	24,257	11.4%
1914	23,372	11.4%
1915	17,943	10.5%

(*a*) Accident Bulletins Nos. 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 48, 52 and 56.

It is not possible from the main heading above to grasp what is meant by "other work," and to determine from that alone whether the causes of such casualties bear a relation to the size of a train-crew or not. The following table, however, will show the detailed causes for such casualties for 1915: (*a*)

Analysis of accidents to trainmen, reported in Annual Table No. 1B, as occurring while doing "other work" about trains not in shops or enginehouses or while attending switches, for the year ended June 30, 1915.

Causes.	Total Killed.	Total Injured.
Shaking grates	..	704
Firing engine, raking fire, shoveling coal into fire etc.	..	1,831
Coaling engine	1	238
Taking water at water cranes	1	440
The working or action of reverse levers	..	542
Scalded by water from squirt hose	..	219
Throwing switches	..	838
Poling cars	..	128
Coupling or uncoupling air or steam hose, including the turning of angle cocks	12	412
Using hand brakes	1	1,098
Loading or unloading freight, baggage, etc.	1	1,463
Cinders in eye	..	1,060
Stepping in or stumbling over objects, stepping in holes, slipping, etc., on or at side of track	18	3,384
Unexpected or abnormal movement of trains, cars or engines	23	2,082
Struck by objects on or at the side of the track, not fixed structures	1	189
Struck while riding in or on trains, cars, or engines by trains, cars, or engines on adjoining track	4	309
Struck while riding in or on trains, cars, or engines by projection from trains, cars, or engines on adjoining track	2	102
Miscellaneous	12	2,731
Total	76	17,770

Conclusion. It is important to note that in 1915, 17,943 casualties, or 10.5% of all railroad casualties occurred while doing "other work" (than coupling or uncoupling) about trains not in shops or warehouses or while attending switches. The number or the percentage has not been lower than this in six years, and in 1913 there were 24,257 of such casualties. A close study of the causes of these particular casualties shows, however, that by far the greatest contributing cause was stepping or stumbling over objects, in holes or slipping on the track; and that the other principal contributing causes were firing engines, coupling or uncoupling air or steam hose, using hand-brakes, loading or unloading freight, cinders in the eye, and unexpected or abnormal movement of the cars. The only ones of these classes which might conceivably be reduced by a larger train-crew are those casualties which occurred while using hand-brakes or from an unexpected or abnormal movement of the cars. It cannot be accurately said that any one of the other fifteen classes of casualties under this general grouping have any legitimate relation to "full-crew" legislation or could find any material relief in that legislation.

COMING IN CONTACT, WHILE RIDING ON CARS, WITH OVERHEAD BRIDGES, TUNNELS, OR ANY SIGNAL APPARATUS, OR ANY FIXED STRUCTURES ABOVE OR AT THE SIDE OF THE TRACK.

A considerable number of employees and trespassers each year are killed or injured by coming into contact with overhead and side obstructions. The following table will show the number of casualties so resulting for the last fourteen years and the percentage which such casualties bear to all casualties: (*b*)

Year ending June 30.	Casualties from overhead obstructions.	Percentum of all casualties.
1902	1,219	2.8%
1903	1,121	2.2%
1904	1,364	2.4%
1905	1,323	2.2%
1906	1,683	2.3%
1907	1,777	2.1%
1908	1,509	2.0%
1909	1,343	2.0%
1910	1,113	1.2%
1911	1,763	1.0%
1912	1,755	.9%
1913	2,125	1.0%
1914	1,770	.7%
1915	1,370	.8%

The following table, taken from Accident Bulletin No. 56, will show the detailed causes for all casualties resulting from overhead and side obstructions for 1915: (*a*)

Analysis of accidents to persons, reported in Annual Table No. 1B, as due to coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structure above or at side of track, for the year ended June 30, 1915.

Causes.	Total Killed.	Total Injured.
Switch stands	2	271
Water cranes	5	96
Mail cranes	2	42
Buildings at side of or inclosing track	3	128
Bridges, side	21	102
Bridges, overhead	57	143
Tunnels	2	16
Overhead wires	4	77
Poles, including signal, telephone, telegraph, electric light, warning poles, etc.	6	142
Miscellaneous	17	234
Total	119	1,251

It would take no little imagination to see how the 1,500 casualties, which result each year from persons being struck while on the train by overhead and side obstructions, could be decreased by placing more trainmen on the cars. The proper solution for this problem lies in such requirements as the installation of warning ropes. There is obviously no relief to be had in "full-crew" legislation.

FALLING FROM CARS OR ENGINES.

Several thousand persons of all classes receive casualties each year by falling from cars or engines. The total number of casualties which have occurred for the various years since 1911, which was the first year that this distinct heading was tabulated, together with the percentage which they bear to all casualties is tabulated in the following table: (*b*)

Year ending June 30.	Casualties due to falling from cars.	Percentum of all casualties.
1911	7,304	4.5%
1912	7,560	4.1%
1913	8,563	4.0%
1914	8,039	3.9%
1915	6,181	3.6%

The further treatment of this particular study is grouped with, and comes at the conclusion of, the next study headed "getting on or off cars and engines."

GETTING ON OR OFF CARS AND ENGINES.

Even more persons receive casualties each year while getting on or off cars and engines than by falling from trains. The following table will give the total number of casualties which occurred while getting on or off trains for the years from 1911 to 1915 inclusive: (*c*)

(*a*) Accident Bulletin No. 56, page 35.
(*b*) Accident Bulletins Nos. 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52 and 56.

(*a*) Accident Bulletin No. 56, page 36, table No. 5a.
(*b*) Accident Bulletins Nos. 44, 48, 52 and 56.
(*c*) IBID.

Year ending June 30.	Casualties due to getting on or off cars.	Percentum of all casualties.
1911	13,051	8.1%
1912	13,760	7.6%
1913	15,329	7.2%
1914	14,561	6.5%
1915	12,323	7.2%

In a still more detailed form the tabulation following shows the causes of casualties happening while falling from or getting on or off cars and engines for the year 1915, as given by the Interstate Commerce Commission: (*a*)

Causes of accidents to employees, classified (C6 and C7), as falling from and getting on or off cars and engines, for the year ended June 30, 1915.

Causes.	Total Killed.	Total Injured.
Fell from roof of box car, by reason of—		
Defect in car	1	56
Ice or snow	5	81
Parting of train	8	72
Derailment, collision, or shock due to abnormal movements of cars other than those in subclass 3	32	666
While setting brakes	30	610
Fell from—		
Coal car	12	93
Freight car other than box or coal car	25	322
Engine or tender	49	766
Passenger car	6	84
Engines, tenders, or cars (all kinds) not in motion	7	591
Miscellaneous causes	38	1,122
Not clearly explained	76	153
Slipped, getting on moving trains or cars	43	1,147
Jumping off moving trains	15	2,244
Jumping from engines or cars, anticipating collision, derailment or other accident	1	276
Fell from engines or cars by reason of—		
Defective handholds and sill steps	..	422
Getting on or off moving engine	20	2,023
Caught in frog, guard rail or switch	..	20
Total	368	10,748

Conclusion. The greater part of casualties which result from falling from or getting on or off cars and engines are received by employees and passengers. The Interstate Commerce Commission has made no detailed study of those of the above casualties which result to passengers and it is not possible, therefore, to set forth their final causes. It is fair to say in a general way, however, that a reasonable interpretation would lead to the conclusion that a larger number of assistants at stations to assist people in getting on or off passenger trains would reduce casualties to passengers. There is to that extent a relation between this group of casualties and "full-crew" legislation. But the majority of casualties in this group are received by employees, and it is difficult to discover any material relief in "full-crew" legislation to the employees from the casualties which they receive by falling from or while getting on or off trains.

OTHER ACCIDENTS ON OR AROUND TRAINS NOT HERE NAMED.

This heading is intended to include accidents in or around trains which have not been already included under one or another of the classes above enumerated. The following table will show the number of casualties which have resulted from such accidents for the years from 1911 to 1915 inclusive: (*b*)

Year ending June 30.	Casualties from other accidents.	Percentum of all casualties.
1911	4,857	3.0%
1912	5,741	3.1%
1913	7,468	3.5%
1914	7,579	3.7%
1915	6,896	4.0%

In order more definitely to show just what is included under this heading the following table has been printed. This table will show the causes of all "other accidents on or around trains," for 1915, as reported by the Interstate Commerce Commission: (*a*)

Analysis of accidents to persons, reported in Annual Table No. 1B, as "other accidents" on or around trains, for the year ended June 30, 1915.

Causes.	Total Killed.	Total Injured.
Unexpected closing of car doors	3	757
Unexpected or abnormal movement of trains, cars or engines	39	1,970
Window sashes of coaches or cabooses falling on hand or arm	..	380
Struck by objects falling from fastenings or racks in coaches or cabooses	..	194
Broken glass from windows or doors in coaches or cabooses	..	365
Loading or unloading freight, baggage, etc.	8	705
Struck by objects falling or thrown from passing trains	3	219
Coupling or uncoupling air or steam hose, including the turning of angle cocks	4	57
Climbing or riding between or under cars or engines	19	205
Standing, walking or running alongside of trains, cars or engines	14	678
Trains, cars or engines striking objects on or at the side of the track	5	157
Miscellaneous	40	1,074
Total	135	6,761

Conclusion. There were 6,896 casualties classified under this group in 1915 and the number has been near that for the last several years. A close examination of the twelve chief underlying causes shows that only two, unexpected or abnormal movement of trains and miscellaneous could conceivably have been reduced by a larger train-crew. It might further be said, in good reason, that a larger train-crew could have watched for tramps and trespassers underneath and on the cars, and have reduced the casualties to those two types of persons. In the main, however, the causes of casualties in this group are not such as could find material relief in "full-crew" legislation.

BEING STRUCK OR RUN OVER BY ENGINES OR CARS AT STATIONS OR YARDS.

A considerable number of casualties result each year to parties who are struck by engines or cars at stations or yards. The following table will show the number of such casualties for the years beginning with 1911: (*b*)

Year ending June 30.	Casualties.	Percentum of all casualties.
1911	4,945	3.0%
1912	5,018	2.7%
1913	5,700	2.6%
1914	5,452	2.5%
1915	4,007	2.3%

Conclusion. The function of policing the stations and yards is not one which properly belongs to a brakeman and it would seem that a "full-crew" law, requiring an additional brakeman, could not possibly prevent the four or five thousand casualties annually occurring at those places.

BEING STRUCK OR RUN OVER BY ENGINES OR CARS AT HIGHWAY GRADE CROSSINGS.

Between two and three thousand people are each year killed or injured by trains at highway grade crossings. The following table will show the casualties resulting from being so struck for the years from 1911 to 1915 inclusive: (*c*)

Year ending June 30.	Casualties at grade crossings.	Percentum of all casualties.
1911	3,426	2.1%
1912	3,538	1.9%
1913	4,205	1.9%
1914	4,082	2.0%
1915	4,067	2.3%

(*a*) Accident Bulletin No. 56, page 34, table No. 4.
(*b*) Accident Bulletins Nos. 40, 44, 48, 52 and 56.
(*c*) IBID.

Conclusion. The danger resulting from poorly protected highway grade crossings is formidable and one which calls for a solution, but quite clearly the additional brakeman is not such a solution. There is no more safety at the grade crossing when a "full-crew" train passes than when a train passes which does not carry the additional brakeman.

BEING STRUCK OR RUN OVER BY ENGINES OR CARS AT OTHER PLACES.

There are five thousand casualties which occur to persons each year by reason of being struck or run over by engines or cars at other places. The following table will show the total number of such casualties for the years from 1911 to 1915: (*a*)

Year ending June 30.	Casualties.	Percentum of all casualties.
1911.....	5,731	3.5%
1912.....	5,804	3.2%
1913.....	5,877	2.7%
1914.....	5,406	2.6%
1915.....	4,712	2.7%

Conclusion. Although there are five thousand persons killed or injured each year by reason of being struck or run over by engines or cars at places other than stations, yards and grade crossings, it is not easy to conceive a relation between such casualties and the size of a train-crew. Additional brakemen on a moving train have no means to keep the track clear in front of the engine and a conclusion must follow that "full-crew" legislation affords no solution to this particular group of casualties.

OTHER CAUSES.

The heading of "other causes" is given to all accidents, other than train and industrial accidents, which have not been included in one or the other of the various classes already named. The following table shows the number of casualties resulting from such accidents from 1911 to 1915 inclusive: (*b*)

Year ending June 30.	Casualties from other causes.	Percentum of all casualties.
1911.....	3,483	2.1%
1912.....	3,126	1.7%
1913.....	3,286	1.5%
1914.....	3,247	1.6%
1915.....	2,770	1.6%

Conclusion. The Interstate Commerce Commission has made no segregation showing, in a positive way, the kinds of accidents which are included under "other causes" and for that reason it is not possible to make an intelligent analysis of this group. It is only fair to say, however, that it is quite possible there are accidents in this group which might be reduced by "full-crew" legislation. It is equally possible that there are not. No conclusion, whatsoever, can be made.

INDUSTRIAL ACCIDENTS AS A GROUP.

When our legislators are told that there were 211,272 railroad casualties in 1913, and near that number each year since 1911, it is little wonder that they should grasp at any proposed remedial legislation. And yet, at a second glance, such a statement if completed, should add that the great majority of those casualties result from industrial accidents. It is surprising and to some factions, perhaps, disturbing, to find that over fifty per cent. of the deaths and injuries in this enormous casualty list are caused by industrial accidents. For it is quite apparent that such accidents are entirely without the purview of train-crew statutes, and that they are not even such as would admit of the possibility of alteration through "full-crew" legislation.

The casualties resulting from industrial accidents which each year constitute from 49.6 to 58.3 per cent. of all casualties, must, therefore, be brushed off the board at the start as having no relation to the type of laws under consideration.

The following table will show the total number of industrial casualties for the years beginning with 1911, and the per cent. of all casualties which such constitute: (*a*)

Year ending June 30.	Industrial casualties.	Percentum of all casualties.
1911.....	79,676	49.6%
1912.....	92,763	51.4%
1913.....	114,034	53.9%
1914.....	113,683	56 %
1915.....	99,535	58.3%

Conclusion. A more detailed tabulation of the classes of industrial accidents here summarized is given below in order to give a still further basis for the conclusion that such accidents have no relation, whatever, to the size of a train-crew.

INDUSTRIAL ACCIDENTS WHILE WORKING ON TRACKS OR BRIDGES.

The following table will show the number of industrial accidents to employees while working on tracks or bridges for the years from 1911 to 1915: (*b*)

Year ending June 30.	Industrial Casualties (Tracks or Bridges).	Percentum of all casualties.
1911.....	18,666	11.6%
1912.....	20,507	11.3%
1913.....	25,531	12. %
1914.....	27,095	13.3%
1915.....	25,013	14.6%

Conclusion. There is, of course, no relation whatever between industrial accidents to employees while working on tracks or bridges and legislation regulating the size of train-crews. The most ardent proponent of the "full-crew" laws would not presume to claim such a relation.

INDUSTRIAL ACCIDENTS AT STATIONS, FREIGHT HOUSES, ENGINE HOUSES, COALING STATIONS, WATER STATIONS, ETC., WHERE NO MOVING RAILROAD CAR OR ENGINE IS INVOLVED.

The following table will show the number of industrial accidents to employees which occurred at the places enumerated in the title of this study from 1911 to 1915 inclusive: (*c*)

Year ending June 30.	Industrial casualties (Stations, Freight Houses, etc.).	Percentum of all casualties.
1911.....	18,662	11.6%
1912.....	22,500	12.4%
1913.....	25,671	12.1%
1914.....	26,196	12.9%
1915.....	23,602	13.8%

Conclusion. There is, again, obviously no relation between casualties of this character and "full-crew" legislation.

(*a*) Accident Bulletins Nos. 40, 44, 48, 52 and 56.
(*b*) IBID.

(*a*) Accident Bulletins Nos. 40, 44, 48, 52 and 56.
(*b*) IBID.
(*c*) IBID.

INDUSTRIAL ACCIDENTS IN AND AROUND SHOPS.

The following table will show the number of casualties due to industrial accidents and occurring in and around the shops for the years from 1911 to 1915 inclusive: (*a*)

Year ending June 30.	Industrial casualties (around shops).	Percentum of all casualties.
1911.....	35,603	22.1%
1912.....	42,892	23.8%
1913.....	54,637	25.8%
1914.....	53,512	26.2%
1915.....	45,092	26.4%

Conclusion. There can be no remedy to industrial accidents which occur around or in shops in the enactment of laws regulating the size of train-crews.

INDUSTRIAL ACCIDENTS ON BOATS AND WHARVES.

The following tables will show the number of casualties resulting from industrial accidents on boats and wharves, for the years from 1911 to 1915: (*b*)

Year ending June 30.	Industrial casualties (Boats and Wharves).	Percentum of all casualties.
1911.....	1,251	.7%
1912.....	1,372	.7%
1913.....	1,828	.8%
1914.....	1,810	.8%
1915.....	1,757	1. %

Conclusion. The "full-crew" legislation obviously, has no bearing to industrial accidents on boats and wharves.

INDUSTRIAL ACCIDENTS AT OTHER PLACES.

The following table will show the number of casualties resulting from industrial accidents at places other than those mentioned in the above studies, for the years from 1911 to 1915 inclusive: (*c*)

Year ending June 30.	Industrial casualties (other places).	Percentum of all casualties.
1911.....	5,494	3.4%
1912.....	5,492	3.4%
1913.....	6,367	3. %
1914.....	5,430	2.6%
1915.....	4,071	2.3%

Conclusion. No absolutely intelligent conclusion can be reached on this study because it is not possible to know the nature of or location of the industrial accidents meant. The Interstate Commerce Commission does not give a more detailed segregation. It is inconceivable, however, how an industrial casualty at any location whatever could find relief in any train-crew increase.

(*a*) Accident Bulletins Nos. 40, 44, 48, 52 and 56.
(*b*) IBID.
(*c*) IBID.

3—Investigation of Causes of Railroad Accidents Made by the Interstate Commerce Commission

The Interstate Commerce Commission was authorized by the act of May 6, 1910, and has since been making official investigations of the causes of the important railroad accidents of this country. In these investigations the government attempts to get beneath the surface reasons and to ferret out the final cause for each accident investigated. A review of these final causes of railroad accidents is the most conclusive means there can be had to determine the merits of "full-crew" legislation as a casualty preventative. Fair minded proponents and opponents of train-crew legislation could not do other than agree that these impartial governmental investigations must be the fairest ground upon which their case can be thrashed out satisfactorily.

A tabulation of the nature of these causes is the background by aid of which one can select plausible measures, and against which one can test, in a final way, whether the "full-crew" laws are the best of a good solution.

A complete summary is here given, therefore, of the final causes of every railroad accident that has thus far been investigated by the Interstate Commerce Commission under that act (e. g. the act of May 6, 1910) and covering the entire period from 1911 to 1915. Those accidents which were occasioned by such a cause as has a possible solution in train-crew legislation are italicized.

A reading over of the final causes of the prominent accidents since 1911 shows that the overwhelming majority of them were due to broken rails, failure of operators properly to give signals, failure of enginemen to obey signals, failure of dispatcher and other officers to obey operating rules and orders, negligence in allowing trains to remain on live tracks, and to defects in or accidents to the roadway. It would take an imaginative eye, indeed, to find more than nine accidents, in the whole lot investigated during the last five years, to which the government has assigned such a cause as could have a possible remedy in "full-crew" legislation. These nine possibilities include causes, moreover, of questionable "full-crew" solution. It is quite possible that, unexcusable negligence or unavoidable mistakes explain the five accidents due to "failure of crew of freight train to keep their train clear of superior train." And yet those five accidents have been classified as part of the nine for which the law offers a possible solution. Four of the remaining accidents were due to "failure of flagman properly to perform his duties in flagging when his view was obscured by a curve in the track." It seems very probable that a faithful additional brakeman, where the present crew was inadequate, could have prevented such four.

A review of the causes found by government investigation for the prominent accidents during the last five years gives an unmistakable conviction that the "full-crew" legislation could afford little, if any, remedial value.

Summary of Reports of Accidents Investigated by the Interstate Commerce Commission from June 30, 1911 to June 30, 1915

Summary of reports of accidents investigated during the two years ended June 30, 1913

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operation (indicated by *).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system.		Train-order system.				
							Automatic.	Nonautomatic.					
1911.													
July 1	Boston & Albany R. R. Co.	Post Road, N. Y.	Train struck automobile.	Passenger.....	3	1	*	...	...	3	Clear..	Automobile stopped on track at highway crossing	View obscured by cars standing on siding.
5	Minneapolis, St. Paul & Sault Ste. Marie Ry. Co.	Superior, Wis.	Collision, head-end.	Freight and freight	4	4	...	...	*	1	Fog.....	Failure of crew to obey train orders.	Crew on duty in excess of hours permitted by law; no telegraph office for distance of 107 miles.
10	Oregon Trunk Ry.	Dyke, Oreg.	Derailment...	Passenger.....	5	35	...	...	*	1	Clear...	Tender derailment due to excessive speed on curve, engineman failing to observe slow order.	Curve of 11°; track new; being used by operating department since July 1.
11	New York, New Haven & Hartford R. R. Co	Bridgeport, Conn.	...do.....	....do.....	14	54	...	*	...	4	..do....	Failure of engineman to observe and obey signals and rules governing operation of trains over a crossover.	No. 8 crossover; speed 55 to 60 miles per hour.
14	Baltimore & Ohio R. R. Co.	Harpers Ferry, W. Va.	....do.....	....do.....	...	...	...	...	*	1	...do...	Tender derailment, cause not definitely ascertained.	Curve of 4°.
27	Seaboard Air Line Ry.	Hamlet, N. C.	Collision, head-end.	Passenger and freight.	10	267	...	...	*	1	...do..	Dispatcher notified freight train crew that all overdue first-class trains had arrived and relieved them of duty of checking train register. This practice was customary at this point.	View obscured by curve.
28	Bangor & Aroostook R. R. Co.	Grindstone, Me.	....do.....	Passenger and passenger.	8	43	...	...	*	1	Rain....	Failure of conductor and engineman to keep their train clear of superior train.	Curve of 8°.
Aug. 13	Pennsylvania Co..	Fort Wayne, Ind.	Derailment and collision.	Passenger and freight.	4	61	*	...	*	2	Clear...	Excessive speed over temporary No. 10 crossover, due to engineman being unfamiliar with track, and overlooking a bulletin requiring low speed issued 10 days prior to accident.	Speed 65 to 70 miles per hour; engineman's request for pilot refused. After derailment train collided head-on with freight train on adioining track.
18	Cleveland, Cincinnati, Chicago & St. Louis Ry. Co.	Columbus, Ohio.	....do.....	....do.....	...	98	...	*	...	1	...do...	Towerman disconnected two levers of interlocking plant, on account of their failure to operate properly, resulting in facing switch points having nothing to hold them in place.	
25	Lehigh Valley R. R. Co.	Manchester, N. Y.	....do.....	....do.....	28	63	*	...	...	2	...do...	Broken rail.....	Piped rail; several transverse fissures.
Sept. 4	Lake Shore & Michigan Southern Ry. Co.	Dock Junction, Pa.	Collision, side.	...do.....	3	36	*	...	...	4	...do...	Failure of engineman to observe signal indication.	Engineman thought to have been incapacitated.
5	Minneapolis, St. Paul & Sault Ste. Marie Ry. Co.	Fremont, Wis.	Derailment...	Passenger.....	3	28	...	*	...	1	Cloudy.	Misplaced facing switch..	Switch misplaced with malicious intent.
11	Chicago north Western Ry. Co.	Oakfield, Wis.	Collision, head-end.	Freight and freight.	...	12	...	...	*	1	Fog....	Failure of crew to obey train orders.	Conductor and engineman were asleep when train was on siding.
13	Lake Erie & Pittsburg Ry. Co.	Cleveland, Ohio.	Derailment...	Work train.....	4	16	...	...	...	1	Clear...	Failure of engineman to operate train at safe speed over new track.	Engine moving backwards; speed 35 miles per hour. Road not ready for operating department.
25	Pennsylvania R. R. Co.	Larimer, Pa.	Collision, head-end.	Passenger and freight.	1	4	*	...	...	4	...do...	Towerman at interlocking plant changed route he had set up for freight train after it had passed home signal, thus allowing it to continue on track on which passenger train was approaching.	Interlocking plant not equipped with approach or route locking.

Summary of reports of accidents investigated during the two years ended June 30, 1913—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operation (indicated by*).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system.		Train-order system.				
							Automatic.	Nonautomatic.					
1911.													
Oct. 9	Boston & Maine R. R.	Hampstead, N. H.	Collision, head-end.	Freight and freight	1	..	...	...	*	1	Clear...	Failure of crew to be governed by train order.	View obscured by curve of 3°.
15	Missouri Pacific Ry. Co	Fort Crook, Nebr.	....do..... ....do.....	Passenger and freight.	8	37	...	...	*	1	...do...	Failure of conductor and engineman properly to check train register.	Curve of 3°.
15	Detroit United Ry	Smith's Crossing, Mich.	Collision, rear-end.	Passenger and passenger.	1	61	...	...	*	2	Fog....	Failure of motorman properly to control speed; practice of requiring crews to change with crews operating in opposite direction regardless of where they may meet and with no protection being afforded either by block signals or by flagging.	Deficient rules.
19	Pere Marquette R. R. Co.	Detroit, Mich	Collision, head-end.	Passenger and freight.	1	44	...	*	...	1	...do...	Failure of conductor to see that train was properly protected and failure of engineman to observe semaphore signal indicating that the switch was open leading to side track	
20	Texas & Pacific Ry. Co.	Marshall, Tex.	....do.....	Light engine and passenger.	1	24	...	...	*	1	Clear...	Failure of hostler to operate light engine at safe speed within yard limits, and failure of night roundhouse foreman to notify hostler that extra freight was approaching without headlight.	Crew of light engine jumped when they saw freight approaching around curve of 2°, first reversing engine, which, after colliding with freight train, ran backward, striking passenger train standing at station.
29	Fort Worth & Denver City Ry. Co.	Bellevue, Tex.	Derailment...	Passenger.....	1	40	...	...	*	1	Rain...	Loosening of rail joint and removal of angle bars and bolts.	Supposed to have been done with malicious intent.
Nov. 2	Erie R. R. Co....	Smithboro, N. Y.	Collision, side	Freight and freight	1	...	*	...	...	2	Clear...	Failure of engineman to observe and be governed by signal indications; failure of head brakeman to act when he saw engineman disregarding signals.	
9	Nashville, Chattanooga & St. Louis Ry.	Dalton, Ga..	Collision, rear-end.	....do.....	1	4	...	...	*	1	Fog....	Failure of operator to deliver a train order, and failure of the dispatcher to send orders as required by rule.	
16	Northern Pacific Ry. Co.	Spire Rock, Mont.	Collision, head-end.	Passenger and work.	6	11	...	...	*	1	Clear...	Failure of crew of work train to keep clear of superior train; misunderstanding of flagging instructions given flagman by conductor.	Collision occurred in narrow rock cut on curve of 11°. View limited to about 100 feet.
18	Great Northern Ry. Co.	Tunbridge, N. Dak.	....do.....	Mail and freight..	2	5	...	...	*	1	Snow...	Failure of crew of freight train to keep clear of superior train.	
22	Chicago, Rock Island & Gulf Ry. Co.	Lively, Tex.	Derailment...	Passenger.....	1	1	*	...	...	1	Clear...	Broken switch point.....	
23	Chicago, Rock Island & Pacific Ry. Co.	Peoria, Ill...	Collision, side.	Freight and street car.	...	13	...	...	*	1	Rain...	Failure of motorman to stop street car before crossing railroad tracks.	Crossing gates not use at night.
Dec. 6	Pennsylvania R. R. Co.	Manor, Pa..	Collision, rear-end, and derailment.	Two freights and express.	6	4	*	...	...	4	Fog....	Failure of flagman properly to protect train; failure of engineman to obey signal indications.	Adams Express train running on adjoining track derailed by wreckage.
9	Chicago, Milwaukee & St. Paul Ry. Co.	Corliss, Wis.	Collision, head-end.	Passenger and light engine.	1	9	*	...	...	2	...do...	Failure of crew of light engine properly to protect engine while making cross over movement.	
18	....do.....	Odessa, Minn	Collision, rear-end.	Passenger and express.	10	23	...	*	...	1	Clear...	Failure of flagman properly to protect train; dispatcher ordered train to be allowed to enter block when he knew that block was occupied; conductor and operator allowed train to enter occupied block without permissive card; operator left block signal in clear position while train was standing at station.	View obscured by box cars on inside of 1° curve.
30	Great Northern Ry. Co.	Sharon, N. Dak.	Derailment ..	Passenger.....	5	18	...	...	*	1	Snow...	Broken rail.....	Rail had laminated seams and a split head.

Summary of reports of accidents investigated during the two years ended June 30, 1913—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operation (indicated by *).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
							Block system.						
					Killed.	Injured.	Automatic.	Nonautomatic.	Train-order system.				
1912.													
Jan. 1	Denver & Rio Grande R. R. Co.	Salt Lake City, Utah.	Collision, head-end.	Freight and switch engine.	2	3	...	...	*	1	Clear...	Failure of dispatcher, yard master, and engineman to obey operating rules.	
14	Missouri Pacific Ry. Co,	Lyndon, Kans.	Derailment...	Freight and freight	3	5	...	...	*	1	...do...	Rail turned over.....	Rail was broken by derailment.
15	Pittsburgh & Lake Erie R. R. Co.	New Castle, Pa.	Collision, head-end.	Passenger and passenger.	5	7	...	*	...	2	Snow...	Failure of engineman to obey switch-light indications; conductor and brakeman also responsible, as error should have been discovered when making stop on track of Pittsburgh & Lake Erie.	Curve of 5°; Baltimore & Ohio train ran through switch to main track of Pittsburgh & Lake Erie, and ran more than half mile on track of latter road.
16	Louisville & Nashville R. R. Co.	Shelbyville, Ky.	....do.....	Passenger and freight	4	27	...	...	*	1	Cloudy.	*Failure of crew of freight train to keep their train clear of superior train*	Curve of 3° through cut; view obscured.
18	Central of Georgia Ry. Co.	Jonesboro, Ga.	....do.....	....do.....	5	5	...	...	*	1	Clear...	Failure of crew to obey train order.	Do.
22	Illinois Central R. R. Co.	Kinmundy, Ill.	Collision, rear-end.	Passenger and passenger.	4	31	...	...	*	2	...do...	Failure of flagman properly to protect train; conductor equally responsible failure of engineman properly to control speed of train; failure of operator to hold train 10 minutes.	
26	Central of Georgia Ry. Co.	Leesburg, Ga.	Collision, head-end.	Passenger and freight.	4	8	...	...	*	1	Fog....	*Failure of crew of freight train to keep their train clear of superior train*	
Feb. 9	Norfolk & Western Ry. Co.	Dry Branch, Va.	Collision, rear-end.	....do.....	3	2	...	*	...	1	Clear...	Failure of operator to hold train when block was occupied; failure of conductor and flagman properly to protect train.	Curve of 4°.
15	Pennsylvania R. R. Co.	Warrior Ridge, Pa.	Derailment...	Passenger.....	5	88	*	...	...	4	Cloudy.	*Broken arch bar*.....	
15	Denver & Rio Grande R.R.Co.	Cuprum, Utah.	....do.....	Freight.....	4	8	...	...	*	1	Clear...	Train ran away, due to inexperience of employees on heavy mountain grades.	Curve of 21°; grade 5 to 7 per cent descending.
15	Atlantic & St. Lawrence R. R. Co.	North Yarmouth, Me.	Collision, head-end.	Freight and freight	3	...	...	...	*	1	...do...	Failure of engineman and conductor to have train under control approaching meeting point.	
17	Pennsylvania Co..	Larwill, Ind.	Collision, rear-end.	Passenger and wreck.	4	11	*	...	...	2	Fog....	Failure of conductor and flagman properly to protect train; failure of engineman to observe signal indications.	
20	Boston & Main R. R.	North Adams, Mass.	....do.....	Passenger and freight.	4	2	*	...	...	2	Clear...	Failure of crew of electric locomotive properly to read signal indications or a false clear indication at signal in middle of tunnel	Collision occurred in Hoosac Tunnel, 1,000 feet from eastern portal. Trains in tunnel hauled by electric locomotives.
Mar. 7	Wabash R. R. Co.	West Lebanon, Ind.	Derailment...	Passenger.....	2	83	...	...	*	1	Snow...	Broken rail. Rail badly worn and track uneven.	Curve of 2°.
8	Georgia R. R.....	Rutledge, Ga.	Collision, head-end.	Passenger and freight.	5	9	...	...	*	1	Clear...	*Failure of crew of freight train to keep their train clear of superior train.*	
12	New York, Ontario & Western Ry. Co.	Galena, N.Y.	....do.....	Freight and freight	2	4	...	...	*	1	Snow...	Failure of crew to obey train order.	View obscured by embankment on inside of curve of 2° 30'.
12	Cleveland, Cincinnati, Chicago, & St. Louis Ry. Co.	Greencastle, Ind.	....do.....	Passenger and freight.	2	30	*	...		2	Cloudy.	Crew allowed train to remain on main track without authority or proper protection; error of operator in notifying dispatcher that train was clear of main track.	Freight train was being operated against current of traffic.
12	Chicago, Milwaukee & St. Paul Ry. Co.	Oakwood, Wis.	Derailment...	Passenger.....	...	37	...	*	...	2	Clear...	Loose highway-crossing plank wedged into brake rigging of locomotive.	Straight track. Speed 45 miles per hour.
13	New York Central & Hudson River R. R. Co.	Hyde Park, N. Y.	....do.....	....do.....	...	48	*	...	...	2	Rain...	Spread rails.....	Curve of 2°; shim used freely; speed estimated to have been 60 miles per hour.
22	Indiana Union Traction Co.	Fortville, Ind.	Collision, head-end.	Passenger and passenger.	1	10	...	...	*	1	Clear...	Error in transmission and writing of train order. Responsibility between dispatcher and conductor and mortorman.	Telephone system of handling train orders
25	Great Northern Ry. Co.	Wrencoe, Idaho.	Derailment...	Freight.....	3	...	...	...	*	1	...do...	Rock slide.....	
Apr. 2	Southern Ry. Co. in Mississippi.	Moorhead, Miss.	....do.....	Passenger.....	2	3	...	...	*	1	...do...	Disconnected throw rod of facing point switch.	
15	Detroit United Ry.	Dexter, Mich.	Collision, head-end.	Passenger and passenger.	1	93	...	...	*	1	...do...	Lap order, due to error either of issuing, transmitting, or receiving order	Do.

Summary of reports of accidents investigated during the two years ended June 30, 1913—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved	Persons.		Method of operation (indicated by*).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system.		Train-order system.				
							Automatic.	Nonautomatic.					
1912 Apr.21	Illinois Central R. R. Co.	Iowa Falls, Iowa.	Collision, rear-end.	Freight and freight	3	1	...	...	*	1	Clear...	Failure of engineman properly to control speed within yard limits.	Curve of 4°.
May 6	New Orleans & Northeastern R. R. Co.	Eastabuchie, Miss.	Derailment...	Passenger.....	9	58	...	...	*	1	Rain...	Soft and uneven track....	Derailed cars caused trestle to collapse under train.
21	Delaware, Lackawanna & Western R. R. Co.	Baldwins Milk Station, N. Y.	Collision, rear-end.	Milk and milk...	1	4	...	...	*	1	Cloudy.	Failure of engineman to obey stop signals given by flagman.	
June 3	Kansas City Southern Ry. Co.	Blanchard, La.	Derailment and collision.	Freight and passenger.	3	13	...	...	*	1	...do...	Bursted air hose due to defective draft rigging caused derailment. Collision due to failure of crew of freight train to clear superior train. Trainmaster, dispatcher, and agent also involved.	Head portion of train being taken to next station when it collided with passenger train.
4	New York Susquehanna & Western R. R. Co.	Macopin Lake Junction, N. J.	Collision, head-end.	Passenger and freight.	1	11	...	...	*	1	Clear...	*Failure of crew of freight train to keep their train clear of superior train.*	Curve of 5° near point of collision.
8	Chesapeake & Ohio Ry. Co.	SilverGrove, Ky.	Collision, rear-end.	Two light engines.	2	2	...	...	...	(1)	...do...	Machinist operating locomotive without authority	
8	Chicago & Alton R. R. Co.	Shirley, Ill..	Derailment...	Passenger.....	...	24	*	...	...	2	...do...	Low spot in track allowed tender truck to mount rail; track unsafe for speed permitted.	
8	Chicago, Indianapolis & Louisville Ry. Co.	Bedford, Ind.	Collision, head-end.	Passenger and passenger.	1	1	...	...	*	1	...do...	Failure of engineman temporarily to remember train order, resulting in train not being under control at meeting point.	Curve of 4°. View very much obscured.
12	Nashville, Chattanooga & St. Louis Ry.	Dalton, Ga..	Derailment...	Passenger.....	3	75	...	...	*	1	...do...	Speed excessive for existing track conditions.	
22	NewYork, Chicago & St. Louis R. R. Co.	Crayton, Pa.	Collision, rear-end.	Freight and freight	2	4	...	...	*	1	Fog....	Unsafe operating conditions and practices.	Dense traffic; trains only spaced 5 minutes apart; high speed; foggy weather.
July 4	Delaware, Lackawanna & Western R. R. Co.	Corning, N. Y.	....do.....	Express and passenger.	39	102	*	...	...	2	...do...	Failure of engineman of express train to observe automatic block signal indications, as well as flagman's signals; failure of flagman to use torpedoes.	
5	Ligonier Valley R. R. Co.	Ligonier, Pa.	Collision, head-end.	Freight and passenger.	22	30	...	...	*	1	Clear...	Failure of dispatcher to deliver, or of conductor to understand or obey a train order. Road had no published rules.	Accident occurred on 6° curve and in a deep cut.
12	Illinois Central R. R. Co.	Courtland, Miss,	Derailment...	Passenger.....	...	9	...	...	*	1	...do...	Track structure inadequate to support heavy train at high speed; track was being repaired.	No speed restrictions; straight track; speed 45 to 50 miles per hour.
14	Chicago, Burlington & Quincy R. R. Co.	Western Springs, Ill.	Collision, rear-end.	Passenger and passenger.	13	29	...	*	...	3	Fog....	Failure of flagman properly to protect train; failure of engineman to control speed and to obey signal indications. Signal system was inadequate as there were no distant indications.	Speed of second train was between 50 and 60 miles per hour.
17	Southern Ry. Co..	Vance, Tenn.	Derailment...	Passenger.....	1	52	...	*	...	1	Clear...	Excessive speed of train on curve.	3½° curve; 3½′ superelevation; speed about 60 milesper hour
25	New York, New Haven & Hartford R. R. Co.	Stonington Junction, Conn.	Collision, rear-end.	Freight and express.	2	5	...	*	...	2	...do...	Failure of flagman properly to protect train; failure of conductor to instruct flagman; failure of towerman to ascertain position of distant signal, which he had temporarily repaired.	Flagman's first trip over this line.
31	Denver & Rio Grande R. R. Co.	Pueblo, Colo	Derailment...	Passenger.....	3	5	...	...	*	2	Rain...	Track underminded, due to high water.	Chicago, Rock Island & Pacific train running over Denver & Rio Grande track.
Aug.12	Chicago, Milwaukee & Puget Sound Ry. Co.	Keechelus, Wash.	....do.....	....do.....	5	10	*	...	...	1	Clear...	Excessive speed on a 10° curve.	Speed 30 or 35 miles per hour.

[1] Yard.

Summary of reports of accidents investigated during the two years ended June 30, 1913—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons. Killed.	Persons. Injured.	Method of operation (indicated by *). Block system. Automatic.	Block system. Nonautomatic.	Train-order system.	Number of main tracks.	Weather conditions.	Causes.	Remarks.
1912													
Aug. 25	Cincinnati, Hamilton & Dayton Ry. Co.	Antioch, Ill.	Derailment...	Passenger.....	1	25	...	...	*	1	Clear...	Failure to maintain track in safe condition.	No speed restrictions. Speed 30 to 35 miles per hour.
30	Northern Pacific Ry. Co.	Hot Springs, Wash.	Collision, head-end.	Passenger and freight.	3	52	...	*	...	1	Rain ...	Failure of crew of passenger train to observe a train order.	Curve of 9° 32′ and deep cut at point of collision.
Sept. 1	Chicago & North Western Ry. Co.	Lyndhurst, Wis.	Derailment...	Passenger.....	7	71	...	*	...	1	...do...	Washout, due to sudden heavy rainfall.	
2	Chicago, St. Paul, Minneapolis & Omaha Ry. Co.	Hustler, Wis.	....do... ...	....do.....	3	12	...	*	...	1	Cloudy	Heavy rains undermined embankment supporting abutments of bridge, which collapsed under weight of train.	Speed of train was about 35 miles per hour.
5	Southern Ry. Co..	Holton, Ga..	....do.....	....do.....	1	25	...	*	...	1	Clear...	Low spot in track and high speed on 4° curve; no speed restrictions.	Speed 45 to 50 miles per hour.
7	Rutland R. R. Co.	Bennington, Vt.	Collision, head-end.	Milk and passenger.	3	18	...	...	*	1	...do...	Failure of conductor and engineman of passenger train to check train register properly and to keep clear of a superior train.	Curve of 2°. View obscured by trees.
10	New York, Chicago & St. Louis R. R. Co.	Erie, Pa....	Derailment...	Passenger.....	...	29	...	...	*	1	...do...	Failure to protect track which was being repaired and was not safe for speed at which train was running.	No speed restriction. Speed 35 miles per hour.
15	New York Central & Hudson River R. R. Co.	Rochester, N. Y.	Collision, rear-end, and derailment.	Three freights....	3	6	..	*	...	4	...do...	Failure of engineman to proceed with caution as required by signal and rules; poor judgment of flagman in protecting train.	Third train, on adjoining track, ran into wreckage.
20	Louisville & Nashville R. R. Co.	Kiserton, Ky.	Collision.....	Passenger and empty cars.	...	25	...	...	*	1	...do...	Open switch.....	Cars on siding.
22	Pittsburg, Shawmut & Northern R. R. Co.	Niles, N. Y..	Collision, head-end.	Passenger and freight.	3	26	...	...	*	1	...do...	Failure of crew of passenger train to observe a train order fixing a meeting point.	
26	Kansas City Southern Ry. Co.	Air Line Junction, Mo.	....do.....	Transfer and passenger.	3	2	...	...	*	1	Fog....	Misunderstanding of orders by conductor of transfer crew; failure of railroad to provide safe operating rules and methods.	4° curve.
Oct. 1	Louisville & Nashville R. R. Co.	Hays Mill, Ala.	Derailment...	Passenger.....	1	20	...	...	*	1	Clear...	Broken rail.....	13 transverse fissures found in rail.
2	Baltimore & Ohio Southwestern	West Athens, Ohio.	Collision, head-end.	Freight and switching.	1	2	...	...	*	1	Fog....	Failure of engineman and head brakeman of switching engine properly to protect their train.	
3	New York, New Haven & Hartford R. R. Co.	Westport, Conn.	Derailment...	Passenger.....	7	36	...	*	...	4	Clear...	Failure of engineman to observe and obey signals and rules governing operation of trains over a crossover.	No. 10 crossover.
7	Western Maryland Ry. Co.	Kobeen, Pa.	Collision, head-end.	Freight and empty passenger.	4	4	...	...	*	1	Fog....	Failure of crew of freight train to obey a train order	3° curve.
10	Baltimore & Ohio R. R. Co.	Chicago Junction, Ohio.	Collision, rear-end.	Passenger and freight.	2	30	...	*	...	2	Fog....	Engineman backed freight train out onto main track without proper signals or instructions.	Inexperienced employee involved.
12	Louisville & Nashville R. R. Co.	Cunningham, Ala.	Derailment..	Passenger.....	2	38	...	...	*	1	Cloudy.	Excessive speed on curve	Speed about 50 miles per hour; 6½° curve 6′ superelevation
18	Delaware, Lackawanna & Western R. R. Co.	Hallstead, Pa.	Collision, rear-end.	Freight and freight.	2	...	*	..	...	2	Fog....	Failure of flagman properly to protect train; failure of engineman to observe and obey signal indications.	
20	Illinois Central R. R. Co.	Hopkinsville, Ky.	Derailment..	Passenger.....	...	128	...	...	*	1	Clear...	Broken rail	Rail was piped.
20	Norfolk & Western Ry. Co.	Cooper, W. Va.	....do.....	....do.....	1	13	...	*	...	2	...do...	Excessive speed on curve.	16° curve; speed 35 to 40 miles per hour.
27	Lehigh Valley R. R. Co.	Homets Ferry, Pa.	Collision, rear-end.	Freight and freight.	1	1	*	...	...	2	Fog....	Failure of engineman to observe and obey block signal indications; failure of head brakeman to call engineman's attention to danger signals; failure of flagman properly to protect train.	Engineman said he was asleep just before collision occurred.
Nov. 8	Western & Atlantic R. R.	Emerson, Ga.	Collision, head-end.	Work and freight.	8	17	...	*	...	1	Clear...	*Failure of flagman properly to perform his duties; failure of engineman clearly to understand movements of work train; operator cleared signal when work train was in block.*	View obscured by curve and cut.

Summary of reports of accidents investigated during the two years ended June 30, 1913—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operation (indicated by *).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system. Automatic.	Block system. Nonautomatic.	Train-order system.				
1912 Nov. 12	Yazoo & Mississippi Valley R. R. Co.	Montz, La.	Collision, rear-end.	Passenger and freight.	15	288	...	...	*	1	Fog....	Failure of flagman properly to protect train; failure of conductor and assistant trainmaster properly to perform their duties; failure of engineman to observe speed restrictions.	
13	Cincinnati, Hamilton & Dayton Ry. Co.	Indiana polis, Ind.	Collision, head-end.	....do.....	15	14	...	*	...	1	Clear...	Failure of engineman and head brakeman to close switch after train backed in on side-track.	Switch lamp not burning; inexperienced employee involved.
16	New York, New Haven & Hartford R. R. Co.	Greens Farms, Conn.	Derailment...	Passenger.....	..	37	...	*	...	4	...do...	Brealing of equalizer bar on truck of dining car.	
16	....do.....	Putnam, Conn.	Collision, rear-end.	Freight and freight.	1	1	...	...	*	2	...do...	*Failure of flagman properly to protect train.*	View obscured by 2° curve and a cut.
19	Seaboard Air Line Ry.	Granite, N. C.	Collision, head-end.	Passenger and passenger.	7	36	...	...	*	1	...do...	Failure of operator to furnish crew with legible copy of train order and to have a clear understanding with conductor as to meeting point fixed by order.	3° curve.
23	Texas & Pacific Ry. Co.	Alexandria, La.	Collision, rear-end.	Freight and passenger.	3	3	...	...	*	1	Fog....	Failure of conductor and flagman properly to protect train; inadequate flagging rule; failure of dispatcher to use proper form of order.	
27	Southern Ry. Co. in Mississippi.	Carrollton Miss.	Derailment...	Freight.....	3	2	...	...	*	1	Clear...	Train struck cattle.	
27	Western Maryland Ry. Co.	Blue Mountain, Md.	Collision, head-end.	Freight and freight.	1	6	...	...	*	1	...do...	Failure of conductor properly to check train register.	6° curve.
27	Pennsylvania R. R Co.	Glen Loch, Pa.	Derailment...	Passenger.....	4	84	*	...	...	4	...do...	Broken cover plate of column supporting bridge.	2° curve, speed 50 miles per hour.
Dec. 3	Pennsylvania Co..	Dresden, Ohio.	Collision, rear-end.	Passenger and passenger.	11	10	...	...	*	1	...do...	*Failure of flagman properly to protect train. Trains spaced 5 minutes apart at telegraph offices.*	View obscured by 2° curve, trees, and cut.
6	Western Maryland Ry. Co.	Pen Mar, Pa.	Collision, head-end.	Freight and empty passenger.	5	9	...	...	*	1	...do...	Failure of dispatcher to provide crew with copy of order affecting their train.	7° curve cut.
10	Northern Pacific Ry. Co.	Toppenish, Wash.	....do.....	Passenger and yard.	2	8	...	*	...	1	Fog....	Failure of conductor and engineman properly to protect yard engine.	
10	Atchison, Topeka & Santa Fe Ry. Co.	Williams, Ariz.	Collision, rear-end.	Freight and freight.	2	...	...	...	*	2	...do...	Failure of engineman properly to control speed of train in yard.	
10	Great Northern Ry. Co.	St. Paul, Minn.	....do.....	....do.....	1	1	...	...	*	4	Clear...	....do.....	Engineman claims he was blinded by electric headlight on adjoining track.
12	Baltimore & Ohio R. R. Co.	Glencoe, Pa.	Derailment...	Freight.....	5	5	...	*	...	3	...do...	Failure of crew to make prescribed air-brake test; failure properly to connect air-brake train line.	Train ran away on Sand Patch Grade.
13	Pittsburgh, Cincinnati, Chicago & St. Louis Ry. Co.	Bowerston, Ohio.	Collision, rear-end.	Freight and freight.	1	3	...	*	...	2	.. do...	Towerman displayed clear distant signal instead of caution when train was standing near home signal; failure of engineman to observe speed restrictions; failure of flagman properly to protect train.	Rules were deficient, as they permitted the display of a clear distant signal under these circumstances.
1913 Jan. 2	Wabash R. R. Co.	Detroit, Mich.	Derailment...	Freight.....	3	...	...	...	*	2	...do...	Broken rail.....	
7	Cleveland, Cincinnati, Chicago & St. Louis Ry. Co.	Lafayette, Ind.	....do.....	Passenger.....	1	70	...	*	...	1	Rain...	Breaking of steel tire on baggage car wheel, due to thermal cracks.	Speed 55 to 60 miles per hour.
8	Vandalia R. R. Co.	TerreHaute. Ind.	Collision, rear-end.	Passenger and passenger.	3	13	...	*	...	2	Clear...	Failure of conductor to protect his train while in station; failure of engineman of second train properly to control speed.	View obscured by smoke.
16	Grand Trunk Western Ry. Co.	New Haven, Mich.	Collision, head-end.	Passenger and freight.	2	25	...	...	*	1	Fog....	Engine of freight train fouled main track on time of passenger train.	
21	Canadian Pacific Ry. Co.	Onawa, Me.	Collision, rear-end.	Freight and freight.	2	4	...	...	*	1	Clear...	Failure of crew of second train to observe a bulletin order requiring trains to be spaced 10 minutes apart.	4° curve near point where accident occurred.
25	International Ry. Co.	Lockport, N. Y.	....do.....	Passenger and freight.	2	61	...	...	*	1	...do...	Failure of motorman of passenger train to observe and obey flagman's signals.	Believed motorman was incapacitated, due to lack of proper rest or to use of strong drink.

Summary of reports of accidents investigated during the two years ended June 30, 1913—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operation (indicated by*).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system. Automatic.	Block system. Nonautomatic.	Train-order system.				
1913 Feb. 1	Houston & Texas Central R. R. Co.	Benchly, Tex.	Derailment...	Passenger.....	2	9	...	...	*	1	Clear...	Defective engine equipment and excessive speed in view of existing track conditions.	Straight track, but unsafe for high speed.
11	Union Pacific R. R. Co.	Valmont, Colo.	Collision-head-end.	Passenger and freight.	...	5	...	...	*	1	...do...	Failure of conductor and engineman of freight rain to keep their train clear of passenger train.	2° reverse curve.
25	Southern Ry. Co.	Jennings, Va.	....do.....	Passenger and passenger.	1	17	...	...	*	1	...do...	Mistake of operator in copying an order.	2° curve.
28	Chicago & North Western Ry. Co.	Goose Lake, Iowa.	....do.....	Passenger and freight.	1	13	...	*	...	1	Snow...	*Freight train occupied main track on time of passenger train without flag protection; failure of operator to issue proper form of caution card.*	View obscured by curve and cut.
Mar. 4	Minneapolis & St. Louis R. R. Co.	Steamboat, Rock, Iowa.	Collision, rear-end.	Freight and freight.	2	4	...	...	*	1	Clear...	Failure of conductor and engineman of second train to obey a rule limiting speed of freight trains, and failure to approach station limits under control; failure of flagman properly to protect train.	There were curves of from 2° to 3° approaching point of collision.
10	Pere Marquette R. R. Co.	Okemos, Mich.	Derailment...	Freight.....	2	...	.	...	*	1	...do...	Loose tire on engine.....	Straight track.
14	Union Pacific R. R. Co.	Gothenburg, Nebr.	Collision, rear-end.	Passenger and passenger.	4	13	*	...	...	2	Blizzard	Failure of engineman to bring train under control after passing caution signal, and his failure to see and obey danger signal.	
14	....do.....	Herdon, Nebr.	....do.....	Freight and freight.	5	2	*	...	...	1	...do...	Failure of engineman to observe and obey signal indications; failure of conductor and flagman properly to protect leading train.	
31	Southern Ry. Co..	Oyama, N.C.	Derailment...	Freight.....	3	1	...	*	...	1	Fog....	Broken rail.....	Transverse fissures in rail.
Apr. 2	Chicago, Burlington & Quincy R. R. Co.	Wakeley, Wyo.	Collision, head-end.	Passenger and passenger.	2	17	...	*	...	1	Snow...	Failure of engineman to observe and be governed by a train order.	Engineman and conductor were not required to compare orders.
4	Baltimore & Ohio R. R. Co.	Hoytville, Ohio.	Derailment...	Passenger.....	2	18	...	*	...	2	Clear...	Open facing point crossover switch not equipped with switch lights.	Passenger train running against current of traffic.
27	Chicago, St. Paul, Minneapolis & Omaha Ry. Co.	Baldwin, Wis.	Collision, head-end.	Passenger and freight.	2	11	...	*	...	1	...do...	Freight train occupied main track on time of passenger train without proper protection.	
28	New York, New Haven & Hartford R. R. Co.	Braintree, Mass.	....do.....	Passenger and work.	...	34	...	...	*	1	Fog....	Work train occupied main track on time of opposing passenger train.	Crew failed to identify main-line train and mistook it for branch-line train for which they were waiting.
May 12	Northern Pacific Ry. Co.	Lake View, Wash.	Derailment...	Passenger.....	4	7	...	*	...	1	Clear...	Uneven and insecure track; failure of section foreman to protect track, which was being repaired.	
19	Lake Erie & Western R. R. Co.	Indianapolis, Ind.	Collision, head-end.	Freight and freight.	1	2	...	*	...	1	...do...	Failure of operator to stop a train and deliver an order fixing a meeting point for that train at his station.	
19	International & Great Northern R. R. Co.	Kouns, Tex.	....do.....	Passenger and freight.	1	40	...	...	*	1	...do...	Failure of engineman to obey an order; failure of conductor to obey a rule requiring him to signal engineman as train approached point mentioned in order.	
20	Wheeling & Lake Erie R. R. Co.	Dewey, Ohio.	....do.....	Passenger and passenger.	1	45	...	...	*	1	Cloudy.	Failure of engineman to remember and obey an order fixing a meeting point for his train; negligence of conductor and brakeman in failing to stop train when they found it was passing meeting point.	
26	Pittsburgh, Shawmut & Northern R. R. Co.	County House, N. Y.	....do.....	Freight and freight.	1	7	...	...	*	1	Fog....	Failure of operator to relay a meet order; failure of dispatcher to ascertain whether or not meet order had been delivered before issuing order allowing train to pass meeting point.	Deficient rules.

Summary of reports of accidents investigated during the year ended June 30, 1914

Date.	Name of road.	Location of accident.	Kind of accident.	Kind of trains involved.	Persons.		Method of operation (indicated by *).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system. Automatic.	Block system. Nonautomatic.	Train-order system.				
1913. May27	Missouri Pacific Ry. Co.	Brant, Mo..	Collision, head-end.	Passenger and passenger.	4	48	...	*	...	1	Clear...	Issuance of a lap order; failure of an operator to stop one of the trains at the entrance of a block which was occupied by the other train.	Collision occurred on a 3° curve. Dispatcher was sick and not in proper physical condition for duty.
27	Pennsylvania Co..	Niles, Ohio..	....do.....	Passenger and freight.	2	20	...	*	...	2	Rain...	Failure of tower operator to set switch properly; failure of engineman to observe speed restrictions.	
June 6	Detroit United Ry.	Waterville, Mich.	....do.....	Work and freight.	2	**3**	...	...	*	1	Clear...	*Failure of crew of freight train to protect train by flag while rounding curve.*	Rules were inadequate for the safe operation of trains.
12	New York, New Haven & Hartford R. R. Co.	Stamford, Conn.	Collision, rear-end.	Passenger and passenger.	6	26	...	*	...	4	...do...	Failure of engineman to apply brakes in time to stop train before passing home signal; improper location of distant signal; lack of brakes of necessary efficiency.	Engineman inexperienced in fast passenger-train service.
18	Lake Shore & Michigan Southern Ry. Co.	Kalamazoo, Mich.	Collision, head-end.	Passenger and work.	2	14	...	...	*	1	...do...	Failure to obey rule requiring inferior trains to clear superior trains 5 minutes at meeting point; failure properly to observe flagging rule.	Failure to observe speed restrictions.
27	Pennsylvania Co..	Woodville, Ohio.	....do.....	....do.....	1	32	...	*	...	1	...do...	Work train occupied main track on time of passenger train without proper protection.	
July 2	Missouri Pacific Ry. Co.	Berger, Mo.	Derailment...	Passenger.....	1	108	...	*	...	1	...do...	Believed some part of lead truck of locomotive became defective and dropped on rails.	Curve of 3° 40′; superelevation 5½ inches; speed 48 miles per hour.
13	Michigan Central R. R. Co.	Jackson, Mich.	Collision, head-end.	Passenger and passenger.	1	6	...	...	*	1	...do...	Failure of crew to obey a train order.	
13	Pacific Electric Ry. Co.	Los Angeles, Cal.	Collision, rear-end.	....do.....	14	294	...	...	*	2	...do...	Failure of flagman properly to protect train; failure of motorman properly to control speed; failure of company to provide safe and adequate method of train operation.	No signals or orders, trains spaced by vision; inexperienced employees.
13	Michigan Central R. R. Co.	Francisco, Mich.	Derailment...	Passenger.....	2	2	*	...	...	2	...do...	Tender derailment; cause not definitely ascertained.	Curve of 1½°; speed 45 miles per hour.
22	Duluth & Iron Range R. R. Co.	Colby, Minn.	Collision, head-end.	Freight and freight.	3	3	...	...	*	2	Rain...	Failure of crew to observe and be governed by position of switch, resulting in operating train against current of traffic.	Switch not equipped with switch lock and left in wrong position.
27	Lehigh Valley R. R. Co.	Slatington, Pa.	Collision, rear-end.	....do.....	1	31	*	...	...	2	Clear...	Failure of engineman to obey signal indications.	
30	Pennsylvania R. R. Co.	Tyrone, Pa..	....do.....	Passenger and passenger.	1	216	*	...	...	4	...do...	Failure of engineman to observe and be governed by signal indications; failure of fireman and assistant road foreman of engines properly to observe signal indications.	
31	Great Northern Ry. Co.	Allouez, Wis.	Collision.....	Switch engine and standing cars.	2	6	...	...	...	(1)	...do...	Failure of switchmen to ride on top of cars, as required by rule, in order to transmit signals to engineman; failure of engineman properly to control speed.	Unloading ore at dock; no method of protecting men doing work.
Aug. 5	Minneapolis, St. Paul & Saute Ste. Marie Ry. Co.	Waukesha, Wis.	Collision, head-end.	Freight and switch engine.	1	1	...	...	*	1	...do...	Failure of engineman properly to control speed of freight train within yard limits.	
12	Chicago, Rock Island & Pacific Ry. Co.	Richfield, Nebr.	Collision, rear-end.	Passenger and circus.	...	56	...	*	...	1	...do...	Failure of conductor and engineman of circus train to keep their train clear of superior train; failure of passenger engineman properly to control speed.	Employees did not have uniform understanding of rules.
13	Baltimore & Ohio R. R. Co.	Rowlesburg, W. Va.	Collision.....	Freight and freight.	3	...	...	*	...	2	Fog....	Failure of conductor and engineman to test air brakes when helper engine was cut in behind thirty-first car, resulting in remaining 42 cars and caboose being without air.	Cut-out cock on helper engine was closed. Train broke in two, 40 cars and caboose running down grade and colliding with following train.
27	Vandalia R.R. Co.	Otter Creek Junction, Ind.	Collision, head-end.	Passenger and freight.	1	7	...	...	*	1	Clear...	Failure of conductor and engineman of freight train to keep their train clear of superior train.	Crew of freight train overlooked passenger train.
31	Oregon Short Line R. R. Co.	Banks, Idaho	Derailment...	Light engine.....	2	3	...	...	*	1	...do...	Failure of engineman properly to operate air brakes on heavy grade, resulting in losing control of engine.	Curve of 10°; speed 60 miles per hour.

[1] Yard.

Summary of reports of accidents investigated during the year ended June 30, 1914—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operation (indicated by*).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system. Automatic.	Block system. Nonautomatic.	Train-order system.				
1913. Sept. 1	Chicago, Rock Island & Pacific Ry. Co.	Maynard, Iowa.	Derailment...	Passenger.....	3	103	...	...	*	1	Clear...	Track and roadway in bad condition and unsafe for operation of trains at speed allowed.	Tender derailment; straight track; rules allowed 40 miles per hour.
2	New York, New Haven & Hartford R. R. Co.	North Haven, Conn.	Collision, rear-end.	Passenger and passenger.	21	42	*	...	...	2	Fog....	Failure of flagman properly to protect train; failure of conductor to see that train was protected; failure of both engineman properly to control speed and to stop trains before passing danger signals; lack of adequate signal system and of proper supervision by operating officials.	No distant signals in connection with home signals; signals not overlapped.
4	Chicago, Milwaukee & St. Paul Ry. Co.	Penfield, Mont.	Collision, head-end.	Freight and work.	2	11	*	...	...	1	Clear...	Failure of conductor and engineman of freight train to obey train order; failure of conductor and engineman of work train to obey signal indications.	Engineman of work train had not been examined on automatic block rules; lack of proper supervision.
6	Minneapolis, St. Paul & Sault Ste. Marie Ry. Co.	Adams, N. Dak.	Collision, rear-end.	Freight and freight.	2	2	...	...	*	1	Cloudy.	Failure of conductor to protect train left occupying main track.	Train left on main tract at expiration of 16 hours on duty; no night telegraph office in distance of 101 miles.
22	Long Island R. R. Co.	College Point, L. I.	Collision, head end.	Passenger and passenger.	3	81	...	...	*	1	Clear...	Failure of towerman to hold train when superior train was overdue.	Rules conflict.
Oct. 2	St. Louis Southwestern Ry. Co.	Stephens, Ark.	....do.....	Freight and work.	4	4	...	...	*	1	...do...	Failure of conductor and engineman to obey a train order.	All of train crew of freight train riding in caboose; 42 cars in train.
3	New York, Chicago & St. Louis R. R. Co.	Fairview, Pa	....do.....	Freight and freight	2	2	...	...	*	1	...do...	Failure of engineman to observe and obey flagman's signals and switch light indication.	Use of torpedoes by flagmen not required.
19	Mobile & Ohio R. R. Co.	Buckatunna, Miss.	Derailment...	Passenger.....	17	145	...	...	*	1	...do...	Tender derailment, believed to have been due to excessive speed on curve of 3°, with only 3½-inch superelevation.	Speed 55 miles per hour.
20	Pennsylvania R. R. Co.	Portville, N. Y.	Collision, side.	Freight and light engine.	2	3	...	*	...	1	Rain...	Failure of engineman of freight train to stop inside fouling point of siding; failure of engineman of light engine properly to control speed until he knew track was clear.	
25	New York, New Haven & Hartford R. R. Co.	Westerly, R. I.	Derailment...	Passenger.....	...	77	...	*	...	2	...do...	Broken rail.....	Transverse fissures; rail in service three years.
27	Southern Ry. Co.	Easley, S. C.	....do.....	....do.....	1	7	...	*	...	1	Clear...	Believed to have been due to turning over of rail.	Curve of 4°; superelevation 5 inches; speed 35 miles per hour.
29	St. Louis & San Francisco R. R. Co.	Chelsea, Okla.	....do.....	....do.....	1	1	...	*	...	1	...do...	Tender derailment; believed that bad track conditions caused tender to rock, resulting in its derailment.	Straight track; speed 40 miles per hour; 50 miles per hour allowed.
31	Great Northern Ry. Co.	Rexford, Mont.	Collision, head-end.	Passenger and work.	1	24	...	...	*	1	Cloudy.	Failure of flagman to understand and obey instructions; failure of conductor to know that flagman understood instructions.	Flagman had not been examined.
31	Philadelphia, Baltimore & Washington R. R. Co.	Washington, D. C.	Derailment...	Switch engine....	1	1	...	...	...	(1)	Clear...	Believed to have been due to rails breaking and to decayed ties giving way.	Trestle about 15 feet high; curve of 15°.
Nov. 6	Lake Shore & Michigan Southern Ry. Co.	Mount Union, Ohio.	Collision, head-end.	Freight and freight	3	5	...	...	*	1	...do...	Failure of conductor and engineman to obey train orders; failure of dispatcher to send middle order as required by rules.	
13	Central of Georgia Ry. Co.	Clayton, Ala.	Derailment...	Passenger.....	9	181	...	...	*	1	...do...	Broken rail; break occurred prior to accident.	Track conditions unsafe for speed permitted; straight track; descending grade, 1.47 per cent; 56-pound rails; 6 broken rails, patched up, found within 1,300 feet of derailment; 16 found within 1 mile.

[1] Accident occurred on private trestle.

Summary of reports of accidents investigated during the year ended June 30, 1914—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons		Method of operation (indicated by *).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
							Block system.						
					Killed.	Injured.	Automatic.	Nonautomatic.	Train-order system.				
1913. Dec. 16	Central Vermont Ry. Co.	Georgia, Vt.	Collision, head-end.	Freight and freight	2	1	...	...	*	1	Clear...	Failure of conductor and engineman to obey train order; failure of dispatcher to send middle order as required by rules.	Operating rules not properly enforced.
29	Virginia Ry. Co...	Keever, Va..	....do.....	....do.....	4	2	...	...	*	1	...do...	Failure of conductor and engineman to obey train order.	
1914. Jan. 5	Lehigh & Hudson River Ry. Co.	Hamburg, N. J.	Collision, rear-end.	....do.....	1	2	...	...	*	1	...do...	Failure of flagman properly to protect train.	View very much obscured.
9	Georgia Southern & Florida Ry.Co.	Cordele, Ga.	Derailment...	Passenger.....	2	28	...	...	*	1	...do...	Broken rail.....	Split head and web; rail in service 13 years.
18	Southern Ry. Co..	Davidson, N. C.	....do.....	....do.....	2	3	...	...	*	1	...do...	Obstruction on track....	Track spike on outside rail of 3° curve.
25	Michigan Central R. R. Co.	Michigan Air Line Crossing, Mich.	Collision, head-end.	Passenger and freight.	4	7	...	...	*	1	Snow...	Failure of conductor and engineman of freight train to keep their train clear of passenger train.	
29	Pennsylvania R. R. Co.	Conemaugh, Pa.	Collision, rear-end.	....do.....	3	5	*	...	...	4	Fog....	Failure of engineman of passenger train properly to observe and obey signal indications; failure of conductor and flagman of freight train properly to protect train.	
31	Chicago & Alton R. R. Co.	Lockport, Ill.	Derailment...	Passenger.....	...	14	*	...	...	2	Snow...	Broken rail.....	Piped rail.
Feb. 6	Grand Trunk Ry. System.	Fosters, Mich.	Collision, head-end.	Freight and work.	3	17	...	...	*	1	...do...	Failure of crew of work train properly to protect train.	Misunderstanding of train order, due to improper wording of same; rules governing forms of train orders not understood by employees.
9	Chicago, St. Paul Minneapolis & Omaha Ry. Co.	Bigelow, Minn.	Derailment...	Passenger.....	2	34	...	*	...	1	Clear...	Broken rail.....	Split head; rail in service 13 years.
16	St. Louis & San Francisco R. R. Co.	Nichols Junction, Mo.	Collision, side.	Passenger and passenger.	...	34	...	*	...	1	...do...	Failure of engineman properly to control speed of train.	Signal system in vicinity of station inadequate.
18	Cleveland, Cincinnati, Chicago & St. Louis Ry. Co.	Riverside, Ohio.	Collision, head-end.	Freight and cars occupying main track.	2	1	...	*	...	2	...do...	Operator gave false clear signal; dispatcher failed to establish single-track zone.	Dangerous operating practices; yardmaster allowed cars to stand on main track for 6 hours without flagging protection.
24	Missouri, Kansas & Texas Ry. Co. of Texas.	Hillsboro, Tex.	Collision, rear-end.	Passenger and passenger.	1	7	...	...	...	(1)	...do...	Failure of engineman properly to control speed of train.	
Mar. 3	Grand Trunk Western Ry. Co.	Chicago, Ill.	....do.....	Passenger and freight.	1	4	...	...	...	(1)	Fog....	Failure of conductor and engineman of freight train to keep their train clear of passenger train.	
14	Chicago, St. Paul, Minneapolis & Omaha Ry. Co.	Mendota, Minn.	Derailment...	Passenger.....	1	76	...	*	...	1	Clear...	Open switch, due to throw rod being disconnected, on account of missing cotter key.	
21	Minneapolis & St. Louis R. R. Co.	Olds, Iowa..	Collision, head-end.	Freight and light engine.	2	1	...	...	*	1	Cloudy.	Failure of engineman to keep light engine clear of freight train.	
22	Cleveland, Cincinnati, Chicago & St. Louis Ry. Co.	Indianapolis, Ind.	Derailment...	Freight.....	2	5	...	*	...	2	Clear...	Failure of engineman properly to observe and obey signal indications.	Ran off derail at interlocking plant.
25	Great Northern Ry. Co.	Thama, Idaho.	Collision, head-end.	Passenger and freight.	2	39	...	...	*	1	Snow...	Failure of engineman of freight train to keep his train clear of passenger train.	Conductor was left at last stop; watches of employees inaccurate.
30	Chicago, Burlington & Quincy R. R. Co.	Hawthorne, Ill.	Derailment...	Passenger.....	...	...	*	...	...	3	Cloudy.	Loose wheel.	
Apr. 5	Wabash R. R. Co.	Attica, Ind..	Two derailments.	Freight and passenger.	3	93	*	...	...	1	Clear...	Cause of first derailment not definitely ascertained derailment of passenger train due to collapse of two spans of bridge weakened by first derailment.	Freight car derailed at frog on curve approaching bridge; derailed truck damaged and weakened end post of bridge.
10	Baltimore & Ohio R. R. Co.	Wheeling Junction, Pa.	Collision, head-end.	Freight and freight	1	2	...	...	...	(1)	...do...	Failure of leverman to set up proper route.	
22	Toledo & Ohio Central Ry Co.	Kenton. Ohio.	Collision, rear-end.	....do.....	2	...	...	...	*	1	...do...	Engineman attempting to couple train to helper locomotive while in motion.	

[1] Yard.

Summary of reports of accidents investigated during the year ended June 30, 1915

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operation (indicated by*).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system. Automatic.	Block system. Nonautomatic.	Train-order system.				
1914													
May 5	St. Louis & San Francisco R. R. Co.	Mansfield, Ark.	Collision, head-end.	Freight and light engine.	2	...	...	...	...	(1)	Clear...	Failure of both crews properly to protect trains while switching.	
14	Atlantic Coast Line R. R. Co.	Palmer, Ga.	Collision, rear-end.	Passenger and freight.	2	1	...	...	*	1	Rain...	Failure of engineman of passenger train to observe and obey stop signals of flagman and brakeman of freight train.	
17	Chicago & North Western Ry. Co.	Crystal Lake, Ill.	Collision, head-end.	....do.....	...	36	...	*	...	1	Clear...	Locomotive of freight train occupying main track switching on time of passenger train.	
19	Northern Alabama Ry. Co.	Hayes Mines, Ala.	Collision, rear-end.	Freight and freight	1	5	...	...	*	1	...do...	Failure of flagman properly to protect train; failure of engineman properly to control speed.	View much obscured; descending grade varying from 1½ to 2½ per cent.
27	Missouri, Kansas & Texas Ry. Co. of Texas.	West Point, Tex.	Derailment...	Freight.....	2	...	...	...	*	1	Cloudy.	Embankment giving way, having been weakened by excessive rains.	
31	Baltimore & Ohio R. R. Co.	Cook's Mills, Pa.	....do.....	Light engine.....	5	3	...	*	...	2	Clear...	Tender derailment, due to excessive speed.	Speed 63 miles per hour.
June 1	Colorado & Southern Ry. Co.	South Park Junction, Colo.	Collision, head-end.	Passenger and passenger.	1	26	...	...	*	1	...do...	Failure of conductor and engineman to keep their train clear of superior train.	
12	Atchison, Topeka & Santa Fe Ry. Co.	Bagdad, Cal	....do.....	Passenger and freight.	2	48	...	...	*	1	...do...	Failure of crew of freight train to close open main lines switch when setting out train.	
13	Hocking Valley Ry. Co.	Starr, Ohio.	....do.....	Passenger and passenger.	5	130	...	...	*	1	...do...	Failure of operator to deliver train order.	
14	Southern Ry. Co..	Sadler, N. C.	Derailment...	Passenger.....	2	4	...	*	...	1	...do...	Spreading of passing track switch point, due to wedging in switch of section of arch bar tie strap broken from car in a previous train.	
15	Southern Pacific Co.	Conley, Cal.	....do.....	....do.....	1	27	...	...	*	1	...do...	Broken flange under box car, first car in train.	48 inches broken off.
28	Louisville & Nashville R. R. Co.	Moore's, Ky	....do.....	....do.....	2	57	...	...	*	1	...do...	Tender derailment, believed to have been due to operating an engine backing up at excessive speed over uneven track.	
July 1	Detroit, Jackson & Chicago Ry.	Michigan Center, Mich.	Collision, head-end.	Passenger and passenger.	2	38	...	...	*	1	Cloudy.	Dispatcher issued a lap order.	
17	Virginia Ry.....	Fairmont Park, Va.	Collision, side.	Passenger and freight.	7	91	...	...	*	1	Clear...	Failure of motorman of electric street railway to observe and be governed by stop signals at crossing.	Motorman was asleep due to working conditions not affording opportunity for adequate rest.
23	Pennsylvania R. R.	Shannon, Pa.	Derailment...	Passenger.....	1	2	...	*	...	1	...do...	Not definitely determined; believed to have been due to excessive speed in view or existing track conditions.	Curve of 9°; superelevation 5½ inches; speed probably 35 miles per hour; no speed restriction on curve.
Aug. 5	Kansas City Southern Ry.	Tipton Ford, Mo.	Collision, head-end.	Passenger and passenger.	43	34	...	...	*	1	...do...	Failure of crew of gasoline motor passenger car to obey train order fixing meeting point.	Burning gasoline responsible for many casualities.
12	Southern Ry.....	Tuxedo, N. C.	Derailment...	Passenger.....	1	10	...	*	...	1	Cloudy.	Broken rail, believed to have been in overturned or partially overturned position at time of rupture.	
13	Tennessee Central R. R.	Green Hill, Tenn.	....do.....	....do.....	...	29	...	...	*	1	Clear...	Tender derailment; cause not definitely ascertained.	
14	Denver & Rio Grande R. R.	Thistle, Utah.	Derailment... and collision.	Freight.....	...	1	...	...	*	2	...do...	Train broke in two on heavy descending grade; conductor failed to have sufficient hand brakes set on cars while forward portion was being taken to next station; 53 cars ran away, those on rear being derailed on curve, while balance continued to next station, colliding with part of head-end which had been taken to that point.	

[1] Yard.

Summary of reports of accidents investigated during the year ended June 30, 1915—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operation (indicated by *).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
							Block system.						
					Killed.	Injured.	Automatic.	Nonautomatic.	Train-order system.				
1914.													
Aug. 21	Chicago, Rock Island & Pacific Ry.	Galloway, Ark.	Derailment...	Passenger.....	2	25	...	...	*	1	Clear..	Sun kink.....	Hot weather expanded rails.
27	Chicago, St. Paul, Minneapolis & Omaha Ry.	Peak, Nebr.	Collision, head-end.	Passenger and light engine.	1	52	...	...	*	1	Cloudy.	Failure of crew of light engine to keep clear of superior train.	
Sept. 14	St. Louis, Iron Mountain & Southern Ry.	Watson, Ark.	....do.....	Freight and work.	1	3	...	...	*	1	Clear..	Failure of crew of work train to keep clear of superior train; failure of operator to copy train order correctly; failure of dispatcher to obey rules governing handling of train orders.	Work extra had about 15 minutes in which to travel 8 miles, pushing 32 cars; with about 85 or 90 pounds steam pressure.
15	St. Louis & San Francisco R. R.	Lebanon, Mo.	Derailment...	Passenger.....	27	27	*	...	...	1	Rain...	Track, undermined by high water, slid into creek under weight of train.	
16	Missouri, Kansas & Texas Ry. of Texas.	San Marcos, Tex.	....do.....	....do.....	...	10	...	...	*	1	Clear...	Not definitely determined; believed that uneven track caused locomotive to rock sufficient to unseat male engine truck casting and derail driving wheels.	
18	Alabama Great Southern R. R.	Livingston, Ala.	....do.....	....do.....	10	41	*	...	...	1	...do...	Open facing point switch: switch had been opened with malicious intent after train entered block.	
19	Baltimore & Ohio R. R.	Woodlyn, Pa.	....do.....	....do.....	...	38	*	...	...	2	...do...	Broken tender axle.....	
22	St. Louis, Iron Mountain & Southern Ry.	Rixey, Ark.	....do.....	....do.....	1	13	...	*	...	2	Rain...	Rail joint removed and rail moved out of place, with malicious intent.	
Oct. 17	Delaware, Lackawanna & Western R. R.	Fulton, N. Y.	....do.....	....do.....	1	9	...	...	*	1	Clear...	Open facing point switch had been opened with malicious intent.	
18	New York Central & Hudson River R. R.	South Little Falls, N. Y.	Collision, rear-end.	Freight and freight	2	1	...	*	...	2	Fog....	Failure of conductor and flagman properly to protect their train.	Block 66 miles long; manner of operating block system inadequate to provide proper protection.
19	Missouri, Kansas & Texas Ry. of Texas.	Bartlett, Tex.	Derailment...	Passenger.....	3	13	*	...	...	1	Rain...	Spread rails.....	
19	Kansas City Southern Ry.	Air Line Junction, Mo.	....do.....	....do.....	1	1	...	*	...	1	Clear...	....do.....	Track in very bad condition.
28	Chesapeake & Ohio Ry.	Barboursville, W. Va.	....do.....	....do.....	...	33	*	...	...	2	...do...	....do.....	
31	Delaware, Lackawanna & Western R. R.	Alford, Pa..	....do.....	....do.....	...	22	*	...	...	2	...do...	Broken rail.....	Tranverse fissures.
Nov. 10	Missouri, Kansas & Texas Ry. of Texas.	Sargent, Tex.	Collision, head-end.	Freight and freight	...	3	...	...	*	1	Cloudy.	Failure of conductor and engineman to keep their train clear of superior train.	
12	Lehigh Valley R. R.	Mud Run, Pa.	Derailment...	Passenger.....	2	27	*	...	...	2	Clear...	Not definitely determined; thought to have been obstruction on track.	
24	Southern Ry.....	Alexandria, Va.	Collision, rear-end.	Freight and freight	1	...	...	...	...	(1)	...do...	Failure of engineman properly to control speed of train within yard limits.	
27	Chicago & Alton R. R.	Clark, Mo..	Derailment...	Passenger.....	...	13	...	*	...	1	...do...	Not definitely ascertained.	
Dec. 9	Philadelphia & Reading Ry.	Royersford, Pa.	Collision, side.	Passenger and freight.	2	4	*	...	...	4	Cloudy.	Failure of engineman and head brakeman to keep their train clear of superior train.	Rules governing operation of trains and signals apparently not understood by all employees.
10	St. Louis & San Francisco, R. R.	Joplin, Mo..	Derailment...	Passenger.....	...	16	...	...	*	1	Snow...	Tender derailment due to uneven and irregular condition of track.	
13	Illinois Central R. R.	Central City Ky.	Collision, head-end.	Freight and freight	1	5	...	...	...	(1)	...do...	Failure of conductor and engineman to keep their train clear of superior train.	Rules not properly obeyed by employees, nor enforced by officials.
17	Chicago Great Western R. R.	Cornelia, Iowa.	Collision, rear-end.	....do.....	3	8	...	...	*	1	Clear...	Failure of conductor and flagman properly to protect train occupying main track on time of superior train.	
18	Southern Ry.....	Jetersville, Va.	Derailment...	Passenger.....	1	20	...	...	*	1	...do...	Tender derailment; locomotive being operated backing up; cause not definitely ascertained, but believed to have been a low place in track.	

[1] Yard.

Summary of reports of accidents investigated during the year ended June 30, 1915—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operation (indicated by*).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system. Automatic.	Block system. Nonautomatic.	Train-order system.				
1915. Jan. 1	Chicago, Burlington & Quincy R. R.	Liberty, Mo.	Collision, head-end.	Passenger and passenger.	...	16	*	...	...	1	Clear...	Failure of conductor and engineman to keep their train clear of superior train; failure of engineman of other train to obey block signal in stop position.	
3	St. Louis & San Francisco R. R.	Olathe, Kans.	Derailment...	Freight.....	4	...	*	...	...	1	...do...	Switch opened with malicious intent after train entered block.	
4	Minneapolis & St. Louis R. R.	Emmons, Minn.	....do.....	Passenger.....	...	14	...	...	*	1	...do...	Broken brake lever fulcrum, allowing brake rigging to drag and break off bolts holding facing point switch point, resulting in misplaced switch.	
15	Wabash R. R.....	Runnells, Iowa.	....do.....	....do.....	1	25	...	...	*	1	...do...	Spread rails.....	Rail shimmed 1 inch and not adequately braced.
19	Seaboard Air Line Ry.	Osgood, N. C.	....do.....	....do.....	1	9	...	*	...	1	...do...	Switch improperly secured or left partially open with malicious intent.	
23	Erie R. R.....	Glen Eyre, Pa.	....do.....	Freight.....	3	...	...	*	...	1	Snow...	Failure of engineman to observe and obey stop indication of dwarf signal at derail.	Engine crew had no sleep since previous trip.
30	Pennsylvania R. R.	Sizerville, Pa.	Collision, rear-end.	Freight, light engine, and freight.	1	4	...	*	...	2	Clear...	Train ran away on mountain grade, account brake not in proper condition for use on mountain grades, and train starting down hill at too high rate of speed.	Weather unusually cold; after colliding with light engine, momentum caused collision with train standing ahead of light engine.
30	Atlantic Coast Line R. R.	Callahan, Fla.	Derailment...	Passenger.....	...	29	*	...	...	2	...do...	Failure of section foreman properly to protect track while making repairs.	
30	Chicago, Milwaukee & St. Paul Ry.	Oakwood, Wis.	....do.....	....do.....	...	21	*	...	...	2	...do...	Broken wheel.....	Built-up wheel.
Feb. 1	Cincinnati, Georgetown & Portsmouth R. R.	Fair Oak, Ohio.	Collision, head-end.	Passenger and freight.	3	10	...	...	*	1	Fog....	Failure of engineman and conductor to keep their train clear of superior train; superior train left station in advance of schedule leaving time.	Operating rules habitually disregarded both by officials and employees.
2	Pennsylvania R. R.	Irving, N. Y.	Collision, rear-end.	Freight and freight	1	6	...	*	...	1	Clear...	Failure of conductor and flagman properly to protect train; failure of engineman properly to control speed after exploding torpedoes.	
5	Oregon Short Line R. R.	American Falls, Idaho.	Derailment...	Freight.....	1	...	*	...	...	1	...do...	Failure of section foreman to protect track while changing rails.	Rails were being forced into position and tight connection allowed automatic signals to remain in clear position.
9	Chicago, Milwaukee & St. Paul Ry.	Oakwood, Wis.	....do.....	....do.....	...	...	*	...	...	2	...do...	Broken wheels.....	Three defective wheels in four-wheel truck; worn treads.
19	Baltimore & Ohio R. R.	Youngstown, Ohio.	....do.....	....do.....	1	3	...	*	...	2	...do...	Broken arch bar on tender truck, allowing column bolt to come in contact with riser rail of defective switch, resulting in switch point being thrown.	Switch known to be defective for some time.
22	Chicago, Great Western R. R.	Talmage, Iowa.	....do.....	Passenger.....	2	20	...	...	*	1	Rain...	Broken rail, due to deficiency in strength of track fastenings, allowing rail on outside of curve to spread and break under engine.	
22	Denver & Rio Grande R. R.	Fountain, Colo.	....do.....	....do.....	2	12	...	...	*	1	Clear...	Believed to have been spread rails.	
23	Nevada-California-Oregon Ry.	Horse Lake, Cal.	Collision, rear-end.	Mixed and freight.	1	...	...	...	*	1	Rain...	Failure of conductor to protect train while stopping to take water.	
Mar. 2	Denver & Rio Grande R. R.	Grizzly, Colo.	Derailment...	Passenger.....	1	3	...	...	*	1	Clear...	Broken rail, due to rock falling on track.	
5	Atchison, Topeka & Santa Fe Ry.	Elsinore Junction, Cal.	....do.....	....do.....	1	16	...	...	*	1	...do...	Believed to have been defective and insecure condition of track.	Gauge 1 inch wide; loose spikes allowed additional spread of ¼ inch under train; frog settled ¼ to ½ inch.

Summary of reports of accidents investigated during the year ended June 30, 1915—*Continued*

Date.	Name of road.	Location of accident.	Kind of accident.	Kinds of trains involved.	Persons.		Method of operationd (indicate by*).			Number of main tracks.	Weather conditions.	Causes.	Remarks.
					Killed.	Injured.	Block system.		Train-order system.				
							Automatic.	Nonautomatic.					
1915.													
Mar. 5	Wabash R. R.....	Garber, Ill..	Collision,head-end.	Freight and work.	1	10	...	*	...	1	Fog....	Failure of crew of extra, together with dispatcher, to keep train clear of main track on time of superior train.	Wires down on part of road; dispatcher sent message to crew of extra to run carefully, prepared to stop if any opposing trains appeared.
14	Chicago & Eastern Illinois R. R.	Shelburn, Ind.	Derailment...	Passenger.....	1	16	...	*	...	1	Clear...	Low spot in track, coupled with high speed.	Joints on one side of track 1 inch low; speed 60 miles per hour.
16	Wabash R. R.....	Strahan, Iowa.	....do.....	Freight.....	1	2	...	*	...	1	...do...	Not definitely ascertained.	Caboose and last car of 21-car train derailed.
29	Ahnapee & Western Ry.	Forestville, Wis.	....do.....	....do.....	1	1	...	...	*	1	...do...	Uneven and irregular track conditions, and speed inconsistent with safety while being hauled by locomotive backing up.	
Apr. 4	Atchison, Topeka & Santa Fe Ry.	Monrovia, Cal.	Collision,head-end.	Passenger and passenger.	...	90	...	...	*	1	...do...	Dispatcher violated rules by issuing train order at meeting point; engineman failed properly to control speed.	
8	Great Northern Ry.	Rainbow, Mont.	Collision, rear-end.	Freight and work.	2	...	...	...	*	1	...do...	Train backed down main track without signal having been given from rear end.	
29	Lake Shore Electric Ry.	Fremont, Ohio.	Collision,head end.	Passenger and passenger.	...	37	...	...	*	1	...do...	Failure of conductor and motorman to obey and be governed by train order fixing meeting point.	
30	Baltimore & Ohio R. R.	Eighty-Four, Pa.	Derailment...	Freight.....	1	4	...	*	*	1	...do...	Broken rail.	
May 7	Atchison, Topeka & Santa Fe Ry.	Los Angeles, Cal.	Collision.....	Freight and street car.	5	41	...	...	...	(1)	...do...	Crossing flagman gave proceed signal to eastbound trolley car in such a manner that it was misinterpreted and acted upon by a car moving in opposite direction; failure of motorman properly to control speed approaching steam railroad crossing.	Freight train struck electric street car on crossing.
17	San Pedro, Los Angeles & Salt Lake R. R.	....do.....	Collision,head-end.	Passenger and switch engine.	...	4	*	...	...	1	Cloudy.	Failure of yard crew to keep locomotive clear of main line within yard limits on time of first-class train without having proper authority, and their failure to observe and be governed by automatic signal indications.	
June 3	Chicago & Alton R. R.	Minier, Ill..	Derailment...	Passenger.....	...	25	...	*	...	1	Clear...	Tender derailment, due to uneven condition of track.	
7	Southern Ry.....	Hoffman,Ill.	....do.....	Light engine.....	1	1	...	...	*	1	...do...	Broken axle.	
9	Seaboard Air Line Ry.	Irondale, Ala.	....do.....	Passenger.....	3	20	...	...	*	1	...do...	Rail removed from track with malicious intent.	Two of three men arrested confessed, implicating the third man.
15	Southern Pacific Co.	Tonopah Junction, Nebr.	....do.....	Mixed.....	2	1	...	...	*	1	...do...	Broken bottom brake rod on freight car caught under wheel, derailing it.	
24	Western Maryland Ry.	Thurmont, Md.	Collision,head-end.	Passenger and passenger.	6	44	...	...	*	1	...do...	Error of dispatcher in assuming that a train order, after being superseded, could be restored by annulling the superseding order.	
27	Chicago, Rock Island & Pacific Ry.	Platte River, Mo.	....do.....	Freight and freight	4	1	...	*	...	1	...do...	Failure of conductor and engineman to keep their train clear of main track on time of superior train; failure of two operators to comply with manual block rules.	
29	Mobile & Ohio R. R.	Lawly, Ala.	....do.....	Passenger and light engine.	1	12	...	...	*	1	...do...	Engine crew of light engine overlooked superior train.	

[1]Yard.

4—Conclusions Showing Whether a Larger Train-Crew Can Reduce Casualities

There is an unmistakable ground for grievance against the railroads, on the part of their employes and the public, in the face of the finding that our railroads are killing 27.8 persons and injuring 479.2 persons every twenty-four hours, or killing and injuring one person every three minutes. It is true that the railroads of the country are killing 10,173.6 persons and injuring 174,941.4 persons, or killing and injuring 185,115 persons each year. These are moreover, not chance or particular findings but are all drawn from averages of railroad casualties for the last five years. It need not be said that this problem is challenging an expedient solution.

The proponents of the twenty-two so-called "full-crew" laws believe that this quite formidable railroad casualty problem would be largely solved by an extension of legislative requirements that trains carry larger crews. This contention has made necessary a scientific inquiry into the causes of railroad casualties, to determine whether they are such as could be diminished by an increase in the train-crew. An increase in the train-crew, in terms of the laws under consideration, means simply a requirement for additional brakemen. This whole investigation, therefore, narrows itself down to the determination of whether, or, to what extent, an additional brakeman will remove the causes for railroad casualties.

A settlement of this one issue is so much the crux of the whole "full-crew" debate, that an exhaustive diagram has been prepared above of the causes for all railroad casualties in the United States dating back for a period of fourteen years. No effort has been spared to make this chart as complete and accurate as the records of the Interstate Commerce Commission at Washington, D. C., permit. All railroad casualties have been classified into their first causes and final causes. This grouping of causes affords a most extraordinary opportunity for any impartial mind readily to ferret out the merits or demerits of any proposed remedial measure. It affords an unusual opportunity for the legislator to determine whether, or how many of, those casualties might have been prevented by an additional brakeman.

But a careful perusal of the charts which show the causes for railroad casualties in the United States, reveals the fact that at least eleven of the twenty chief causes have no conceivable relation to the train-crew. First among these eleven are the industrial accidents to employes at terminals, on tracks, at wharves and in shops, which alone claim over 100,000 casualties each year. At one stroke, therefore, more than fifty percentum of the whole lot of railroad casualties are brushed aside as having no conceivable relation to the train-crew. It is likewise necessary to cast aside as wholly irrelevant those casualties due to boiler explosions; roadway and bridge fires, landslides and floods; overhead and side obstructions; being struck by engines or cars at highway grade crossings; and those due to being struck by cars or engines at other places. This means, in brief, that during the last five years an annual average of 117,598.8 casualties or 63.5% of all, had their origin in causes wholly without the province of a train-crew and are palpably irrelevant. This leaves the number of casualties still on the table, so to speak, and needing further analysis very much smaller.

A more detailed study of the nine, from the twenty, chief causes still remaining shows clearly that the probability of a reduction through the crew is, as to several of them very negligible. It cannot be said that, in the main, any decrease could be effected by the train-crew in those casualties known as Other Work About Trains Not in Shops or While Attending Switches, Falling from Cars or Engines, Getting On or off Cars or Engines, Other Accidents On or Around Trains and Other Causes.

It would thus seem that at the first two analyses it would be very conservative to reject sixteen of the twenty main causes of casualties as wholly, or almost wholly, irrelevant to the size of a train-crew. This at once rids of 94.2% of the present railroad casualties in this country. It is clear, therefore, that "full-crew" legislation not only affords no solution, but has no material relation to at least 94.2% of our present railroad casualties. A more detailed analysis is necessary to determine its remedial value to the remaining 5.8% of all casualties.

The casualties still left for analysis are those which occur annually by reason of collision, derailment and coupling or uncoupling accidents. The casualties in these classes, which in 1915 constituted 5.8% of all casualties, would seem to have a very direct relation to the train-crew. They are the only classes which do savor of that relation.

That there is a very direct relation between the causes of 5.8% of railroad casualties and the train-crew, does not mean that all of these causes have a relation to the size of the train-crew. Many of them were due to the ignorance, the carelessness and the oversight of one of the train-crew. But "full-crew" legislation can afford a possible remedy to only those which are related to the size of the train-crew. And this makes it necessary still to sweep aside all collision, derailment and coupling or uncoupling casualties which are not relevant to the size of the train-crew. A more minute sub-division and sub-classification of each of these remaining three chief causes shows that almost one-half of the collisions were head-on (engine to engine) collisions; that much over one-half of the derailments were due to defects in the roadway, negligence of signalmen and trainmen and obstruction of the track; and that three-fourths of the coupling and uncoupling casualties were due to adjusting coupler with foot, cars accidentally starting, careless manipulation of lever, fingers on hand being caught, uncoupling without using lever, when necessary, foot being caught, miscalculating speed, engine accidentally starting, lost footing, slipping off car, being struck by objects, mistakes in signals and going between cars unnecessarily. Now these sub-causes account for a majority of all collisions, derailment and coupling or uncoupling casualties and although bearing relations to the train-crew, do not bear a relation to the size of the train-crew. They are not such causes, therefore, as could be eliminated by a requirement for a larger train-crew. There are then only a portion of the collision, derailment and coupling or uncoupling casualties, the causes of which have any relation to the size of a train-crew.

There has been no attempt in the above process to reject other than those casualties whose causes have palpably no material relation to the train-crew in general and to the size of the train-crew in particular. These analyses wipe off the slate 97.6% of our present casualties (or 165,763 from a total of 170,661 for 1915) as having no such relation. That this 97.6 per cent. of our casualties has no material relation to the size of the train-crew makes positive that they could not be reduced by "full-crew" statutes. For the only change effected by "full-crew" statutes is the change the size of the train-crew.

The remaining 2.4 per cent. of casualties has a possible relation to the size of the train-crew and represent the highest conceivable percentum of casualties which could be affected through a change in the size of the train-crew.

The most radical proponent of the "full-crew" laws could not claim, in the face of these analyses, a greater maximum percentum of casualties as bearing a direct relation to the priniciple involved. The most conservative opponent would never consent to such a great maximum. From the standpoint at this impartial investigation, it is unfortunate that the rejections cannot cease at this already small percentage. A still further analysis and closer scrutiny of the causes which account for the remaining 2.4 percentum of casualties, would seem almost like a preconceived attempt to analyze away all of the powder of the proponents. But no analysist could admit that a "full-crew" law might have prevented even this small residue of casualties, and still remain faithful to his scientific principles. For up and until the present step the study has been brushing off the table all class of casualties

only, which by classes had no material relation to the size of the train-crew. It has been found that at least 97.6% of the classes of railroad casualties have no such relations. No more classes can be rejected in whole without running the risk of rejecting a class that contains some casualties which do have that relation. But although no more general classes can be scientifically rejected by classes, it does not follow that the whole of the remaining casualties are relevant. In fact, it is quite evident upon investigation, that at least a part of most of the remaining classes could not have been prevented by a larger crew and are not relevant.

The casualties still on the slate and included in the remaining group of 2.4% of all casualties (4095 from a total of 170,661 in 1915), contain whole groups when it was known that only a portion were relevant. In some instances "miscellaneous" classes have been left when it was not possible to know whether any or all were relevant. The classes of casualties, in brief, which are now remaining are all collisions which were caused by trains colliding from the rear, trains separating and miscellaneous; all derailments which were caused by defects of equipment, trains separating and miscellaneous reasons; and all coupling or uncoupling casualties which were due to cars not equipped with automatic coupler, coupler broken, coupling damaged cars, coupling with chain or other emergency appliance on curve too sharp for automatic coupler, coupling with chain or other emergency appliance because of uneven track, coupling or uncoupling safety chains, part of defective coupler falling on foot while opening knuckle, delay in moving parts hard to move, fatal injuries for which there was no witness, and all other causes, and unexplained. It is conceivable that there were casualties in each of the classes enumerated just above which had an origin in a cause relative to the size of a train-crew. But it does not take an expert eye to see that a great majority of these casualties were not such as actually would have or could have been prevented by "full-crew" legislation. All rear-end collisions have been left in this group although it is obvious that no great reduction could there be effected since all trains carry a rear-end flagman whether required by law or not. All derailments due to defects of equipment, trains separating and miscellaneous have been left, although any one can readily see that an additional brakeman would not have prevented all, or nearly all such. It is wild presumption to leave the whole lot of casualties due to defects of equipment as having a solution in this law, and no less wild to leave in all "miscellaneous" derailments simply for lack of data. All coupling or uncoupling casualties within twelve different classes have been left as having a possible remedy and yet it is obvious that a great majority of these did not have their origin in such a cause as would have been modified by a "full-crew" law. It is bold indeed, to say that an additional brakeman could have prevented all such casualties occurring on cars not equipped with automatic couplers, or where coupler was broken, or while coupling damaged cars, or while coupling with chain, where coupler cannot be used because of curve or uneven track, or coupling or uncoupling safety chains. It is equally bold to assume that an additional brakeman would have prevented all such casualties due to dropping defective couplers on foot or delay in moving difficult parts. Particular attention is called to the fact that a desire to be absolutely fair has prompted the inclusion within this group of the whole lot of miscellaneous collisions, all miscellaneous derailments and all coupling or uncoupling casualties which are unclassified and unexplained, and all these which occurred for which there was no witness. There is no statistical data available upon which to base a scientific rejection of any particular numerical portion of the remaining casualties. It would seem, however that much over a majority of this residue might conservatively be rejected as being due to such causes as a "full-crew" law could not possibly remedy.

The statistics set out above and showing the relation of a train-crew to railroad casualties was given by the Interstate Commerce Commission. No mention or segregation was made of the more prominent casualty-producing accidents. Beginning with 1911, under authority of the Act of May 6, 1910, the Interstate Commerce Commission has undertaken to make a field investigation itself of all of the more prominent accidents. The final cause which was found by the Commission for every accident investigated in 1911, 1912, 1913, 1914 and 1915 is tabulated above. A reading over of the causes there assigned shows that the Interstate Commerce Commission found that the overwhelming majority of the more prominent accidents during the last five years were caused by broken rails, failure of enginemen to obey signals, failure of operators properly to give signals, failure of dispatcher and other officers to obey operating rules and orders, negligence in allowing trains to remain on live tracks, and to defects in or accidents to the roadway. The investigations show that only nine of two hundred and sixty-seven accidents were assigned to causes which relate to and could have had a possible solution in "full-crew" legislation.

A detailed examination of the final causes which account for the 185,115 annual railroad casualties in the United States affords a conclusive measure of the remedial value of the "full-crew" laws. It shows that, after several careful analyses an impartial mind is compelled to sweep 97.6% of all these casualties off the board as due to causes irrelevant to the size of a train crew. A further analysis of the causes which account for the remaining 2.4% of casualties would be delving into the unknown. It is quite possible that many, and probable that some, of them could be prevented by "full-crew" legislation. It is impossible to do other than speculate upon these few remaining casualties, but it would seem that much over a majority of the remaining 2.4% are irrelevant.

CHAPTER V

The Effect of "Full-Crew" Legislation on Casualties in Different States

The analyses of railroad casualty statistics in this country from 1901 to 1916, which were given in the just previous chapter, are an attempt to separate out into groups the various final causes for those casualties. A review of these several causes affords a scientific basis by which to determine whether they are such as might find a remedy in "full-crew" legislation. But these analyses make it clear that a very negligible percentum of our railroad causalties only, bear even a conceivable relation to the size of the train-crew. There was no effort in that chapter to determine whether the passage of the twenty-two "full-crew" laws had as a matter of fact, decreased the number of casualties in this country. It was only attempted to determine the prevalence of those causes which have a conceivable remedy in an increase in the size of the train-crew.

There is another and scarcely less important test which may now be applied to calculate the effectiveness of the full-crew" laws as safety measures. That test is a study of the effect which the laws have actually had upon railroad casualties for the country as a whole and in these states which have passed train-crew statutes.

1—The Effect Upon the Country as a Whole

Twenty-two important states in this country have been for various numbers of years experimenting with train-crew legislation, and it would seem that the efficacy of those laws as safety measures should be reflected in the casualties for the country as a whole. That these laws have been adopted at different times makes it difficult to fix any particular year as a line of demarcation by which to compare railroad casualties in the United States prior with those subsequent to the enactment of the "full-crew" laws.

It is quite possible and valuable, however, to select out certain peculiarly "full-crew" periods, such as 1911 and 1913 and to observe the effect produced on the casualty list of the country by reason of the various state laws enacted in those years.

Adoption of "full-crew" laws. Before any intelligent judgment can be made of the effect of the twenty-two "full-crew" laws upon railroad casualties, a basis must be established for comparison of casualties prior, with those subsequent to the operation of the laws. The present laws were enacted in the order set forth in the chart below.

1842	Maine	1911	Maryland
1853	Connecticut.		Washington
1854	Texas		Wisconsin
1882	South Carolina	1913	Massachusetts
1895	North Dakota		New Jersey
1902	Ohio		New York
1903	Arizona		Nebraska
1907	Arkansas		Nevada
1909	Indiana		Oregon
1911	Pennsylvania	1914	Mississippi
	California	1915	West Virginia

A reading of the above tabulation will show that in 1911 and in 1913 only were there enough "full-crew" laws enacted to affect casualties in the country as a whole. In each of the other years there were one or two states only which took legislative action. An attempt will be made, therefore, to determine what reduction was effected upon the railroad casualties of the United States by the wave of "full-crew" laws in 1911 and that in 1913.

The effect of the laws of 1911. In 1911 there were seven train-crew statutes (Cal., Md., O., Pa., Tex., Wash., and Wis.) enacted or extended and the effect which they had, if any, in reducing the railroad casualties of this country should be registered in the accident reports of the Interstate Commerce Commission. The most expeditious method of grasping the effect of the laws enacted in 1911, is to make a segregated comparison of railroad causalties for 1910, 1911 and 1912. The following tabulation shows the number of casualties occurring during these years in each of the twenty classes:

TOTAL RAILROAD CASUALTIES IN THE U. S.

	1910.	1911.	1912.
1. Collisions	8194	7430	8327
2. Derailments	5154	5348	7441
3. Accidents to trains, cars or engines except collisions, derailments and boiler explosions and	(grouped with next)	(grouped with next)	(grouped with next)
4. Bursting of, or defects in, locomotive boilers or boiler attachments	1891	2102	2064
5. Accidents to roadway or bridges not causing derailments such as fires, floods, landslides, explosions.	(not segregated for 1910)	135	45
6. Coupling or uncoupling cars, exclusive of accidents with air or steam hose	3191	3175	3428
7. While doing other work about trains not in shops or engine houses or while attending switches	18397	18329	19653
8. Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structures above or at the side of track	1113	1763	1755
9. Falling from cars or engine	(not segregated for 1910)	7304	7560
10. Getting on or off cars or engine	(not segregated for 1910)	13051	13760
11. Other accidents on or around trains not here named	(not segregated for 1910)	4857	5741
12. Being struck or run over by engines or cars at stations or yards	(not segregated for 1910)	4945	5018
13. Being struck or run over by engines or cars at highway grade crossings	(not segregated for 1910)	3426	3538
14. Being struck or run over by engines or cars at other places	(not segregated for 1910)	5731	5804
15. Other causes	(not segregated for 1910)	3483	3126
16. Industrial accidents to employees while working on tracks and bridges		18666	20507
17. Industrial accidents to employees at stations, freight houses, engine houses, coaling stations, water stations		18662	22500
18. Industrial accidents in and around shops		35603	42892
19. Industrial accidents on boats and wharves		1251	
20. Industrial accidents at other places		5494	

TOTAL CASUALTIES

1910	86,178
1911	160,555
1912	180,123 (*a*)

In a general way it may be said that in 1912, which was the year just following the enactment or extension of seven "full-crew" laws, there was not, as anticipated by the proponents of those measures, a drop in the casualty list. There was, on the other hand a jump in that casualty list of 20,000 casualties in the one year. (*b*)

It is true that, although there was a marked rise in the total of casualties for the year, there were actual decreases in some of the classes of casualties and increases in other classes. It is siginficant, moreover, to note that the classes which showed decreases after the enactment of the law were classes generally that have no conceivable relation to the "full-crew" remedy and the classes which show increases were classes generally that have at least a conceivable relation.

The classes of casualties in which there were reductions immediately following the "full-crew" wave of 1911 were:

1. Bursting of, or defects in, locomotive boilers or boiler attachments.

2. Accidents to roadway or bridges not causing derailments such as fires, floods, landslides, explosions.

3. Coming in contact, while riding on cars, with overhead bridges, tunnels or any signal apparatus, or any fixed structures above or at the side of track.

4. Other causes.

5. Industrial accidents to employees while working on tracks and bridges.

6. Industrial accidents to employees at stations, freight houses, engine houses, coaling stations, water stations.

7. Industrial accidents in and around shops.

8. Industrial accidents on boats and wharves.

9. Industrial accidents at other places.

(*a*) Accident Bulletins of Interstate Commerce Commission.
(*b*) The increase in casualties was from a total of 160,555 in 1911 to 180,123 in 1912.

The above classes were the only classes of casualties which sustained reductions following the "full-crew" wave of 1911, and it is obvious at a glance that no increase in the size of the train-crew could possibly have affected these particular reductions.

Combined with accidents to trains, cars or engines except collisions, derailments, there were, on the other hand numerous increases in the classes of casualties known as:

1. Collisions.
2. Derailments.
3. Coupling or uncoupling cars.
4. While doing other work about trains not in shops or engine houses or while attending switches.
5. Falling from cars or engines.
6. Getting on or off cars or engines.
7. Other accidents on or around trains not here named.
8. Being struck or run over by engines or cars at stations or yards.
9. Being struck or run over by engines or cars at highway grade crossings.
10. Being struck or run over by engines or cars at other places.

The classes enumerated immediately above were the classes of casualties which showed increases just subsequent to the "full-crew" wave of 1911. It is very significant to note that every class of casualty which was found in the preceding chapter to have a conceivable relation to the size of the train-crew, shows, not a decline as expected, but an actual increase. If the "full-crew" legislation affords any preventive for any classes of casualties it would seem to afford such for those due to collisions, derailments, coupling or unocupling cars, getting on or off engine or cars, or other accidents on or around trains not otherwise classified. These are the only classes of casualties for which the "full-crew" laws offer even a theoretical remedy. But, instead of a decline, there was a marked jump in each of these classes. The collision casualties increased from 7430 in 1911 to 8327 in 1912, the derailment casualties from 5348 to 7441, the other accidents about trains not in shops or engine houses or while attending switches from 18,329 to 19,653, the getting on or off trains casualties from 13,051 to 13,760, and the other accidents on or around trains not otherwise classified from 4857 to 5741.

There would seem to be no ground, on the face of the overwhelming increases in these particular classes just subsequent to the enactment of the laws, for a conclusion that those laws have been practical and effective safety measures.

The significance of these increases in the only classes of casualties which a "full-crew" law could possibly relieve, moreover is not swallowed up by the corresponding increase in mileage and traffic. The collision casualties in 1912 increased to 10.7 percentum over those of 1911, the derailment casualties 39.1 percentum, the coupling or uncoupling casualties 7.9 percentum and those due to getting on or off cars 5.4 percentum. But the corresponding increase in mileage in 1912 over that in 1911 was only 1.3 percentum. There was an actual decrease of 68,339,916 (or 2 percentum) in the number of passengers carried one mile, and the increase in tons carried one mile was only 4 percentum. (*a*) There can be no doubt but that despite the "full-crew" wave of 1911, the casualties of the following year kept more than pace with the increase in mileage and traffic.

The effect of the laws of 1913. There were six states (Neb., Nev., N. J., N. Y., Ore. and Mass.) which passed "full-crew" laws in 1913, and after taking into consideration the increase in traffic and mileage of that year, the reduction in railroad casualties should be reflected in the total casualties of the country. As was the case in considering the effect of the wave of "full-crew" laws in 1911, it is again essential to know first the number of casualties by classes occurring in 1912, 1913 and 1914.

TOTAL RAILROAD CASUALTIES IN THE UNITED STATES.

	1912	1913	1914
1. Collisions	8,327	8,488	6,163
2. Derailments	7,441	6,868	5,879
3. Accidents to trains, cars, or engines except collisions, derailments, and boiler explosions and	(*)	(*)	(*)
4. Bursting of, or defects in, locomotive boilers or boiler attachments	2,064	1,490	851
5. Accidents to roadway or bridges not causing derailment such as fires, floods, landslides, explosions	45	26	None
6. Coupling or uncoupling cars, exclusive of accidents with air or steam hose	3,428	3,556	2,865
7. While doing other work about trains not in shops or engine houses or while attending switches	19,653	24,257	23,372
8. Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structures above or at side of track	1,755	2,125	1,770
9. Falling from cars or engines	7,560	8,563	8,039
10. Getting on or off cars or engines	13,760	15,329	14,561
11. Other accidents on or around trains not here named	5,741	7,468	7,579
12. Being struck or run over by engines or cars at station or yards	5,018	5,700	5,452
13. Being struck or run over by engines or cars at highway grade crossings	3,538	4,205	4,082
14. Being struck or run over by engines or cars at other places	5,804	5,877	5,406
15. Other causes	3,483	3,126	3,286
16. Industrial accidents to employees while working on tracks and bridges	..	25,531	27,095
17. Industrial accidents to employees at stations, freight houses, engine houses, coaling stations, water stations	..	25,671	26,196
18. Industrial accidents in and around shops	..	54,637	53,512
19. Industrial accidents on boats and wharves	..	1,828	1,810
20. Industrial accidents at other places	..	6,367	5,430

TOTAL CASUALTIES.

1912	180,123
1913	211,272
1914	202,964 (*a*)

There was a general drop in the railroad casualties of this country from 211,272 in 1913 to 202,964 in 1914. A segregation is made below of the particular classes which showed a decrease and those which showed an increase.

(*a*) These figures may be found in the Statistical Abstract of the United States for 1915, pages 272 and 276.

(*) Grouped with next.
(*a*) Accident Bulletin of Interstate Commerce Commission.

The following classes of casualties showed a decrease in 1914 just after the enactment of the several "full-crew" laws passed in 1913:

1. Collisions.
2. Derailments.
3. Bursting of, or defects in, locomotive boilers or boiler attachments.
4. Accidents to roadway or bridges not causing derailment such as fires, floods landslides and explosions.
5. Coupling or uncoupling cars.
6. While doing other work about trains not in shops or engine houses or while attending switches.
7. Coming in contact with overhead bridges, tunnels or any fixed structures above or at the side of the track.
8. Falling from cars or engines.
9. Getting on or off cars or engines.
10. Being struck or run over by engines or cars at stations or yards.
11. Being struck or run over by engines or cars at grade crossings.
12. Being struck or run over by engines or cars at other places.
13. Industrial accidents in or around shops.
14. Industrial accidents on boats and wharves; and industrial accidents at other places

It is obvious that there was a decrease in 1914 over 1913, in almost every class of casualties These decreases consequently show in collisions, derailments, coupling and uncoupling cars and getting on or off cars, the classes which were found to have a conceivable relation to the size of the train-crew. The collision casualties decreased 2325 in 1914 or 37 percentum over 1913, the derailment casualties 13 percentum, the coupling or uncoupling casualties 24 percentem and the getting on and off cars casualties 5 per centum.

It would seem that the decrease in collision and coupling casualties have some significance. The derailment decreases are only commensurate with the 1913 decreases over 1912, which was not a "full-crew" year and would not seem attributable therefore, to that legislation. The total mileage of railroads in the United States increased .9 in 1914 over that in 1913, the number of passengers carried one mile increased 1 percentum and the number of tons carried one mile actually decreased by 4 percentum or (13,078,861,898 tons).

There can be no doubt but that the great decrease in freight traffic accounted to some extent for the decrease in casualties in 1914, but unless a closer analysis by states shows otherwise, it may be assumed that the "full-crew" legislation contributed.

Conclusions.

It is difficult to state whether the "full-crew" movement in the various states has been effective in reducing the railroad casualties of the country. It is interesting, however, to review the trend of the casualty list just following the wave of "full-crew" laws enacted in 1911 and that in 1913. There was no decrease in the whole number of casualties in 1912, just after the passage of the law in seven states. There was, on the other hand, a decided increase. This increase, moreover came particularly within each of the four classes of casualties, for which the proponents contend their law offers the greatest remedy. The collision casualties increased from 7430 in 1911 to 8329 in 1912, the derailment casualties from 5348 to 7441, the coupling or uncoupling casualties from 3175 to 3428 and the getting on or off cars casualties from 13,051 to 13,760. These were real increases in casualties in the four classes on which the new law should have had the greatest effect and are not explained by any corresponding increases in mileage or traffic. There were, on the other hand, real decreases in 1914 for the country as a whole over the casualty list of 1913 especially in the collision and coupling or uncoupling casualties. In the face of these two observations of the effect of the "full-crew" waves of 1911 and 1913, it is not possible to make a scientific conclusion that the laws have any significant bearing on railroad casualties. It is not fair, however, from the standpoint of either the proponents or opponents to over-emphasize the importance of this particular general study. Much more definite and scientific conclusions may be drawn from the state studies which follow immediately.

2—Casualties in "Full-Crew" States Before and After the Law

An attempt is now being made to reduce railroad casualties in twenty-two states through the agency of the so-called "full-crew" laws. Some of those laws are palpably weak and admittedly ineffective and others are rigid and exacting. The most stringent laws and those most representative of the highest ideals of their proponents, perhaps, are the statutes in New Jersey, Pennsylvania, New York, Wisconsin, Indiana and California. It would seem therefore, that if "full-crew" legislation has merit as an effective preventive of casualties it would have had opportunity to manifest that safety quality in these six leading states. New Jersey has been experimenting with the law since 1913, Pennsylvania since 1911, New York since 1913, Wisconsin since 1911, Indiana since 1907 and California since 1911. A separate study has been made of railroad casualties in each of these states showing the causes for casualties, comparing the casualties occurring before, with those occurring subsequent to the enactment of the law and a conclusion of effectiveness of the law as a safety measure for each state.

New Jersey

The legislators of New Jersey enacted their first and present "full-crew" law at the annual session in 1913 and it became operative on May 1 of that same year. The law was enacted with the sole expressed purpose of reducing casualties on the railroads of New Jersey. It was one of the most stringent of the twenty-two "full-crew" laws and required the employment of 488 additional brakemen in New Jersey during the first full year of its operation. (*a*) It would seem that the effect of this law upon the New Jersey casualties should be clearly reflected in the casulaty list of that state. No effort has been spared, therefore, in making a scientific study and classification of New Jersey casualties occurring during the three-year period just previous and the three-year period subsequent to the enactment of the law.

Total number of casualties. The records of the Board of Public Utility Commissions of New Jersey show that there have been the following casualties in the state during the last six years.

RAILROAD CASUALTIES IN NEW JERSEY.

	Killed.	Injured.	Total casualties.
1910.....	344	536	880
1911.....	372	902	1274
1912.....	355	811	1166
1913.....	367	652	1019
1914.....	333	544	877
1915.....	302	572	874
1916.....	435	1088	1523

It is apparent that there has been a gradual decline in railroad casualties in New Jersey since the enactment of the "full-crew" law. But that the law is at least not the only factor contributing to that reduction is made manifest, since the decline began, and continued through two years previous to the enactment of the law. There has been a steady decline in the casualty list each year since 1911 until 1916.

Before any final estimate can be made of the efficacy of the law it is necessary to prepare an analytical tabulation of the causes of the New Jersey casualties.

(*a*) Proceedings of Trenton "full-crew" hearing typed by Miss Frances Smith (1915).

There are two valuable and quite distinct methods by which to arrive at a conclusion on the efficacy of the New Jersey "full-crew" law. One method involves an analysis of the causes for New Jersey casualties during the year just prior to the enactment of the law. The object of that study would be to determine whether the normal causes for railroad casualties in the state are such as have a conceivable solution in "full-crew" legislation. The other method involves a comparison by sub-groups of casualties just before the law with those just subsequent. The object of this study is to determine whether the general decreases obtaining since the law, are conceivably due to that law.

METHOD OF ELIMINATION OF IRRELEVANT CAUSES.

It is not possible from any list of casualties obtaining in New Jersey since the passage of the law (e. g. during 1913, 1914, 1915 and 1916) to tell whether that law has been effective or not because the casualties which were prevented by the law, if any, would not show in the list. The most accurate method, therefore, to judge the merits of the law as a safety expedient is to study the causes which ordinarily make for casualties in New Jersey. A study of each cause and sub-cause for New Jersey railroad casualties throughout the whole year of 1912 (the year just previous to the enactment of the "full-crew" law) should enable any impartial analysist to judge whether these causes were such as might have had a conceivable preventative in a "full-crew" law. In this hope an examination has been made of the cause for each of the original eleven hundred and sixty-six (1166) casualties occurring in New Jersey during that year. (*a*)

In order the more effectively to analyze the causes for New Jersey casualties, it makes for a clearer picture, after dividing those 1166 casualties into nine different general classes and thirty-five sub-classes, (*b*) to pile all of those casualties upon one table. After an examination the irrelevant groups may be brushed from the table one by one. By a continued process of elimination, first of general groups which are palpably irrelevant, second of sub-groups within the remaining general groups which are irrelevant and third of individual cases within the remaining sub-groups which are irrelevant, it is quite possible to eliminate at least all casualties which are known to have no conceivable preventative in "full-crew" legislation.

SEGREGATED CLASSES OF NEW JERSEY CASUALTIES.

I. Collisions.

1. Switching.
2. Personal carelessness.
3. Others.

II. Derailments.

1. Defect in equipment.
2. Switching.
3. Personal carelessnesss.
4. Others.

III. Coupling or uncoupling cars.

1. Adjusting coupler with foot.
2. Uncoupling without using lever.
3. Uncoupling moving cars, losing footing.
4. Caught between cars.
5. Others.

IV. Getting on or off trains.

1. Passengers getting on moving trains.
2. Passengers getting off moving trains.
3. Trainmen getting on or off engine or cars.
4. Slipping on steps.
5. Others.

V. Trespassing on right-of-way.

1. Walking on tracks.
2. Crossing tracks.
3. Stealing ride on train.
4. Others.

VI. Struck by locomotive or cars.

1. Working on tracks.
2. Care and operation of trains.
3. Others.

VII. Crossing track at highway.

1. Pedestrians struck.
2. Vehicles struck.
3. Others.

VIII. At bridges and tunnels.

1. Overhead obstruction.
2. Side obstruction.
3. Others.

IX. Other causes.

1. Falling from cars or engine.
2. Throwing switches.
3. Defective equipment.
4. Other than in connection with the operation of trains.
5. Others.

At bridges and tunnels. One of the nine general classes of New Jersey casualties is that group occurring at bridges and tunnels. This group caused 15 of the 1166 casualties occurring in 1912. But an examination of the sub-causes (*a*) for this general group of casualties makes it evident that these casualties were all due to overhead obstruction, side obstruction and others, and were not such as could conceivably have been prevented through a "full-crew" law. It is necessary, therefore, to brush off the table at least 15 of the 1166 (or 1.2% of all) casualties as irrelevant.

Struck by locomotives or cars. A second one of the nine general classes of New Jersey casualties is that group due to a person being struck by locomotives or cars. This group caused 137 of the 1166 casualties occurring in 1912. But an examination of the sub-causes (*b*) for the casualties within this group makes it quite clear that the casualties within this group were due to working on tracks, care and operation of trains, others, and are not such as might conceivably have been prevented by a "full-crew" law. It is necessary therefore, to brush off the table at least 152 (e. g. 137 plus the 15 already eliminated) from the total of 1166 or 13% of all casualties as having no conceivable preventative in "full-crew" legislation.

Trespassing on right-of-way. A third one of the nine general classes of New Jersey casualties is that group known as casualties due to trespassing on right-of-way. This group contained 267 of the 1166 casualties occurring in 1912. But it seems quite far-fetched to assume that additional brakemen riding on the train might conceivably prevent casualties to trespassers. A study of the sub-causes (*c*) for this group makes it quite apparent that this whole general class is palpably irrelevant.

It is necessary, therefore to eliminate at least 419 (e. g. 267 plus the 152 already eliminated) from 1166 or 35.8% of all

(*a*) Investigator Mr. John Rees and an assistant made a personal study of each casualty sheet for 1912 and 1913 from the Trenton records.

(*b*) The following table gives a classification of all casualties occurring in New Jersey during 1912. The nine general classes were adopted from the grouping made by the Public Utility Commission and the thirty-five sub-groups were made after a personal examination of the cause for each of the 1166 casualties.

(*a*) 1. Overhead obstruction, 12.
2. Side obstruction, 2.
3. Others, 1.

(*b*) 1. Working on tracks, 57.
2. Care and operation of trains, 28.
3. Others, 52.

(*c*) 1. Walking on tracks, 110.
2. Crossing tracks, 38.
3. Stealing ride on train, 42.
4. Others, 77.

casualties as having no conceivable preventative in a "full-crew" law.

Crossing tracks. A fourth one of the nine classes of New Jersey casualties is that group due to crossing tracks. This group caused 148 of the 1166 casualties occurring in 1912. But a study of the sub-causes for casualties within this group shows that they were due to pedestrians being struck, vehicles being struck and others (*) and not to such causes as have any relation to the size of the train-crew. It is necessary, therefore, to eliminate at least 567 (e. g. 148 plus the 419 already eliminated) of the 1166 or 48.7% of all casualties as having no conceivable preventative in a "full-crew" law.

Collisions. A fifth one of the nine general classes of New Jersey casualties is that group known as collisions. This group caused 105 of the 1166 casualties occurring in 1912. A study of each of these 105 casualties shows that they may all be grouped under one or the other of the following sub-causes: switching, personal carelessness and others.

A tabulation has been made below of the cause for each individual casualty occurring within each of the just above enumerated sub-causes. But an examination of the cause for each of the thirty-seven due to personal carelessness (*a*) each of the twenty occasioned while switching (*b*) and each of the forty-eight other (*c*) collision casualties fails to reveal a single collision casualty which might reasonably be expected to have a preventative in a "full-crew" law. It is necessary, therefore. to brush off the table at least 672 (e. g. 105 plus the 567 already eliminated) of the 1166 or 57.6% of all casualties as irrelevant.

Derailments. A sixth one of the nine general classes of New Jersey casualties is that group known as derailments. This group caused sixteen of the 1166 casualties occurring during 1912. A study of the derailment casualties shows that they may be classified into the following sub-causes: Defect in equipment, defect in road, malicious obstruction of tracks, switching in yards, personal carelessness and others. The cause of each derailment is grouped below under its respective sub-group. A reading over of these individual causes shows that none of the four casualties due to personal carelessness (*d*) none of the five occurring while switching (*e*) and none of the other casualties (*f*) bear any relation to the size of the train-crew. It is necessary, therefore, to brush off the table at least 688 (e. g. 16 plus the 672 already eliminated) from the 1166 or 59% of all casualties as having no conceivable preventative in a "full-crew" law.

(*) The 148 casualties within this group may be classified under the following sub-causes:
1. Pedestrians struck, 38.
2. Vehicles struck, 94.
3. Others, 16.

(*a*)

Personal Carelessness

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	..	1	Erie	1.—One injured. As engine 651 was pulling out of Swift's siding, Newark, with four cars, an automobile ran directly in front of the engine. The footboard on front of engine and wheels on right side of auto collided, causing slight damage to spokes and steps of auto. Regular signs on each side of the track at this point. Engine bell was ringing and engine moving about two miles per hour. Man injured on account of jumping out of auto.
1912	Jan.	..	10	Pa.	2.—While train was pulling into Park Place Terminal at Newark, the motorman claimed the brake did not hold the train and it collided with the butting block at the end of the track Ten passengers slightly injured, but physician's examination did not show injury. Motorman did not make sufficiently heavy application of brakes.
	Mar.	..	1	Erie	3.—One injured. Brakeman had instructions to shove cars in track 83 ten car lengths; instead, he gave a forcible signal to the engineer. There was an opening between cars standing on east and west end of track, and when cars on east end collided with those on west end, drawheads on engine 2013 and Erie car 49,783 broke, and force of the collision crushed Anderson, who was standing on the footboard of the engine.
	June	1	16	N. Y. S. & W.	4.—One killed; 16 injured. Extra 104 disregarded train 918, collided head-on with that train. Macopin Lake Junction, N. J.
	Oct.	..	6	C. R. R. of N. J.	5.—Six injured. Train No. 710, coming into the shed at Jersey City, struck a coach standing on track 10.
	Nov.	..	2	Pa. R. R.	6.—Two injured. Flagman was dropping two cars from upper to lower end of yard. He lost control of the cars, and they struck cabin car of extra 908, pushing it into the end of bumper and end of No. 1 freight train. One man had his skull fractured, the other right leg bruised. Trenton Yard, N. J.

(*b*)

Switching

Year	Month	Killed	Injured	Road	REMARKS.
		..	1	Pa.	1.—While drilling cars in South Amboy yard, a draft side-swiped engine 715, catching left arm of fireman, who was leaning out of cab window. Arm fractured.
1912	Mar.	2	10	Pa.	2.—Two killed, ten injured. Passenger train No. 398 ran through open switch and collided with train A-15, which was standing on the siding, switch being left open by flagman of train A-15.
	Sept.	1	6	C. R. R. of N. J.	3.—One killed, 6 injured. Train 341 was switching at Lakehurst, and backed in on running track to clear No. 312. Switch was left open, and No. 312 collided head-on with No. 341.

(*c*)

Others

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	1	4	N. Y. S. & W.	1.—One killed, four injured. Train 962, engine 105, collided with pusher engine, extra 111, east end of passing siding. Stockholm Station.
	Dec.	..	3	Erie	2.—Three injured. Train 420, while dropping coach 1851 down main track, car struck C. P. B. 775, knocking one pair of trucks off center, and slightly injuring three passengers. Crew claimed that brake failed, but inspection indicated that same was in good condition. Forest Hill, N. J.
	Dec.	..	3	W. J.	3.—Three injured. Trolley car, containing three passengers, struck by tank of engine, Traction Company obligated to bring cars to full stop, and have conductor flag cars across siding, but car was run tooo close to crossing and on account of rails being wet, the brakes failed to hold car, and it went onto siding in front of engine and was struck. Engine moving six or eight miles an hour. Clayville Siding, Main Road Crossing, So. Vineland, N. J., where siding is crossed by track of Milleville Traction Co.
	Dec.	..	1	C. R. R. of N. J.	4.—One injured. Engine 375 was backing on track 10, from Communipaw to the coal chutes; P. and R. engine 569 back west from Jersey City yard on No. 8 track crossed over and struck engine 375 before it cleared. Shop laborer, acting as hostler's helper, who was on tank of engine 375 was struck and injured.
	Dec.	..	8	Erie	5.—Eight injured. Train 601 struck a trolley car at Carlstadt crossing, throwing same from track sideways. Accident claimed to be due to crew of trolley car closing derail and attempting to cross track ahead oftrain. Train was running about ten miles per hour. Engineer did not discover trolley car on track until within about 50 feet away. Whistle and bell on engine sounded at proper point. Crossing gates are provided at this crossing and are protected between the hours of 7 A. M. and 12 midnight. Accident occurred at 12:23 A. M.

1912	Jan.	..	2	D. L. & W.	6.—Two injured. Following extra 303 west close stopped at signal after starting. Extra 303 stopped. Water glass broke filling cab of engine 991 with steam. Engineman did not see flagman and ran in rear of 303. One fireman injured; one conductor injured.
	Feb.	..	1	P. & R.	7.—One injured. Coal handler was caught when a string of cars bumped into an empty car at chutes 23 and 25, Port Reading Yards, N. J. Two fractures of right thigh.
	Feb.	..	1	C. R. R.	8.—One injured. While engine 420 was shoving cabooses in on track 8, No. 91166 was shoved into the side of 91222, and a driller, who was on the ground, was struck and injured.
	Mar.	..	3	N. Y. S. & W.	9.—Three injured. Train 979 collided with Drill Engine 128 in Little Ferry Junction Yard, slightly injuring conductor and two other employees.
	Mar.	..	1	C. R. R.	10.—One injured. Engine 70 shoved 17 cars in on track 23, and struck engine 423, injuring fireman.
	Mar.	..	1	C. R. R. of N. J.	11.—One injured. Drill engine collided with cars standing on frog of track 31 at West End Ave. Yard, Elizabethport. Fireman injured.
	May	..	1	Pa.	12.—One injured. Brakeman was riding on the front step of engine 2683, which collided with engine 398 at Waverly yard. He sustained injuries in consequence of jumping from the engine and falling.
	July	..	1	Pa.	13.—One injured. Engine No. 423 collided with engine No. 2043 at the Meadows inspection trip, resulting in Fireman Carr being injured, in consequence of jumping from the engine.
	July	..	3	N. Y. S. & W.	14.—Three injured. Extra 96, west, collided with the side of extra 1873. Three trainmen injured.
	July	..	2	W. J. & Seashore	15.—Two injured. Train No. 1340, north, struck trolley car, injuring motorman and one passenger. Camden, N. J.
	Aug.	..	2	C. R. R. of N. J.	16.—Two injured. While extra 414 was backing on to the "Y" track at East Rahway, that train struck some coaches which had been left standing on the track, injuring two trainmen.
	Sept.	..	1	C. R. R. of N. J.	17.—One injured. Engine 100, with three cars, was pulling from Jersey City passenger yard to train shed to place one car on train 651. Cars broke loose after passing Tower No. 1 and collided with head-end of cars in No. 651. One employee injured.
	Oct.	..	7	N. Y. S. & W.	18.—Head-on collision between passenger train No. 106 and L. & N. E. extra 24 west, with engine 17 coupled in. Extra 24 west occupied main line about one-half mile west of Hainesburg, N. J., on the time of the passenger train, without protection.
	Nov.	..	2	D. L. & W.	19.—Two injured. Light engine 141 moving east on westward main track, collided with engine 356, running from east end of yard, Port Morris, N. J. Two trainmen injured.

(*d*) *Personal Carelessness*

Year	Month	Killed	Injured	Road	REMARKS.
1912	Mar.	..	1	C. R. R.	1.—One injured. While assisting with the re-railing of a car, conductor attempted to change the position of a block which he had put under the truck after having given the engineer signal to back up and had his hand caught and badly cut.
	Sept.	..	3	Pa.	2.—Three injured. Passenger train 333 ran in on Langen's siding. Engine and two passenger coaches striking three freight cars standing on the siding, on account of switch having been left open by freight crew. Three people received shocks.

(*e*) *Switching in Yards*

Year	Month	Killed	Injured	Road	REMARKS.
1912	Apr.	..	1	Erie	1.—One injured. Light engine left track at derail because brakeman failed to take derail off the track after adjusting switch to let engine in the caboose switch. Brakeman pinned between the step and the ground.
	Apr.	..	1	W. S.	2.—One injured. Engineman had right leg broken when car on which he was riding was derailed, on account of being shoved through switch which was set wrong and he was thrown, striking on rail.
	July	..	1	D. L. & W.	3.—One injured. Engine derailed at derail switch, upsetting car, throwing trainman from the car, bruising heels and back.
	Sept.	..	1	Pa.	4.—One injured. While engine 511 was pulling ten Adams' express cars west, on No. 9 track, in passing over switch leading from No. 9 track to ferry coal wharf, seventh car was derailed. Porter jumped from car, sustaining internal injuries.
	Nov.	..	1	D. L. & W.	5.—One injured. Rear trucks took part of switch leading to east end of yard, derailing the rear truck. Flagman fell from car, fracturing leg. Extra 154, Secaucus, N. J.

(*f*) *Others*

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	..	3	N. Y. S. & W.	1.—Three injured. Extra 128 and 90, freight (engine 90 coupled in) both engines and five cars left rails at Pompton Lake while running about ten miles per hour. Three employees injured.
1912	Mar.	..	1	Pa.	2.—One injured. While extra train 2239 was taking the crossing movable point frogs at W. & P. Branch, the engine was derailed, causing the three following cars to leave the track. Cause unknown. Freight firemen, both legs broken and internally injured.
	June	..	1	L. V.	3.—One injured. Train 795, caboose and one car derailed. Conductor slightly injured.
	July	..	1	Erie	4.—One injured. Extra engine 602, while pushing five loads ahead of engine, derailed four cars and the engine. Conductor, who was riding cars, jumped off, and was injured.
	Nov.	..	1	Erie	5.—One injured. Brakeman was burned about the face, caused by escaping gas from brake in gas main under track where car had been derailed. Jersey City.

Coupling and uncoupling. A seventh one of nine general classes of New Jersey casualties is that group occurring while coupling or uncoupling cars. This group caused 29 of the 1166 casualties occurring during 1912.

These twenty-nine casualties are further sub-divided into four classes, namely those due to adjusting coupler with foot, those due to uncoupling without using lever, getting caught between cars and others. It is not probable that a larger train-crew would have prevented any number of casualties due to coupling by foot rather than by hand. The four casualties that actually did occur from this cause (*a*) had no relation. None of the seven uncoupling casualties due to uncoupling without using lever are relevant (*b*) to the size of train-crew. None of the ten other casualties are relevant (*c*) to the size of a train-crew.

It is possible that casualty No. 3 of the group Caught Between Cars (*d*) may have been due to a lack of help.

But twenty-eight of the twenty-nine casualties within this group have no reasonable relation. It is necessary, therefore, to eliminate at least 716 (e. g. 28 plus the 688 already eliminated) from the 1166 or 61.4% of all casualties.

Getting on or off trains. An eighth one of the nine general classes of New Jersey casualties is that group of casualties occurring while persons are getting on or off trains. This group caused 101 of the 1166 casualties occurring during 1912. A study of the causes for these casualties shows that they may be classified under some

one of the following sub-classes—those occurring to passengers while getting on moving trains, those to passengers while getting off moving trains, trainmen getting on or off engine or cars, persons slipping on steps and others. The individual cause for each casualty occurring within their sub-classes is recorded below. But of the 16 casualties to passengers getting on moving trains (*e*) none would have been prevented by a larger train-crew except possibly No. 9. It does not follow from this statement that these are not preventable casualties. Obviously, most of them would be prevented by having doors which close automatically.

(*a*) *Adjusting Coupler with Foot*

Year	Month	Killed	Injured	Road	REMARKS.
1912	Feb.	..	1	C. R. R.	1.—One injured. Brakeman attempted to shove drawhead over with his foot. Foot slipped off the drawhead and when the drawhead of tank of engine and drawhead of car came together his foot was cut off at the ankle.
	June	..	1	W. S.	2.—One injured. In coupling cars conductor's foot slipped off end of tie, spraining it.
	June	..	1	Erie	3.—One injured. Trainman making coupling, and seeing that couplers were not going to match, attempted to adjust them by pushing one over with his foot. His foot slipped in between couplers and toes were crushed. Extra freight 1017, Little Falls, N. J.
	Aug.	..	1	C. R. R.	4.—One injured. The conductor had his foot crushed while closing the knuckle on a car.

(*b*) *Uncoupling Without Using Lever*

Year	Month	Killed	Injured	Road	REMARKS.
1912	Jan.	..	1	C. R. R.	1.—One injured. Brakeman had his finger caught in coupler while pulling pin on coupler of drill engine.
	Feb.	..	1	Pa.	2.—One injured. While adjusting knuckle on car, brakeman had other cars drift down against his hand, severely injuring his hand.
	Feb.	..	1	N. Y. S. & W.	3.—One injured. Man had hand slightly injured in attempting to couple engine to a coach.
	Apr.	..	1	C. R. R.	4.—One injured. While drilling train 176, brakeman, in opening knuckle on car, caught his left hand, mashing thumb and one finger.
	June	..	1	L. V.	5.—One injured. Trainman crushed fingers between couplings.
	June	..	1	Erie	6.—One injured. Trainmen, while in the act of adjusting emergency knuckle, caught right hand.
	July	..	1	N. Y. S. & W.	7.—One injured. Brakeman, uncoupling caboose from a coach, caught and injured fingers between cars. Beaver Lake.

(*c*) *Others*

Year	Month	Killed	Injured	Road	REMARKS.
1912	Jan.	..	1	N. Y. S. & W.	1.—One injured. While drilling in yard coupling on cars failed to make, cars running against Erie 50636, under which repair man was working.
	July	..	1	D. L. & W	2.—One injured. Man fell from car while releasing brake, bruising leg, wrist and back.
	Aug.	..	1	Pa.	3.—One injured. While uncoupling engine from train 70, the uncoupling lever failed to work, and when the engine moved this man was dragged about 35 feet, sustaining injuries to right leg and thigh.
	Aug.	..	1	Erie	4.—One injured. Conductor stood on footboard of the tank of engine and stepped off, getting right foot on the ground and left foot on the rail, but did not remove left foot from rail in time and same was caught between footboard and the rail. This occurred as the engine was backing in slowly to couple onto four cars.
	Sept.	..	1	P. & R.	5.—One injured. While brakeman was about to raise cutting lever of car to uncouple cars, he struck his right elbow against the edge of end sill, bruising his arm. Blood poison developed.
	Sept.	..	1	Erie	6.—One injured. Brakeman, while riding footboard of a car, placed his one foot on the running board and had his back to the train to which the car that he was riding on were to be coupled, when the shock of the cars coming together caused his left leg to buckle, resulting in a fracture. Foot amputated. Watsessing Junction, N. J.
	Oct.	..	1	N. Y. S. & W.	7.—One injured. Conductor on engine 93 injured while uncoupling cars. Cut lever ran through right hand.
	Oct.	..	1	P. & R.	8.—One injured. Car repairer, in moving a car coupler from scrap pile, placed it too close to the track and switch engine 1640 turned the coupler over on his foot, bruising it.
	Oct.	..	1	C. R. R. of N. J.	9.—One injured. Brakeman on train 345 slightly injured at Matawan by drawhead breaking off his car and causing him to fall from the top of the car to the ground.
	Oct.	..	1	D. L. & W.	10.—One injured. Switchman, in attempting to make a cut of cars, stumbled over the switch rod and was struck by cars and injured about the head. Hoboken, N. J.

(*d*) *Caught Between Cars*

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	..	1	N. Y. S. & W.	1.—One injured. Brakeman, while uncoupling cars, caught between cars and dragged under Erie 25037. Sparta, N. J.
1912	Jan.	1		Pa.	2.—One killed. Car inspector was adjusting coupling between two empty cars when a loaded car struck the same, knocking him down and running over his body.
	Jan.	..	1	C. R. R.	3.—One injured. Brakeman was coupling cars when three cars shoved in on that track, struck the cars on which he was working.
	Feb.	..	1	L. V.	4.—One injured. While making coupling, arm was caught between cars, crushing left forearm. Perth Amboy, N. J.
	July	..	1	W. S.	5.—One injured. Brakeman was in between engine and caboose to fix the knuckle, was caught when they came together.
	July	..	1	N. Y. S. & W.	6.—One injured. While uncoupling cars, brakeman was caught and rolled between cars and platform.
	Sept.	..	1	C. R. R. of N. J.	7.—One injured. Brakeman was standing between cars, attempting to couple steam shovel to a car. The rear truck of steam shovel caught his foot and squeezed it. Engine 293, Elizabethport.

(*e*) *Passengers Getting on Moving Trains*

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	..	1	Pa.	1.—One injured. Man attempted to get train 274 after same had started from station. Left arm broken. Roebling Station.
1912	Jan.	..	2	Erie	2.—Two passengers injured attempting to board moving trains.
	Jan.	..	1	Erie	3.—One injured. Attempting to get on coach while train was in motion.
	Mar.	..	1	D. L. & W.	4.—One injured. Passenger attempted to board train after same had started. Lost hold and fell between cars. Right leg cut off.
	Apr.	1		West Shore	5.—One killed. While attempting to board a moving train, trespasser was struck by a bridge and knocked off.
	June	1		Pa.	6.—One killed. After signal had been given and train was in motion, passenger came upstairs and attempted to board the head of fifth coach of west-bound passenger train 73, but failed to pull himself up the steps in time, being struck by the fence at west end of station and knocked under train. Head was decapitated.
	June	..	1	Erie	7.—One injured. A man, intending to get on N. Y. S. & W. train 919, cut through Fuller Yard and over the interlocking switches at the head end of train shed, and attempted to board train while it was in motion. Because of package he was carrying he could not get his feet on the steps, which caused him to fall. Wheel of car went over his right leg.
	July	1		C. R. R. of N. J.	8.—After train 704 had started from Ferry St. Station, Newark, an intending passenger attempted to board same, but fell and was struck by Congress St. Bridge. Fatally injured.
	July	..	1	W. S.	9.—One injured. Train started as woman was in the act of boarding it. Back and right wrist sprained.
	July	..	1	W. J. & Seashore	10.—One injured. Man attempted to board local electric train 1300, at Vineland, N. J., after train had started. Fell and was slightly injured.
	July	..	1	C. R. R. of N. J.	11.—One injured. Man attempted to board train 319, at Allenhurst, while train was in motion, and fell under the wheels. Both legs and one arm cut off.
	Aug.	..	1	W. S.	12.—One injured. In attempting to board a moving train a man fell, suffering slight wound. Weehawken, N. J.
	Aug.	..	1	P. & R.	13.—One injured. Man attempted to board rear end of passenger train 652, after train started from Belle Mead Station, and fell.
	Sept.	..	1	C. R. R. of N. J.	14.—One injured. After train 992 had left Elizabethport Station, passenger attempted to board the same and was thrown to the ground and injured.
	Nov.	..	1	Erie	15.—One injured. Man, attempting to board passenger train which was in motion, fell and had his leg cut off. Englewood, N. J.

All of the twenty-three casualties to passengers getting off moving trains (*a*) excepting possibly No. 3, were due to personal foolhardiness. Little need be said of the casualties to trainmen getting on or off locomotives or cars as they would ordinarily not assist each other on or off the trains. (*b*) There were ten casualties, of minor significance, to persons slipping on the steps of trains while in the act of boarding or alighting from the trains. (*c*) It is possible that an additional man on the trains might have prevented every one except No. 4. There is little doubt but that raised platforms would have made everyone of these nine casualties impossible. These nine casualties are such as might have had a remedy in a larger train-crew. There were twenty casualties in this group due to causes other (*d*) than the four sub-classes already considered. It is possible that casualties numbered 6, 10 and 12 would have been avoided by a larger train-crew. At the same time it is possible that these casualties occurred on trains which would not be affected by the present "full-crew" law.

From these considerations it can be maintained that all except 14 of the actual casualties would have occurred in just the same way with additional brakemen on the trains unless perhaps the presence of the additional man would have produced a favorable pyschological effect upon the people involved.

It is necessary, therefore to eliminate at least 803 (e. g. 87 of the 101 casualties in this group plus the 716 already eliminated) from the 1166 or 68.9% of all causalties as having no conceivable preventative in a "full-crew" law.

(*a*) *Passengers Getting Off Moving Trains*

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	..	1	C. R. R. of N. J.	1.—One injured. As train 291 was backing up to yard after discharging its passengers, at Elizabeth Station, a passenger jumped off and fell, and the wheels passed over his right foot, cutting it off above the ankle.
	Dec.	..	1	Erie	2.—One injured. Woman passenger claimed that another woman, in getting on train obstructed her way from coming down the steps, and she jumped off backwards while train was in motion. Back and head cut slightly.
	Jan.	..	1	N. Y. C. & H.	3.—One injured. Train started as she was alighting, causing her to fall. Sprained ankle.
	Feb.	..	3	E. R. R. of N. J.	4.—Three injured. Three persons jumped from train 153 after it had started from Elizabeth Station, February 18th, and were injured.
	Mar.	..	1	C. R. R. of N. J.	5.—After train 452 had left Spring St. Station, Elizabeth, passenger jumped off and was injured.
	Mar.	..	1	Erie	6.—One injured. A passenger, on train 71, jumped from train while in motion. Bruised about the face and hands.
	Apr.	1		D. L. & W.	7.—One killed. Passenger alighted from train before the same stopped at station. Fell under the train and was killed. Orange Station.
	Apr.	..	1	C. R. R. of N. J.	8.—One injured. As train 339 was passing Elizabethport Station a passenger jumped from the rear platform, fell, and was injured about the face.
	Apr.	..	1	Erie	9.—One injured. Boy jumped off of passenger train 61 before train had come to a stop. He fell and, in doing so, his left leg went under car and was run over below the knee. Inspection showed everything O. K.
	May	..	1	P. & R.	10.—Passenger alighted from train 627 before it came to a stop at Trenton Junction Station. Fell on station platform, slightly injured.
1912	June	..	1	C. R. R. of N. J.	11.—One injured. After train 129 had left Roselle Station, a passenger jumped off and was injured.
	July	..	1	C. R. R. of N. J.	12.—One injured. While train 449 was passing Elizabethport Station, man jumped off and had top of head cut.
	Aug.	..	1	Erie	13.—One injured. A woman jumped off as train was starting. Slightly injured. Jersey City train shed.

Sept.	..	1	W. S.	14.—One injured. Man jumped from northbound passenger train No. 89 while it was moving, and fell, sustaining slight injuries.
Sept.	..	1	C. R. R. of N. J.	15.—One injured. While train 358 was coming into the train shed at Jersey City a passenger stepped off before the train stopped, falling to the platform and was injured.
Sept.	..	1	Pa.	16.—One injured. As train 131 was leaving Monmouth Junction Station this passenger walked down the steps and off the train while the same was in motion, thinking she was at Trenton, N. J. She had been sleeping and when train had stopped, brakeman had announced the stops of the train, stating Trenton, and passenger thinking she was at Trenton walked off the train while in motion. Left arm fractured.
Oct.	..	1	Pa.	17.—One injured. Man stepped from passenger train 627 after it had started from Elizabeth. Fell and was injured.
Oct.	..	1	D. L. & W.	18.—One injured. Man found by a gateman after passage of train with arm cut off and head injured. Supposed to have been a passenger on train 351, west, who jumped off before that train had stopped at East Orange, N. J.
Oct.	..	1	C. R. R. of N. J.	19.—One injured. After train 627 had left Elizabeth this passenger jumped off, fell and was injured.
Nov.	..	2	C. R. R. of N. J.	20.—Two injured. After train 795 had started from Arlington Ave. Station a woman and her daughter jumped from the train, fell and were injured. Jersey City, N. J.

(*b*) *Trainmen Getting On or Off Engine or Cars*

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	..	1	Pa.	1.—One injured. While engine 1062 was drilling cars, and in going over Newark Bay Bridge, freight brakeman stepped off cabin car and fell in bay, striking the timbers on his way down, injuring his spine and rectum.
	Dec.	..	1	D. L. & W.	2.—One injured. Track foreman jumped from train and fell with hand across the rail; hand run over and crushed; scalp wound.
	Dec.	..	1	P. & R.	3.—One injured. While freight 698 was passing Ewing, engineman went back in tank to inspect the valve. In returning to cab he fell from the engine and in attempting to board train struck left leg against switch, fracturing left leg and sustaining slight bruises on right side of face.
	Dec.	..	1	W. S.	4.—One injured. Yard brakeman slipped and fell while attempting to get on foot board of engine. Face cut and scratched. Weehawken.
	Dec.	..	1	D. L. & W.	5.—One injured. Engineman stepped off side of running board of engine and struck switch stand, fracturing bone of instep. Port Morris, N. J.
	Dec.	..	1	N. Y. S. & W.	6.—One injured. Fireman at West end attempted to board train while in motion, fell and was injured.
1912	Jan.	..	1	C. R. R. of N. J.	7.—One injured. Brakeman injured attempting to get on moving car and falling.
	Jan.	..	1	W. S.	8.—One injured. Attempting to board moving engine, slipped and fell.
	Jan.	..	1	L. V.	9.—One injured. One trainman fell in boarding a car.
	Feb.	1		W. J. & S.	10.—One killed. Brakeman, while attempting to get on car, fell under train.
	Feb.	..	1	D. L. & W.	11.—One injured. Trainman, coming down from car, had left foot caught and crushed between cars, below the ankle. Bloomfield, N. J.
	Feb.	..	1	N. Y. S. & W.	12.—One injured. Laborer, in alighting from box car, turned his ankle, same resulting in a fracture.
	Mar.	..	1	W. S.	13.—One injured. Brakeman, while getting on tank step of engine 478, fell and had left leg broken.
	Mar.	..	1	Pa.	14.—One injured. Brakeman, stepping down from car in motion, stepped on a cover of an air box, throwing him to the ground, dislocating his arm.
	Apr.	..	1	P. & R.	15.—One injured. Brakeman, getting off car in Fort Reading yard, was caught between car and upright post, fracturing his left shoulder blade.
	Apr.	..	1	C. R. R. of N. J.	16.—One injured. While putting train 141 away at Matawan, brakeman jumped off car to throw switch and sprained his ankle.
	May	..	1	D. L. & W.	17.—One injured. Engine wiper, trying to climb on engine, fell, and had two toes crushed.
	June	..	1	Pa.	18.—One injured. While this brakeman was attempting to board train at Metuchen, N. J., while the same was in motion, he turned on his ankle, spraining same.
	June	..	1	Pa.	19.—One injured. While attempting to board cabin car of his train while same was in motion, his foot struck the step of the cabin car, causing him to strike his shin against the same.
	June	..	1	W. S.	20.—One injured. Brakeman, alighting from moving train, stepped in a small hole, wrenching his knee.
	June	..	1	C. R. R. of N. J.	21.—One injured. Brakeman, while drill extra 142 was drilling cars, stepped off one of the cars into a water drain running under the track and injured his leg.
	July	..	1	P. & R.	22.—One killed. Brakeman jumped off draft of empty cars, jumped to the ground and fell. In attempting to get up, was struck by car step and fell under the wheels of the car, death resulting from the injuries.
	July	..	1	Erie	23.—One injured. Yard clerk, attempting to get on left front step of engine, caught his right foot in frog. As he held on to the handle with his hand, was dragged for a distance of five feet before engine stopped. Right leg bruised and gashed in groin.
	Sept.	..	1	W. J. & S.	24.—One injured. Brakeman, while getting on cabin car, caught his foot under third rail protection board, throwing him off and breaking his leg in two places. Mizpah, N. J.
	Sept.	..	1	W. J. & S.	25.—One injured. Passenger conductor fell from train while attempting to alight to throw switch at Holly Beach, and broke his left wrist.
	Sept.	..	1	C. R. R. of N. J.	26.—One injured. Brakeman, jumping off engine 91 in the Jersey City Freight Yard, had his coat caught in upright over the breast beam. Was dragged and injured.
	Oct.	..	1	L. V.	27.—One injured. Section foreman had his arm broken getting off of car of work train 563, Jersey City.
	Oct.	..	1	Erie	28.—One injured. Brakeman, in getting off of car, at Croxton, N. J., fell, spraining his hip and hand.
	Oct.	..	1	P. & R.	29.—One injured. Yardmaster was a passenger on train 152 and in attempting to get off the train at Trenton Junction Station, while it was in motion, injured his leg. Developed that ligaments in his leg were torn apart.
	Nov.	..	1	Erie.	30.—One injured. Watchman was inspecting a car and went to jump down to the ground from side door, but a ring he had on his third finger caught on a nail and tore the finger off at the second joint.
	Nov.	..	1	P. & R.	31.—One injured. Brakeman, in getting on engine in Manville Yard, struck his left ankle against step of engine, injuring it.
	Nov.	..	1	N. Y. S. & W.	32.—One injured. Engineer walked off end of running board, engine 130, injuring hip and chest.

(*e*) *Slipping on Steps*

Year	Month	Killed	Injured	Road	REMARKS.
1912	Jan.	..	1	Erie	1.—One injured. Woman alighting from passenger train fell. Platform steps and handles found O. K.
	Jan.	..	1	W. S.	2.—One injured. Man alighting from standing train slipped on the ice and fell.
	Apr.	..	1	W. S.	3.—One injured. While boarding standing train woman slipped off car step, causing her to fall backward on the platform.
	Apr.	..	1	Pa.	4.—One injured. Fireman, in going up to light the headlight, accidentally slipped off and sustained fracture of left leg in consequence of falling to the ground.
	Apr.	..	1	Erie	5.—One injured. Woman, in alighting from coach, slipped on top step of platform, falling down coach steps.
	May	..	1	W. S.	6.—One injured. Unknown lady, alighting from standing train, slipped and fell from car steps.
	June	..	1	Erie	7.—One injured. A lady, getting off vestibule coach 1835, slipped on steps and fell between steps of coach and station platform. Injured about the right hip and side. No defects in equipment.
	Aug.	..	1	Erie	8.—One injured. Woman slipped and slid down steps to the ground while coming down the steps of a coach.
	Aug.	..	1	W. S.	9.—One injured. Woman slipped and fell while descending steps of coach train 86. Weehawken, N. J. Sprained ankle and back.
	Aug.	..	1	W. J. & Seashore	10.—One injured. Woman, while getting off train at Mizpah, slipped and fell against lower step of car, on account of having on a pair of new shoes.

(*d*) *Others*

Year	Month	Killed	Injured	Road	REMARKS.
1912	Jan.	..	1	N. Y. C. & H.	1.—One injured. Yard brakeman fell, coming down ladder of car, because rung of ladder broke.
	Feb.	1	..	C. R. R. of N. J.	2.—One killed. Brakeman, standing on steps on engine tank, about to cut off car, was caught between the tank and car, standing too close to switch. Belmar, N. J., freight station.
	Feb.	..	1	C. R. R. of N. J.	3.—One injured. A passenger jumped from train at Bond St., Elizabeth, and was injured about the head.
	Apr.	1	..	Erie	4.—One killed. Passenger who had been asleep, when station was called, suddenly awakened and jumped off the train. Instantly killed.
	May	..	1	C. R. R. of N. J.	5.—One injured. When train 311 was about half way between Red Bank and Beach St., passenger jumped off and was cut about the head.
	May	..	1	W. S.	6.—One injured. Details not given.
	June	..	1	W. S.	7.—One injured. Passenger alighting from standing train, stepping box tipped over and he fell to the ground. Right knee bruised.
	June	..	1	Pa.	8.—One injured. Man jumped from rear-end of last coach of Modock train, Warren St., Jersey City, in order to take a short cut home. In doing so fell, sustaining injuries to right side and hip.
	July	..	..	W. S.	9.—One injured. Man, alighting from train, thrown when stepping box tipped over. Slightly injured.
	July	..	1	W. J. & Seashore	10.—One injured. Aged man fell from excursion train 22, in Camden, slightly injuring wrist and nose.
	July	..	1	W. S.	11.—One injured. Woman stepped into open platform trap door while boarding train.
	Aug.	..	1	Pa.	12.—One injured. Details not given.
	Sept.	1	..	W. S.	13.—One killed. An unknown immigrant woman fell from second 3 immigrant train while passing from one car to another and was killed.
	Sept.	..	1	W. S.	14.—One killed. A lady alighted from Camden train on the opposite side from the station. Fell. Slightly injured.
	Sept.	..	1	W. S.	15.—One injured. A man evidently got onto electric train 1056, to see someone off, or attempted to ride from Tennessee to New York Ave., and when he attempted to jump off at Arctic Ave. he fell and fractured his skull. Arctic Ave crossing, Atlantic City.
	Sept.	..	1	W. S.	16.—One injured. Woman fell into the ditch alongside of track after alighting from the train at the station at Haworth, N. J. Train 75.
	Oct.	..	1	Erie	17.—One injured. A laborer, attempting to get on a train at Croxton Transfer to go to Jersey City, was struck by a westbound train.
	Oct.	..	1	P. & R.	18.—One injured. While shifting, engine 1346 was backing off 9 track with six empty cars, fireman attempted to get off the tank and came in contact with a coal car standing on track 10.
	Nov.	..	1	Erie	19.—One injured. Man suddenly left car on train 139, on the wrong side, and was unable to get on before the train started. Evidently fell off Hackensack Bridge.
	Nov.	..	1	W. J. & Seashore	20.—One injured. Man fell from excursion train, extra 6062, at Beach Creek, N. J., slightly injuring one knee.

Other causes. The last of the nine general classes of New Jersey casualties is that miscellaneous group which cannot be classified within any of the other eight classes and which is known as Other Causes. This group accounted for 348 of the 1166 casualties occurring in 1912.

This class is sub-divided into the following groups, falling from cars or engines, throwing switches, defective equipment, other than in connection with the operation of trains and others (any not included in just mentioned four groups). There were one hundred casualties to people losing their balance and falling. (*a*) Only five of these were to others not trainmen or men in railroad employ. None of the one hundred casualties in this sub-class would have had a remedy in the present "full-crew" law. None of the thirteen casualties classed as due to throwing switches (*b*) would have been prevented by a larger train-crew. In the elimination of these two classes it is assumed that in each case of injury to an employee, the injury was sustained in the performance of a duty which would have been none the less a duty, with its attached risk even with an additional man on board the train.

There were 52 casualties to persons, practically all employees, because of defective equipment. (*c*) It is claimed that a larger crew will make more effective the train inspection. However, not a single casualty of the 52 was such that an additional brakeman would have averted the disaster with the possible exception of group No. 6 which involved minor injuries to five persons. The 33 casualties to persons, sub-classed as other than in connection with the operation of trains (*d*), need practically no consideration as they are obviously irrelevant to the size of any train-crews. There were 150 casualties under other causes, sub-classified as

others. (*e*) The casualties in this group numbered 23, 28, 35, 37, 42, 64, 81 and 84, and four others charged to this class for which no detail are given in P. U. C. files, are such as might possibly have been different with a larger train-crew. These are so classed simply because in most cases the detailed cause is too brief to judge correctly and the possibility of their having been relevant is assumed even though it is not at all evident.

(*a*)

Falling From Cars or Engine

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	1		D. L. & W.	1.—One killed. Jumped from car to go back to caboose when train had stopped at West End for signal. Cars stood on bridge over N. Y. S. & W. tracks, and he fell through bridge, sustaining fatal injuries. The man was an attendant of a live poultry car. Hoboken, N. J.
	Dec.	1		Erie	2.—One killed. Car 5280 was being unloaded to lighter, by men from Open Dock G, at Weehawken Yard. Conductor, intending to make a switch of the dock, notified them to get away from car, and they did. While switching main G track, conductor discovered body of employee under the Montour R. R. car. There were no witnesses to the accident, but it would appear he got back on the car, and in some manner fell off and under wheels.
	Dec.	..	1	N. Y. S. & W.	3.—One injured. While moving between Oakland and Pompton Lakes, brakeman fell from top of car in train.
	Dec.	..	1	N. Y. S. & W.	4.—One injured. Laborer, while riding car on coal dock, fell from car, Erie 25304, sustaining injury to shoulder. Edgewater, N. J.
	Dec.	..	1	P. & R.	5.—One injured. Brakeman fell from train, engine 772 at Hopewell and was badly bruised.
	Dec.	..	1	Erie	6.—One injured. Trainman was on his way down end ladder of A. C. L. car 29427, when egine was coupled onto train, and caused him to fall off car to the ground. All safety appliances on car A. C. L. 29427 inspected and found in good condition. Little Falls.
	Dec.	..	1	Erie	7.—While crew were drilling cars at Essex Falls, brakeman fell from Erie car 100647, injuring his side and back. Car inspected and no apparent cause from any defects about car. Apparently slipped from car.
1912	Jan.	1	..	L. V.	8.—One killed. Trainman fell from tank of engine and was run over by the engine.
	Jan.	1	..	L. V.	9.—One killed. Trainman fell under cars.
	Jan.	1	..	C. R. R.	10.—One killed. Man killed while crossing platform between smoker and mail car. Attempting to grab his hat which had blown off, and fell from train.
	Jan.	..	1	L. V.	11.—One injured. Fireman slipped and was caught between apron and tank.
	Jan.	..	1	L. V.	12.—One injured. Trainman fell from car.
	Jan.	..	1	C. R. R.	13.—One injured. Engineer slipped on running board of engine.
	Jan.	..	1	Pa.	14.—Slipped on icy running board; fell from top of box car. Brakeman.
	Jan.	..	1	C. R. R.	15.—One injured. Brakeman, jumping from freight train slipped and rolled under car.
	Jan.	..	1	C. R. R.	16.—One injured. Conductor injured jumping from engine; slipped and fell.
	Jan.	..	1	D. L. & W.	17.—One injured. Slipped on icy running board and fell from car.
	Jan.	..	1	L. V.	18.—One injured. Fell from engine tank.
	Jan.	1	..	L. V.	19.—One killed. Fireman fell under tender and was killed.
	Jan.	..	1	C. R. R. of N. J.	20.—One injured. Employee fell from tank engine.
	Jan.	1	..	N. Y. S. & W.	21.—One injured. Laborer on coal dock, riding Erie car, slipped on ice on footboard of car and fell to dock.
	Jan.	..	1	Reading	22.—One injured. Coal handler was cleaning out coal car; when shifting engine pushed draft of cars against car which he was cleaning and the jar caused him to fall through the hopper of the car.
	Jan.	..	1	Erie	23.—One injured. Brakeman was applying brake on the car; slipped and fell from the top of the car.
	Jan.	..	1	Erie	24.—One injured. Brakeman fell from box car.
	Feb.	1	..	W. S.	25.—One killed. Yard brakeman struck by switch stand while hanging on side of car, was thrown under the wheels and killed.
	Feb.	..	..	C. R. R.	26.—One injured. As train No. 341 was coming to a stop at Atsion, brakeman slipped off of the car and was slightly injured.
	Feb.	..	..	C. R. R.	27.—One injured. Driller was making cut between car and engine when his foot slipped and was caught between drawhead and end sill, and was squeezed.
	Feb.	..	1	L. & H.	28.—One injured. Conductor stepping from car slipped and fell, sustaining slight bruise.
	Feb.	..	1	Pa.	29.—One injured. Freight brakeman fell from end sill of a car that was being rushed out on siding, falling on the track between the rails.
	Feb.	..	1	W. S.	30.—One injured. While laborer was climbing between cars, they started up suddenly, and he was thrown on the ground.
	Mar.	1	..	D. L. & W.	31.—One killed. Conductor attempted to get on front of engine 45, and fell between engine and cars.
	Mar.	1	..	C. R. R. of N. J.	32.—Two killed. Car inspector fell from Bush Terminal float No. 7 at No. 4 float bridge, Jersey City, and was drowned.
	Mar.	2	..	Erie	33.—Two killed. One slipped and fell from train. The other crushed between cars.
	Mar.	..	1	L. V.	34.—One injured. Trainman slipped and had his right foot caught between cars, crushing it at ankle.
	Mar.	..	1	Port Reading	35.—One fatally injured. Brakeman in performance of his duty tripped on piece of coal and turned his ankle. He then stepped on front step of engine 1321, and a few seconds later fainted and fell under the engine, which passed over both his legs, crushing them. He died three days later.
	Mar.	..	1.	D. L. & W.	36.—One fatally injured. Conductor in attempting to get on front of engine 45 fell between engine and cars, and was fatally injured.
	Mar.	..	1	Pa.	37.—One injured. Man lost his balance, fell against coal board, bruising his ribs.
	Mar.	..	1	Pa.	38.—One injured. Brakeman fell from engine.
	Apr.	1	..	Pa.	39.—One killed. Child fell out of open window of car while in seat with his father.
	Apr.	..	1	W. S.	40.—One injured. Yard brakeman bruised his back. Was climbing side ladder of car. Top rung broke and he fell to the ground.
	Apr.	..	1	L. & H.	41.—One injured. Trainman getting down from top of caboose was thrown by a sudden stop of the train; his right foot went through the window. Slightly injured.
	May	..		L. & H.	42.—One injured. Workman was working on top of a work train, and, in walking across one of the cars, he slipped and fell through the hopper. Slightly injured.
	June	1	..	P. & R.	43.—One killed. Brakeman jarred from car when three cars bumped into the car he was about to apply the brake on, causing him to fall between the cars and under the wheels.

June	1		Pa.	44.—One killed. Man standing on the rear-end of the tank of engine 2217 was endeavoring to push the drawhead over with his foot, when he slipped and fell, the engine running over him.
June	..	1	P. & R.	45.—One injured. Coal handler was at work handling brake on a car which was being dropped from scale to chutes, when another draft of cars following, slightly struck the car he was on, causing him to lose his grip on the brake handle and fall from car into Chute 3. Cut on head and bruised on left shoulder.
June	..	1	Erie	46.—Trainman fell from top of box car on his head.
June	..	1	N. Y. S. & W.	47.—One injured. While drilling car just west of Oakland, brakeman fell when cutting car; mashed right arm and right foot under wheel.
June	..	1	L. & H. R.	48.—One injured. Yard brakeman started to climb ladder, and, in reaching for a brake wheel, same came off, throwing him to the ground and slightly injuring him.
June	..	1	L. V.	49.—One injured. Conductor fell from yard engine 3732. Contusion left hip and shoulder. Phillipsburg.
June	..	1	C. R. R. of N. J.	50.—One injured. While train 197 was drilling at Cedarville, brakeman fell from top of box car to the ground and was injured.
June	..	1	C. R. R. of N. J.	51.—One injured. An employee fell from engine at Dunellen and was injured.
June	..	1	D. L. & W.	52.—One injured. Trainman sitting in chair in baggage car. While train was standing still, he slipped and fell out of car door, fracturing wrist.
July	1	..	D. L. & W.	53.—One killed. Trainman started to climb off the car, fell under the wheels and was fatally injured.
July	1	..	L. V.	54.—One killed. Trainman fell between cars at Jersey City and was killed.
July	..	1	Erie	55.—One injured. Brakeman thrown from top of car when car gave sudden start.
July	..	1	W. S.	56.—One injured. Conductor slipped from step of caboose, train 28, in Weehawken Yard. Injured.
July	..	1	C. R. R. of N. J.	57.—One injured. While preparing engine 740 for train 290, fireman was standing on coal in engine tank. Coal started to roll, throwing him to the ground and injuring him.
July	..	1	L. & H. R.	58.—One injured. Brakeman's hand slipped, throwing him to the ground between rails. Cars passed over him, rolling him around, injuring him.
July	..	1	Pa.	59.—One injured. While brakeman was placing the markers on the rear-end of his train, he accidentally missed his footing and fell, injuring thigh and head.
July	..	1	C. R. R. of N. J.	60.—One injured. Engineer, while fixing overflow pipe on engine, fell from the runing board to the ground and was injured .
July	..	1	Pa.	61.—One injured. While boarding train brakeman slipped on the car step and fell on the end of the ties, sustaining contusion of the side.
July	..	1	C. R. R. of N. J.	62.—One injured. Fireman, while going from tank to engine cab, reached for handrail, and fell to the ground and was injured.
July	..	1	Erie	63.—One injured. After cars had been put in siding and had stopped, trainman in applying brake to hold car, slipped off footguard and struck his hip against end planks of the car. Left knee and hip bruised.
Aug.	1	..	Pa.	64.—One killed. While getting down from the end of a box car, this man lost his balance and fell under the train, the wheels running over and cutting off his left leg. Died shortly afterward.
Aug.	..	1	W. S.	65.—One injured. Yard brakeman had just finished setting up brake when dog flew off, causing brake wheel to fly around, causing him to fall down between the cars. Ribs broken and arms bruised.
Aug.	..	1	L. & H. R.	66.—One injured. Fireman, in attempting to step from front end of engine to freight house platform, missed his footing and fell.
Aug.	..	1	Pa.	67.—One injured. Freight brakeman fell from his train at Martin's Creek, sustaining slight injuries.
Aug.	..	1	Pa.	68.—One injured. Trainman, after bringing train 205 from Pennsylvania Station, Motor 35 cut off, and while passing from No. 7 to No. 4 track, fell off the rear of the motor, sustaining bad bruise on left side of body.
Aug.	1	..	C. R. R. of N. J.	69.—One killed. While engine 64 was drilling cars at Bayway, conductor, who was standing on top of a car, fell off when the coupling was made, and the car wheels passed over him, killing him instantly.
Aug.	..	1	Pa.	70.—One injured. While train with engine 1494 was assisting freight train through the meadows, New Jersey, the fireman accidentally fell from the engine. Severely injured.
Sept.	1	..	D. L. & W.	71.—One killed. Switchman, setting brake on car at Secaucus, slipped and fell under the car. Died as a result of the injuries.
Sept.	..	1	Erie	72.—One injured. Brakeman rode a cut of two cars in the track, and after cars stopped against other cars in the track, he started to come down the ladder on the side of the car. He got hold of the ladder with his right hand, but missed the hold with his left hand and fell to the ground. Slightly injured.
Sept.	..	1	W. S.	73.—One injured. Brakeman fell from car when engine started up. Engine 109, Weehawken, N. J.
Sept.	..	1	Pa.	74.—One injured. Conductor looking for trouble on the trucks of car 710 as train was passing Marion Station, and after opening door of car to see if he could locate the trouble, lost his balance and fell from the train, striking the inner track fence. Severely injured.
Sept.	..	1	N. Y. S. & W.	75.—One injured. Brakeman fell from car to the ground while switching cars at Sparta, sustaining broken leg and injuries to back.
Sept.	..	1	P. & R.	76.—One injured. Conductor was in the act of stepping from engine to tank when his foot slipped off the top brace on tank, causing him to lose his balance and fall against the tank, injuring his left leg.
Sept.	..	1	Erie	77.—One injured. As train with Switch Engine 650 was going around a curve, brakeman who was on top of the rear car attempted to jump to a car standing on the adjoining track, but misjudged the distance and fell to the ground, his intention to be in sight of the head brakeman while going around curve, so that signals could be transmitted properly.
Sept.	..	1	C. R. R. of N. J.	78.—One injured. Brakeman was thrown from the car by being struck by waterspout. Engine 34 at Cartaret.
Oct.	..	1	Erie	79.—One injured. Painter on the underside of the D. L. & W. Bridge, standing on a plank on top of box car, was thrown to the ground, when a train going west on next track struck the plank which had been moved out beyond clearance point of that track.
Oct.	..	1	L. V.	80.—One injured. Man, crossing cars, fell and had his right foot crushed and left leg cut. Jersey City.
Oct.	..	1	Erie	81.—One injured. Laborer was carrying an empty ice tank from Track E-7 to Track E-8, over tops of cars, and in crossing he miscalculated his step and fell to the ground between tracks.
Oct.	..	1	D. L. & W.	82.—One injured. Trainman climbing down ladder on side of car, struck an electric light pole and was knocked from the car, fracturing his arm and bruising his body.
Oct.	..	1		83.—One injured. Man slipped from hand-car and injured his foot.
Oct.	..	1	C. R. R.	84.—One injured. Man fell from engine.
Oct.	..	1	N. Y. S. & W.	85.—One injured. Brakeman, while sleeping in cupola of caboose, fell and broke his collar bone. Edgewater, N. J.

Oct.	..	1	Erie	86.—One injured. Brakeman on top of Milk Train No. 46 fell while walking over the cars, car passing over his left foot.
Oct.	..	1	Erie	87.—One injured. Brakeman on Extra 966 was making a drop of Erie cars over the crossover. Brakeman threw the crossover and after engine passed crossover, in some way lost his balance and fell, sustaining severe scalp wound.
Oct.	..	1	D. L. & W.	88.—One injured. Yardmaster climbing up the side ladder of the car lost his hold and fell to the ground, fracturing his ankle.
Nov.	1	..	W. S.	89.—One killed. Yard brakeman, for some unknown reason, fell from the top of a car while in motion and was killed. Weehawken, N. J.
Nov.	..	1	C. R. R.	90.—One injured. Conductor tripped on a nail and fell between cars from the top of a train. Injured.
Nov.	..	1	D. L. & W.	91.—One injured. Fireman cleaning fire shaker, bar slipped, striking him on the side of the face and he fell from the engine, sustaining injuries.
Nov.	..	1	Pa.	92.—One injured. While conductor was applying handbrake to Express Car 5665, the brakeman closed the angle cock on another car, when the air brake was applied, throwing the conductor from the car. Right shoulder and right elbow sprained. Alling Street Yard, Newark.
Nov.	..	1	D. L. & W.	93.—One injured. Switchman making cut of car slipped and was run over, cutting leg off below the knee. Engine 29, Hoboken.
Nov.	..	1	P. & R.	94.—One injured. While brakeman was turning markers on the cabin car, he fell from the car and injured his back. Extra freight train, Engine 14. Trenton Junction.
Nov.	..	1	N. Y. S. & W.	95.—One injured. While taking water at tank, fireman fell from tank of Engine 90, Paterson, N. J.
Nov.	..	..	P. & R.	96.—One injured. Coal handler slipped from car step, and in falling his head fell on the rail, crushing it.
Nov.	..	1	C. R. R. of N. J.	97.—One injured. Brakeman was jarred and fell between cars because of a coupling parting between cars. Transfer Yard, Elizabethport.
Nov.	..	1	D. L. & W.	98.—One injured. Brakeman standing on top of a car was thrown to the ground, caused by a sudden stopping of engine, which was drilling above car. Hoboken.
Nov.	..	1	N. Y. S. & W.	99.—One injured. Fireman fell from tank of Engine 90 to the ground, spraining his ankle. Paterson.

(*b*)

Throwing Switches

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	..	1	N. Y. & L. B.	1.—One injured. Brakeman attempted to make a flying switch through a pipe connected crossover. Slightly injured.
1912	Feb.	1	..	C. R. R. of N. J.	2.—One killed. Brakeman standing on step of engine tank about to cut off car, was caught between the tank and car, standing too close to switch. Belmar, N. J., freight station.
	Feb.	..	1	L. & H. R.	3.—One injured. While switching, their train struck a cut of cars too hard, and conductor was slightly injured by striking his head against the side of the cab.
	Feb.	..	1	Erie	4.—One injured. While switching brakeman fell from car at Newark, N. J.
	Mar.	..	1	D. L. & W.	5.—One injured. Switchman, riding on east end of car, was caught between switch tender's shanty and car. Bruised internally and externally.
	Apr.	..	1	W. J. & S.	6.—One injured. Foot caught in switch and engine struck brakeman before he could get loose.
	May	..	1	W. S.	7.—One injured. Switch tender caught foot between ties while running for switch and fell. Left shoulder dislocated.
	May	..	1	W. S.	8.—One injured. Brakeman fell over switch timber after throwing switch.
	May	..	1	Erie	9.—One injured. Trainman was riding one car against the other in Wanaque Paper Mill switch, and was working in backward position when cars were about to couple, getting his leg caught between running boards of cars.
	July	..	1	L. & N. E.	10.—One injured. Engineman fell while running ahead of train to throw switch. Right shoulder injured.
	July	..	1	L. & H. R.	11.—One injured. Conductor, in the act of throwing a ball switch, had his foot in the way. Ball came down, mashing big toe.
	Oct.	..	1	N. Y. S. & W.	12.—One injured. Brakeman was struck in the mouth by switch lever.
	Nov.	..	1	Pa.	13.—One injured. Switchman pulled pin out of switch lever in setting the switch from ladder track to No. 9. The lever flew up and struck him in the leg, fracturing same.

(*c*)

Defective Equipment

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	..	2	Erie	1.—Two injured. As Train 15 was approaching West Paterson, eastbound Train 72 had car with broken journal, which toppled over so as to strike Engine 1029 of Train 15, breaking windows and raking the entire train. Two passengers slightly cut by shattered glass.
1912	Jan.	..	1	C. R. R.	2.—One injured. Engineer badly scalded by bursting flues.
	Jan.	..	1	C. R. R.	3.—One injured. Jumped from engine when flues burst and was injured.
	Jan.	..	2	N. Y. S. & W.	4.—Two injured. In moving reloader machine closer to pile of coal, wire rope sheave pulled off, shaft flew through the air and struck two laborers.
	Feb.	2	3	L. V.	5.—Two killed. Three injured. Boiler of locomotive exploded, due to being low in water. All employees.
	Feb.	..	5	C. R. R.	6.—Five injured. The Baker Heater in Pullman Car, "Saratoga," exploded while train was unloading passengers at Lakewood, tearing a hole in the roof of the car and scattering hot coal, water and steam through the car.
	Feb.	..	2	C. R. R.	7.—Two injured. While Engine 14 was drilling at Brill's, the roof of Wabash car 64160 blew off, and conductor and driller, who were on the roof at the time, were injured.
	Feb.	..	2	Pa.	8.—Two injured. In consequence of a flue bursting, the fireman was blown out of the cab, and the engineman jumped out, both sustaining injuries.
	Feb.	..	1	L. & H. R.	9.—One injured. Fireman hurt when a mining cap exploded in the firebox. Cap thought to have been in the coal.
	Feb.	..	1	L. V.	10.—One injured. Flue burst, throwing fireman from his engine. Cut and bruised about head. Left leg crushed at ankle. Cranford, N. J.
	Apr.	..	1	C. R. R. of N. J.	11.—One injured. Water bar on engine burst and brakeman had his hand scalded.
	Apr.	..	1	Pa.	12.—One injured. Boiler flue of engine burst as train was passing under L. V. R. R. bridge at Waverly, N. J. Engineman sustained severe burn of right eye.
	Apr.	..	1	Pa.	13.—One injured. While lowering a slab with a derrick, the socket on boom drum broke, allowing the boom with load on it, to fall, striking a man. Injured about head and spine.
	May	..	1	Pa.	14.—One injured. While Shifting Engine 1801 was pushing five cars through No. 8 track in classification yard, Waverly, N. J., the air went on in emergency, due to a hole worn in main train pipe. This sudden stop threw conductor from the cars, injuring him.

	June ..	1	N. Y. S. & W.	15.—One injured. While riding on car on coal dock, brake staff broke and employee fell from car, sustaining injury to arm.
	July ..	1	L. & N. E.	16.—One injured. Torch on engine 21 exploded, injuring fireman.
	July ..	1	N. Y. S. & W.	17.—One injured. While coaling over fire at Blairstown, torch exploded, burning fireman quite severely.
	July ..	1	Pa.	18.—One injured. Brakeman claimed, while putting brake on a car, the cog would not work properly and slipped out, causing him to lose his balance and fall to the ground.
	July ..	1	P. & R.	19.—One fatally injured. Rear drawhead of Pullman car broke, causing train to part. Man who was standing on front platform of coach immediately following Pullman car fell to track under wheels of the coach.
	Aug. 1	8	Erie	20.—One killed. Eight injured. Wanaque River Railroad bridge collapsed and allowed a derrick to fall into the river.
	Aug. ..	2	P. & R.	21.—Two injured. When Passenger Train 526 passed track laborers east of bridge 53, east of Hamilton Station, the right front driver brake safety hanger flew off engine 333 on train 526 and struck two laborers, severely injuring them.
	Aug. ..	1	Erie	22.—One injured. Yard conductor stood on footboard head end of engine 647 to cut off car 380. Through some unknown cause the cut lever on head end of engine was broken and caught his left hand, injuring it.
	Aug. ..	1	C. R. R.	23.—One injured. While setting brake on a car the brake shaft broke, throwing brakeman to the ground, and four cars following ran over him, cutting and bruising his body.
	Sept. ..	1	L. V.	24.—One injured. While pulling a truck load of freight out of a car when passing rack piece, a cleat broke, throwing him to the ground, and part of the load fell on him. Oak Island Transfer, Jersey City.
	Sept. ..	1	Erie	25.—One injured. Flue burst on engine 1838, and the engineer jumped from the engine, causing sprain of left foot and bruised in right hip. Garfield, N. J.
	Sept. ..	1	Pa.	26.—One injured. Brakeman was in the act of crossing from one car to another on extra train 3200, when an air hose burst, throwing the brakes into emergency and causing the train to part. Brakeman thrown to the ground, sustaining injuries.
	Sept. ..	1	C. R. R.	27.—One injured. While drill engine 1 was drilling cars at the head of Port Johnson Coal Docks, Bayonne, the brakeman was putting on the hand brake when the brake stick broke, causing him to fall to the ground in the middle of the track. Four cars passed over him, and he was injured about the face and head.
	Sept. ..	1	Erie	28.—One injured. While an employee was using a bar to raise the cover of ice tank in an Erie car, the bolt of a ring through which he was using the bar pulled out, the jar causing him to fall from the roof of the car.
	Sept. ..	1	Raritan	29.—One injured. While the freight brakeman was on top of a box car fastening on the trolley wire, a crossing at this point gave way, allowing the wire to sag. This caught him, throwing him down on top of the car. Slightly injured.
	Oct. ..	1	N. Y. S. & W.	30.—One injured. Lubricating glass burst on engine 335 and cut the engineer over the left eye.
	Nov. ..	1	Pa.	31.—One injured. Engine 3359 had all rods both sides stripped off on account of main pin breaking off in the wheel in the left side. Engineman was cut about the face, and when reverse lever flew back his foot was caught. Monmouth Junction.

(*d*) *Other Than in Connection with the Operation of Trains*

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	..	1	Pa.	32.—One injured. Yard brakeman rode, a band of cars in Monmouth Street Yard, Jersey City, for the purpose of placing them for steam heat. While walking back to the engine, he fell into a hole that was dug for the purpose of laying steam heat pipes in yard. Right groin injured.
	Dec.	..	1	Erie	33.—One injured. A freight handler, while trucking freight from car Can. Nor. train 39974 to freight house, gangplank shifted, permitting him to fall to the ground with truck and contents, breaking his leg in three places. Gangplank found to be in good condition and of standard make. West Nutley, N. J.
	Dec.	..	1	Erie	34.—One injured. Brakeman, while unloading freight at Hohokus freight house, slipped and fell with a bag of salt weighing 200 pounds. Bag fell on his foot and caused a sprain of ankle.
1912	Jan.	..	1	C. R. R.	35.—One injured. Car inspector caught between two cars, standing on track; injured.
	Jan.	..	1	Raritan	36.—One injured. Laborer injured unloading rail.
	Jan.	..	1	L. V.	37.—One injured. Caught between cars.
	Jan.	..	1	Pa.	38.—One injured. Brakeman had foot crushed in consequence of same having been struck by lumber which shifted while moving car.
	Feb.	1	..	Erie	39.—Man who was standing on station platform too close to track at River Street, Paterson, N. J., was struck.
	Mar.	1	..	L. V.	40.—One killed. Employee of coal company working on trestle made a misstep and fell from the trestle.
	Mar.	1	..	Erie	41.—One killed. Laborer cleaning turntable pit on opposite side of the table from the turntable operator, working between the tractor rail and the pit wall, failed to notice the table moving towards him, and was caught between the end of the table and the pit wall, resulting in instant death.
	Mar.	..	1	C. R. R.	42.—One injured. An employee fell off ash pit at Somerville and was injured.
	Mar.	..	1	C. R. R.	43.—One injured. An employee fell in turntable pit at Elizabethport and was injured.
	Mar.	..	1	Pa.	44.—One injured. Man drove auto into the gates, after they had been lowered, causing the gate to strike him on the forehead, fracturing skull.
	Mar.	..	1	Pa.	45.—One injured. Passenger rendered unconscious. Heel caught while descending stairway of main waiting room, causing him to pitch forward, sustaining injuries to his head.
	Apr.	1	..	Pa.	46.—One killed. Demented passenger jumped through an open window in a drawing room of Pullman car as the train was passing through Metuchen. Fatally injured. Died before train reached New Brunswick.
	Apr.	..	1	Erie	47.—One injured. While track gang were changing rail, rail jumped out of track and struck a laborer, breaking his leg.
	May	..	1	N. Y. S. & W.	48.—One injured. Laborer on coal pockets slipped while unloading coal from car, falling through pockets of car, bruising back.
	May	..	1	N. Y. S. & W.	49.—One injured. While unloading a car of ties, tie rolled from top of car to ground and struck brakeman on foot.
	June	..	1	L. & H. R.	50.—One injured. In putting in ties, workman caught his leg between end of tie and the rail, badly bruising same above the ankle.
	June	..	1	Raritan	51.—One injured. While raising track, end of tie broke off, causing track to fall on foot of laborer.
	June	..	1	D. L. & W.	52.—One injured. Man stumbled over surveyor's stake and fell. Fractured knee cap.
	June	..	1	W. J. & Seashore	53.—One injured. Passenger was struck by stone just east of Mozart, thrown by unknown person, slightly injuring him.

July	1	..	W. J. & Seashore	54.—One killed. Man slipped off plank walk at Glass Works Branch, Fenwick Creek, Salem, fell into creek and was drowned.
Aug.	..	1	Erie	55.—One injured. A laborer was unloading lumber when he fell from the lumber and into the car due to pockets which were open, sustaining severe injuries.
Aug.	..	1	Erie	56.—One injured. A carpenter was underneath the debris, trying to take some bolts out of the timbers, when the timbers gave way and fell on him, severely injuring him.
Aug.	..	1	Erie	57.—One injured. Track laborer, carrying tie on his shoulder, fell, striking on a large stone and bruising his head.
Sept.	..	1	N. Y. S & W.	58.—One injured. Passenger claims to have caught his hand in coach door when alighting from train at Franklin.
Sept.	..	1	Erie	59.—One injured. In attempting to remove a live electric light wire which had fallen and laid across track, night yardmaster was fatally shocked.
Oct.	1		W. J. & Seashore	60.—One killed. Laborer came in contact with third rail and was instantly killed, three-quarters of a mile south of Sewell.
Oct.	..	1	N. Y. S. & W.	61.—One injured. Trackman, while unloading rails, had his foot injured because of a rail falling on his foot. Jersey City.
Nov.	..	1	Erie	62.—One injured. A trainman, while carrying a barrel and being assisted by another trainman, slipped on the ice and fell, breaking his leg. Hawthorn.
Nov.	..	1	L, & H. R.	63.—One injured. While one man was holding a chisel in cutting rivets, another man handling a sledge missed the chisel and grazed the first man's head, slightly injuring him. Phillipsburg.
Nov.	..	1	Erie	64.—One injured. Uncoiling rope on pile driver, carpenter's helper had finger caught in cog wheel, due to not using handle. Croxton, N. J.

(*e*) *Others*

Year	Month	Killed	Injured	Road	REMARKS.
1911	Dec.	1	..	Pa.	1.—One killed. While riding on steps of engine 2830 of train P-3, flagman was caught between girder of bridge over Grove Street, Jersey City and side of engine, killing him instantly (This accident reported in P. U. C. Summary as one injured.)
	Dec.	2	8	W. J.	2.—Two killed. Eight injured. Pair of steel girders were being placed in bridge No. 115 over Cooper's Creek, Medford Branch, by bridge carpenters, to act as a centre span. The central portion of the old trestle had been removed and girders were supported on new piling and were being jacked sidewise into place. As the men started to jack, one of the girders got away from them and ran off the cap, the entire girder falling to the ground. The men were on the girders and false work at the time of the accident.
	Dec.	1	..	N. Y. S. & W.	3.—One killed. Laborer left gang with which he was employed and started to walk across tracks on top of Edgewater Dock, caught between cars Erie 51405 and 48331 and instantly killed.
	Dec.	1	..	C. R. R.	4.—One killed. As engine 65 was backing in on trestle in Pond Machine Tool Company's yard, Plainfield, fireman was caught between cab of engine and wall of foundry building and instantlyy killed (Summary includes one injured, struck by locomotive. No. detailed report.)
	Dec.	..	1	C. R. R.	5.—One injured. While engine 161 was drilling on the north side of Avenue yard, Elizabethport, conductor was riding on tank and was struck by switch stand leading to track 12, thrown against tank and injured.
	Dec.	..	1		6.—One injured. Trackman, while cutting a nut lock from an angle bar, nut lock broke, and, flying, struck him in the eye. Butler.
	Dec.	..	1	L. & H. R.	7.—One injured. Car repair man had great toe slightly bruised by dropping a brake beam on his foot. Phillipsburg.
	Dec.	..	1	Erie	8.—One injured. Trackman was struck on top of small finger of left hand by a hammer which was used by another trackman in driving a spike, causing the finger to be mashed. Hackensack Bridge Main Line.
	Dec.	..	1	Pa.	9.—One injured. Switchman at Kent fell in front of engine 1031 and was run over and injured.
	Dec.	..	1		10.—One injured. While engine 651 was switching three cars out to main track, Newark, a brakeman was riding on side ladder of car N. P. 45292 when his right hip and face came in contact with end and side of cars N. C. 89400 which stood in freight house track. Clearance at this point is six feet. All safety appliances on both of these cars inspected and found in good condition.
	Dec.	..	1	Erie	11.—One injured. Derail was placed on track in front of motor car, due to towerman at Greenwood Lake Junction setting up route for a Newark Branch train. Motor car struck the derail and caused the supervisor of signals to be thrown up in the air and landing astride of motor cylinder. Injury to pelvis. Motor car was not seen by towerman when route was set up.
	Dec.	..	1	C. R. R.	12.—One injured. While engine 416 was setting out cars on long siding at Wharton, the conductor, who was climbing up the side of one car, was caught between that car and another which was standing on the side track, and was badly injured.
	Dec.	..	1	L. & H. R.	13.—One injured. Trainman riding in caboose on train extra 69 west was thrown against door on account of sudden stop of train, received a slight bruise on the hip and cut over left eye. Andover.
	Dec.	..	1	Erie	14.—One injured. Truck with bale of paper fell on truck handler when he was trucking same from platform. Caused by slipping. No obstruction on freight house platform, which would have tendency to cause the accident. Paterson.
	Dec.	..	2	W. S.	15.—Two injured. Engine 536, working in Weehawken yard, had branch pipe leading from injector to globe valve blowout, slightly injuring engineman and fireman.
	Dec.	..	1	N. Y. S. & W.	16.—One injured. Passenger found alongside of track east of Vreeland Avenue Station, Paterson, with feet cut off, supposed to have been caused by train 946. Passenger supposed to have jumped from train.
	Dec.	..	1	P. & R.	17.—One injured. Brakeman of extra coal train engine 1502 was turning angle cock on rear car of train. Train was backed and brakeman, in stepping backwards with train, caught right foot in wing of frog, bruising foot and wrenching ankle. Port Reading Jct., N. J.
	Dec.	..	1	W. S.	18.—One injured. Passenger had car door close on her hand. Two fingers bruised. Bogota.
	Dec.	..	1	N. Y. & L. B.	19.—One injured. Unknown person threw stone through window of combination car C. R. R. train 324. Man had right ear cut by pieces of flying glass. North of Matawan trestle.
	Dec.	..	1	C. R. R. of N. J.	20.—One injured. While extra 336 was drilling in Hampton yard, brakeman was caught between the roofs of two cars and had his leg badly injured.
1912	Jan.	1	..	Pa.	21.—One killed. Man struck by a train opposite N. Y. & L. V. R. R .Station, So. Amboy, N. J.
	Jan.	..	4	Pa.	22.—Four injured. Four passengers injured on train 567, Phillipsburg.
	Jan.	..	1	Pa.	23.—One injured. Boy was walking in the fill west of Fourth Street, Harrison, N. J. Something was thrown from train and struck him on top of the head.
	Jan.	..	1	Erie	24.—One injured. Coal picker between cars was rolled under truck.

1912	Jan.	..	1	Erie	25.—One injured. Signal helper removing track speeder from track, slipped and sprained ankle.
	Jan.	..	1	Erie	26.—One injured. While cutting ice on east legt of the "Y" an employee was caught between fence and cars.
	Jan.	..	1	Erie	27.—One injured. While brakeman was uncoupling air and steam hose between coaches, train backed up. He was squeezed between cars.
	Jan.	..	1	Erie	28.—One injured. Conductor injured by falling pipe.
	Jan.	..	..	N. Y. S. & W.	29.—One injured. Laborer going up coal pile to pick coal, coal started to slide and carried him down against re-loader.
	Feb.	1	..	N. Y. S. & W.	30.—One killed between crippled cars when engine started to shove the string.
	Feb.	1	..	Pa.	31.—One killed. While engine 665 was drilling a draft of cars, extra service man was riding on footboard of tank of the engine, and was crushed between engine and the car next to the engine. Caused by cars colliding with other cars standing on the track.
	Feb.	1	..	C. R. R.	32.—One killed. Person, presumably lying on northbound track, struck by passenger train under the overhead bridge at Avon, N. J.
	Feb.	1	..	Mt. Hope	33.—One killed. Body of boy found near the rear of the train lying dead alongside of track.
	Feb.	1	..	Erie	34.—One killed. Steam heat man was coupling up steam hose between coaches, and when engine coupled on evidently he must have been caught; head crushed. Died within an hour after the accident.
	Feb.	..	1	L. V.	35.—One injured. While digging under bank, same gave way, falling on laborer and dislocating his hip. Greenville, N. J.
	Feb.	..	1	?	36.—One injured. Caught between cars.
	Feb.	..	1	L. V.	37.—One injured. Laborer fell from platform, striking his head on track.
	Feb.	..	1	Pa.	38.—One injured. While working on top of a box car, man was struck in the face and cut by overhead wire owned by Public Service Co.
	Feb.	..	1	Pa.	39.—One injured. While adjusting the plug at the standpipe at Monmouth Junction, fireman was struck by east-bound engine on track 2.
	Feb.	..	1	Pa.	40.—One injured. Flagman struck by electric light pole while climbing up side ladder of the car. Fell under car, had foot crushed. Greenville, N. J.
	Mar.	1	..	Erie	41.—One killed. One crushed between cars.
	Mar.	..	1	Pa.	42.—One injured. Man running on the running board on top of freight car, in stepping to a car next to a box car, slipped on the edge of the running board, sustaining a sprain of the right ankle.
	Mar.	..	1	Pa.	43.—One injured. Car of hot cinders was drilled out account of smoking badly, and placed under water plug to cool the cinders. Extra service man Madden turned water on, and steam from hot cinders scalded his face.
	Mar.	..	1	Erie	44.—One injured. Laborer attempted to climb over train. Engine slacked the train and his right foot was caught between the bumpers.
	Mar.	..	1	Erie	45.—One injured. Car inspector, while drilling in yard, was caught and injured between cars 4708 and 30908.
	Mar.	..	1	C. R. R.	46.—One injured. While walking over train, brakeman was struck by overhead bridge at Cherry Street, Elizabeth, and received severe scalp wound.
	Mar.	..	1	W. S.	47.—One injured. Man fell into tank of engine while walking over tank of engine to baggage car.
	Mar.	..	1	L. & H. R.	48.—One injured. Conductor, who had been fixing the headlight in getting off the engine, struck his knee against the step.
	Apr.	..	1	Pa.	49.—One injured. Watchman inspecting cars when the door of an empty box car came off the hingle and fell on him, bruising his right leg and knee.
	Apr.	..	1	Erie	50.—One injured. Brakeman had leg crushed. Bergen yard.
	Apr.	..	1	C. R. R.	51.—One injured. Conductor struck by unknown object and injured in Jersey City yard.
	Apr.	..	1	Pa.	52.—One injured. Brakeman, while assisting in drilling cars at Phillipsburg, N. J., caught between running boards of two cars and had left leg broken at thigh.
	Apr.	..	1	N. Y. S. & W.	53.—One injured. While opening door to admit car in boiler house, door fell, striking employee on left side, bruising him about the ribs.
	Apr.	..	1	N. Y. S. & W.	54.—One injured. While drilling cars, shift of cars struck cars standing on side track in process of unloading, with a wagon backed against cars.
	Apr.	..	1	N. Y. & L. B.	55.—One injured. One end of fire hook striking girder of bridge, the other end of hook striking fireman, injuring him.
	Apr.	..	1	L. & H. R.	56.—One injured. Brakeman, in trying to push an ash pan lever, broke fingers on his right hand when his hand slipped.
	Apr.	..	1	C. R. R.	57.—One injured. Brakeman who was hanging on side of cars was struck by cars on adjoining track and slightly injured about the head.
	Apr.	..	1	L. & H. R.	58.—One injured. Truckman slightly injured.
	May	..	1	Pa.	59.—One injured. One slightly injured.
	May.	..	1	C. R. R.	60.—One injured. While train 63 was taking hot water at White House, fireman had his leg caught between spout and back of tender. Badly bruised.
	May.	..	1	Pa.	61.—One injured. While brakeman was riding two express cars down into the local yard, the air went on in the two cars, causing the brake wheel to fly around, catching the brakeman's hand in the wheel.
	May.	..	1	W. S.	62.—One injured. Man leaned out of car door.
	June	1	..	C. R. R.	63.—One killed. Man caught between cars and crushed to death.
	June.	..	1	Pa.	64.—One injured. While man was unloading rail from a car, crew of engine 251 shunted a car in on the track, causing workman to lose his balance and fall to the ground, sustaining an abrasion on top of head and cut on leg.
	June.	..	2	Pa.	65.—Two injured. While examining a tank car loaded with roadbed oil, a lantern was placed too close to the opening of the tank, causing an explosion. Car inspector and foreman injured.
	June.	..	1	W. S.	66.—One injured. Engine wiper attempted to board moving engine and was run over. Left foot cut off.
	June.	..	1	C. R. R.	67.—One injured. While drill engine 65 was shoving two cars in lumber company yard, Plainfield, brakeman was caught between side of car and gate and bruised about body and arm.
	June.	..	1	N. Y. S. & W.	68.—One injured. When removing gangplank from car and freight house platform, plank fell on foot of conductor.
	June.	..	1	Raritan	69.—One injured. Sectionman's truck car ran over foot of sectionman.
	July	1	..	C. R. R.	70.—One killed. While extra 250 was drilling in yard at Red Bank, car of coal was shoved over end of coal dump trestle and brakeman was killed by coal covering him.
	July.	..	..	C. R. R.	71.—One killed. While engine 79 was backing cars down track 6, Jersey City passenger yard, a woman evidently attempted to cross the tracks through opening between the cars and was crushed to death.
	July.	..	1	Erie	72.—One injured. Man was sitting on a pile of ties eating his dinner. Train 82 backed down and shoved cars against the ties. Man's foot was caught between the ties.

July.	..	1	W. S.	73.—One injured. Brakeman was squeezed between cars in the Weehawken yard.
July.	..	1	W. S.	74.—One injured. Man fell in car.
July.	..	1	Raritan	75.—One injured. Was unloading rail. Rail turned and mashed big toe of right foot.
July.	..	1	W. S.	76.—One injured. Sudden stop of train threw man against brass handle over seat in toilet of coach.
July.	..	1	Erie	77.—One injured. Fireman was wetting down the pole on tank of engine 781. While shifting hose from right to left hand, scalded left leg.
July.	..	1	N. Y. S. & W.	78.—One injured. Gangplank fell from car to which freight was being loaded, injuring brakeman.
July	1	1	Erie	79.—One injured. Baggage porter fell from baggage truck with the trunk that he was loading onto train 43, injuring his face.
July.	..	1	L. & H. R.	80.—One injured. (Details not given.)
July.	..	1	Pa.	81.—One injured. Machinist in Jersey City tower house probably fatally injured on account of wood alcohol exploding by igniting.
July.	..	1	Pa.	82.—One injured. While this man was at work at the Interstate Fair Grounds a hexagon nut apparently came off the train and struck this man on the ankle, causing contusions of the ankle.
July.	..	1	L. & H. R.	83.—One injured. Trainman injured at Hamburg.
July.	..	1	Pa.	84.—One injured. While eastbound train 68 was scooping water at Plainsboro, water overflowed and the ballast flew, striking laborer, causing contusion of the ankle.
Aug.	1	..	D. L. & W.	85.—One killed. Man crossing track was struck by work extra, and had both legs and both arms fractured.
Aug.	1	..	C. R. R.	86.—One killed. An employe was caught between cars handled by drill engine 421 at Dunellen yard and killed.
Aug.	1	..	L. & H. R.	87.—One killed. In endervoring to avoid rain, laboror went under the car among others standing in the Bethlehem Steel Company's switch. Car was moved passing over the laborer and killing him. McAfee, N. J.
Aug.	1	..	C. R. R.	88.—One killed. While passing point between Garwood and Cranford passenger jumped from 656 and was instantly killed.
Aug.	..	1	W. J. & S.	89.—One injured. Brakeman found crushed between couplers of two cars at Camden Passenger terminal.
Aug.	..	1	P. & R.	90.—One injured. A brakeman stepped off the back of tank of engine in front of draft of cars. His injuries consisting of a scalp wound. Port Reading yards.
Aug.	..	1	L. & H. R.	91.—One injured. Brakeman was pulling spout of water down to take water. In some way caught his right hand in spout slightly injuring it.
Aug.	..	1	Pa.	92.—One injured. Man working under cars neglected to place a blue flag on the track. Engine 1400 backed in on the track and struck the car, injuring workman's hand. Waverly yard. Newark, N. J.
Aug.	..	1	C. R. R.	93.—One injured. Brakeman caught foot between rails of turntable and outside track, cutting off heel.
Aug.	..	1	L. V.	94.—One injured. Fireman scalded by steam from tank hose.
Aug.	..	1	Pa.	95—One injured. This man in pulling out buss jumper on car 718, threw the same on platform of car 703, and there being grounded, caused a short circuit and a flash, causing eyes to be injured.
Aug.	..	1	Pa.	96.—One injured. Man went to sleep on tracks and when the cars were moved he was caught by the axle bolt of a car and dragged. Internal injuries.
Aug.	..	1	C. R. R.	97.—One injured. Driller was squeezed between cars being drilled in Elizabethport yard and car standing on adjacent track.
Aug.	..	1	Erie	98.—One injured. Brakeman was cut off with a car and held car at clearance point waiting for another car to come down. He had his left leg on the running board of the first car, sitting at the brake, and when second car came down his leg was caught between running boards of both cars.
Aug.	..	1	L. & H. R.	99.—One injured. Trainman had his hand pinched at Sparta Junction, Warwick.
Aug.	..	1	C. R. R.	100.—One injured. While stepping over brake platform from one car to another of extra 334, which was drilling in Dover yard, brakeman was slightly squeezed.
Aug.	..	1	N. Y. S. & W.	101.—One injured. While unloading a frog from a car the frog slipped from the hold of the trackman and fell on the foot of one of men who was assisting in its unloading.
Sept.	..	1	P. & R.	102.—One injured. While a fireman was in the act of jumping off of tank of engine 533 his left foot slipped off tank step, spraining his left ankle.
Sept.	..	1	Erie	103.—One injured. A baggageman slipped on an inclined plank leading out of car door, on account of plank being wet; dislocating his shoulder.
Sept.	..	1	Erie	104.—One injured. A trackman, while turning over a track frog with other track laborers, had one toe mashed on account of the frog dropping on his foot.
Sept.	..	1	W. S.	105.—One injured. Brakeman was injured in the Weehawken yard, being squeezed between engine 342 and a car.
Sept.	..	2	Pa.	106.—Two injured. Engine 719 ran into the rear of car 2048. One brakeman injured by jumping from the engine, another injured by his head striking against the car.
Sept.	..	1	P. & R.	107.—One injured. While extra freight train, engine 1112 was passing Belle Mead, fireman was working at the fire of the engine, and the fire hook was standing upright in the tank and fell and struck him on left arm, badly burning arm below the elbow.
Sept.	..	1	W. S.	108.—One injured. An engine cleaner was squeezed between engine and round house door at Granton. Slightly injured.
Sept.	..	1	C. R. R.	109.—One injured. Conductor who had just alighted from the steps of engine, was struck on the head by the door of a refrigerator car, which opened when passing him.
Sept.	..	1	Pa.	110.—One injured. While unloading switch timbers this man's glove caught on a nail, pulling him from the car. Slightly injured.
Sept.	..	1	C. R. R.	111.—One injured. Drill engine allowed two parlor cars to come together hard, causing porter to strike his head against partition.
Sept.	..	1	N. Y. S. & W.	112.—One injured. Brakeman while trucking a casting weighing about 250 pounds from car to platform plank, slipped and truck casting fell between platform, bruising his ankle.
Oct.	..	1	D. L. & W.	113.—One injured. Engine going to coal pockets and injured party either got feet caught in frog or fell from pilot of engine. Right foot badly injured.
Oct.	..	1	L. & H. R.	114.—One injured. Car repairer, while blocking wheels of car, struck the end of a wooden block with his hand, with the thought of taking up all the slack. Nail projected from the edge of block and pierced his hand about one and one-half inches.
Oct.	..	1	W. S.	115.—One injured. Trainman on train 20 closed the door on his hand, cutting off one of his fingers.
Oct.	..	1	C. R. R.	116.—One injured. While engine 99 was drilling cars in Jersey City yard driller went between cars at head end of fix knuckle. While he was doing so the engine was signalled to back up and he was crushed between the cars and injured.
Oct.	..	1	Pa.	117.—One injured. Engineman while oiling his engine allowed his oil can to come in contact with the shoe frame causing an arc and burning four fingers and the back of his right hand.

Oct.	..	1	N. Y. S. & W.	118.—One injured. Conductor while stepping from running board on engine 124 stepped on a bolt that projected from the floor of the cab, and sprained his ankle.
Oct.	..	1	P. & R.	119.—One injured. Fire cleaner, in getting off passenger engine 220 on ash track in Trenton yard, stepped into a water valve box, sustained fracture of the second rib and right side.
Oct.	..	1	P. & R.	120.—One injured. Coal handler while at work on Pier 1, attempted to cross the tracks between two empty cars at Chute 1, and was crushed, receiving fatal injuries. Port Reading yard.
Oct.	..	1	Pa.	121.—One injured. Man claimed that the suction of train 2148 at Clinton St. station, Trenton, threw him against the side of the waiting room, fracturing his left arm.
Nov.	..	1	C. R. R.	122.—One injured. Driller was drilling cars in Elizabethport shop yard, when he was squeezed between two cars, caused by cars coming together on account of drawhead on car next to engine parting from the engine.
Nov.	..	1	P. & R.	123.—One injured. Brakeman was struck by hook on the end of a pulling rope attached to side of car, which came off, striking the brakeman.
Nov.	..	1	N. Y. S & W.	124.—One injured. While unloading iron, brakeman in the act of throwing piece out of car door, when it fell and struck him on the left foot.
Nov.	..	1	Pa.	125.—One injured. Brakeman slipped while engine was taking water. Fell across the valve of the plug, injuring his right leg. Millstone Jct., New Brunswick.
Nov.	..	1	Pa.	126.—One injured. Laborer while assisting in moving a hand truck, fell off the truck, which ran over him, fracturing his left leg. About one mile north of Stockton.
Nov.	..	1	Erie	127.—One injured. Mason's helper was loading stone into a wheelbarrow between tracks. Engine 2526 struck the wheelbarrow, knocking the man down, breaking his left ankle.
Nov.	..	1	C. R. R.	128.—One injured. While car inspector was coupling air hose of cars in Train 95, drill engine 29 dropped two cars against the train, and inspector was caught between the cars and injured.
Nov.	..	1	Pa.	129.—One injured. Conductor was struck by a freight house door at Phillipsburg, N. J., injuring his head.
Nov.	..	1	Erie	130.—One injured. Laborer had his foot injured by a lever he was using to try to stop car.
Nov.	..	1	D. L. & W.	131.—One injured. Rails shifted in work train, catching and crushing right foot of trainman. Port Morris yard.
				132.—Four other casualties charged to this group, for which no details are given.

In the consideration of the main group classes as due to other causes it has been necessary to eliminate the 100 casualties due to falling from cars or engines, the 13 casualties in connection with the throwing of switches, 47 of the 52 casualties from defective equipment (group No. 6 is classed as possibly relevant) the 33 casualties in connection with things other than the operation of trains and 138 of the 150 casualties remaining (casualties numbered 23, 32, 35, 37, 42, 64, 81 and 84 and group 134 are classed as possibly relevant) as having no conceivable remedy in a larger train-crew.

It is necessary, therefore, to brush off the table at least 1134 (e. g. 331 of the 344 within this group plus the 803 already eliminated) from the 1166 or 97.3% as having no conceivable preventative in a "full-crew" law. It is not possible to proceed further and analyze the remaining 32 casualties to determine whether they are relevant or not relevant. Because of more detailed information relative to these remaining casualties they must be assumed as being conceivably relevant. But granting that they have a conceivable relation to the size of a train-crew there would still remain the tasks of ascertaining whether or not they actually occurred on trains which were manned below the "full-crew" requirements and whether the additional brakeman would actually have prevented them.

Summary.

A thorough analysis of the 1166 casualties occurring in connection with the railroads has been made by segregating each single cause of casualties. This study makes it necessary to eliminate the 572 casualties due to the general classes known as trespassing on right-of-way, at bridges and tunnels, crossing tracks at highway, and being struck by locomotive or cars as being wholly irrelevant. Further and more thorough examination makes it necessary to eliminate the 105 collision casualties, the 16 derailment casualties, 28 of the 29 coupling casualties and 331 of the 348 casualties due to other causes, as having no conceivable remedy in larger train-crews. This leaves 32 casualties as possibly relevant to the size of train-crews and 1134 casualties as entirely without the scope of "full-crew" remedies.

STUDY OF NEW JERSEY CASUALTIES BY METHOD OF COMPARISON.

It is pointed out by proponents of the "full-crew" law that the total number of casualties in 1912 (*a*) was 1166 and in 1913 it was 1019, showing a net decrease of 147. This is certainly a commendable showing for the cause of casualty reduction. On the surface of this statement it would appear that the "full-crew" law in New Jersey was largely instrumental in bringing about this reduction.

In attempting to determine the cause of this decrease it is necessary to know in what classes of casualties decreases occurred. This can best be set forth by the following table:

COMPARISON OF SEGREGATED CLASSES OF NEW JERSEY CASUALTIES FOR 1912 AND 1913.

I. Collisions.

	1911-12	1912-13	Decrease	Increase
1. Switching	20	8	12	..
2. Personal carlessness ...	37	7	30	..
3. Others	48	34	14	..
Total 105		49	Net, 56	

II. Derailments.

	1911-12	1912-13	Decrease	Increase
1. Defect in equipment....	..	1	..	1
2. Switching	5	6	..	1
3. Personal carelessness ..	4	1	3	..
4. Others	7	13	..	6
Total 16		21		Net, 5

III. Coupling or Uncoupling Cars.

	1911-12	1912-13	Decrease	Increase
1. Adjusting coupler with foot	4	4	..	..
2. Uncoupling without using lever	7	3	4	..
3. Uncoupling moving cars, losing footing	..	2	..	2
4. Caught between cars....	7	6	1	..
5. Others	11	23	..	12
Total 29		38		Net, 9

IV. Getting On or Off Trains.

	1911-12	1912-13	Decrease	Increase
1. Passengers getting on moving trains.....	16	12	4	..

(*a*) Year ending Nov. 30, 1912.

2. Passengers getting off moving trains	23	17	6	..
3. Trainmen getting on or off engines or cars	32	27	5	..
4. Slipping on steps	10	6	4	..
5. Others	20	20	..	..
Total	101	82	19	

V. Trespassing On Right-of-Way.

	1911-12	1912-13	Decrease	Increase
1. Walking on tracks	110	117	..	7
2. Crossing tracks	38	33	5	..
3. Stealing ride on trains	42	61	..	19
4. Others	77	65	12	..
Total	267	276		Net, 9

VI. Struck by Locomotive or Cars.

	1911-12	1912-13	Decrease	Increase
1. Working on tracks	57	69	..	12
2. Care and operation of trains	28	40	..	12
3. Others	52	44	8	..
Total	137	153		Net, 16

VII. Crossing Track at Highway.

	1911-12	1912-13	Decrease	Increase
1. Pedestrians struck	38	52	..	14
2. Vehicles struck	94	107	..	13
3. Others	16	12	4	..
Total	148	171		Net, 23

VIII. At Bridges and Tunnels.

	1911-12	1912-13	Decrease	Increase
1. Overhead obstruction	12	15	..	3
2. Side obstruction	2	1	1	..
3. Others	1	8	..	7
Total	15	24		Net, 9

IX. Other Causes.

	1911-12	1912-13	Decrease	Increase
1. Falling from cars or engine	100	78	22	..
2. Throwing switches	13	9	4	..
3. Defective equipment	52	12	40	..
4. Other than in connection with operation of trains	33	8	25	..
5. Others	150	98	48	..
Total	348	205	Net, 143	

From this comparison of 1912 and 1913 casualties it is apparent that six of the main classes sustained increases and three sustained decreases. The three classes sustaining decreases are among those considered relevant to the size of train-crew. Two other classes, derailments, and coupling and uncoupling, considered as conceivably relevant throughout this report, show actual increases. Opponents of the law would go so far as to charge these increases to the law but this cannot be done any more logically than can certain reductions in irrelevant classes be credited to the law. These two classes will be considered as relevant and the assumption will be made that the increases are due to something other than the law. Deducting the total increases from the total decreases leaves a net decrease of 147 casualties in 1913 over 1912.

Because of the fact that very appreciable increases occur in some relevant as well as in some irrelevant sub-classes and at the same time large decreases occur in relevant as well as in irrelevant sub-classes it is impossible exactly to determine to what extent the decrease occurred in so-called relevant sub-causes.

Although 1913 is generally considered a "full-crew" year the law did not go into effect until May 1, 1913. Consequently, the casualties occurring during that portion of the year prior to May 1, were in no way affected by the law.

Whatever effect the law may have on the 1913 casualty list began after May 1. Comparing the casualties of the two years by months will bring us nearer a determination of the effects of the law in bringing about the net reduction. Below is a table comparing 1912 and 1913 casualties segregated by months. (*a*).

COMPARISON OF NEW JERSEY CASUALTIES IN 1912 AND 1913 SEGREGATED BY MONTHS.

Month	1911-12	1912-13
December	135	93
January	109	69
February	81	65
March	87	63
April	81	79
May	48	78
June	91	113
July	122	105
August	97	98
September	128	86
October	100	88
November	87	82
Total	1166	1019

The total number of casualties before May 1 in 1912 was 493, while the casualties in the corresponding period in 1913 were 369, showing a net reduction of 124 in the part of the year before the law went into effect. The total number of casualties in the seven months after May 1, 1912, was 673, while the total number during the corresponding period of 1913 was 650. None of the reduction prior to May 1 could have been due to the law. Consequently it is impossible that more than 23 out of the total reduction of 147 casualties could have been due to the law.

The following table is given to compare New Jersey casualties from 1911 to 1915, inclusive. (*b*) There was a reduction of 23 in the casualty list of 1913 over 1912 due to all causes during that part of the year 1913 in which the law was in effect. The reduction due to the law itself may have helped but it is reasonable to assume that the forces reducing the casualty list by 124 in the first five months of the year were largely responsible for the latter reduction of 23. Comparing four of the relevant classes of casualties (e. g. collisions, derailments, coupling and uncoupling and getting on or off cars) in 1914 and 1915 to 1913, shows that in 1913 there were 190 casualties from these causes, in 1914 there were 202 casualties from these causes and in 1915 there were 175 from these

(*a*) Summary sheets of New Jersey Railroad casualties in Public Utility Commission files.

(*b*)	1911.	1912.	1913.	1914.	1915.	1916.
Collisions	106	105	49	49	51	109
Crossing track	102	148	171	139	170	211
Derailments	129	16	21	38	27	27
At bridges and tunnels	21	15	24	16	4	22
Struck by locomotives or cars	151	137	153	116	68	189
Getting on or off trains	97	101	82	86	80	235
Coupling or uncoupling cars	44	29	38	29	17	73
Other causes	319	348	205	106	156	377
Trespassing on right of way	305	267	276	298	301	280
	1274	1166	1019	877	874	1523

causes. This indicates that "full-crew" legislation can hardly have affected these classes at all. What consistent reductions have been brought about in relevant classes since 1913, have been effected in that class known as other causes. An examination of the 344 casualties in 1912 due to other causes shows that not over 2.7% of this whole class are conceivably relevant. Hence in the reductions of 1913, 1914 and 1915 over any previous year, not over 2.7% of cases could conceivably have been affected by the "full-crew" law. This calculation varies slightly on account of variations in traffic and mileage which occurred during this period. (a) It is evident, however, from a comparison of traffic and mileage that only a very small per cent. of whatever real or numerical reduction actually occurred, could conceivably have changed the conclusion on the law.

LEHIGH VALLEY RAILROAD COMPANY.

Answer No. 7.

Fiscal year.	Coal and other freight—Tons.	Coal and other freight—Tons one mile.
1911.....	12,198,699	762,400,682
1912.....	11,884,426	752,897,879
1913.....	13,576,257	856,218,980
1914.....	12,560,784	789,956,079
1915.....	13,186,373	822,296,623
1916.....	14,787,367	940,805,829

Answer No. 8.

	Passengers—Number.	Passengers—Carried one mile.
1911.....	1,012,669	52,466,357
1912.....	1,034,591	53,674,602
1913.....	1,009,677	56,541,924
1914.....	987,410	49,123,648
1915.....	819,350	43,024,048
1916.....	840,806	44,150,726

ERIE RAILROAD COMPANY.

Answer No. 7.

Calendar year	Freight train mileage.	Freight train mileage.
1911.....	900,297	959,026,794
1912.....	908,721	1,013,579,231
1913.....	816,069	1,026,219,087
1914.....	776,960	1,000,360,420
1915.....	768,505	1,031,495,517

Answer No. 8.

	Passenger train mileage.	Total passengers carried.
1911.....	2,264,346	26,096,388
1912.....	2,281,500	26,676,511
1913.....	2,307,209	27,144,623
1914.....	2,283,032	27,000,500
1915.....	2,285,699	27,188,144

THE BALTIMORE & NEW YORK RAILWAY COMPANY.

Answer No. 7.

Year.	Freight train miles.	Gross tons handles one mile.
1911.....	35,199	23,302,497
1912.....	38,110	26,129,015
1913.....	39,337	26,102,594
1914.....	39,853	26,262,170
1915.....	39,077	28,615,862
1916.....	42,224	50,906,378

THE DELAWARE, LACKAWANNA & WESTERN RAILROAD COMPANY.

(a) A table given above in this report gives figures showing traffic and mileage.

Answer No. 7.

FREIGHT SERVICE.

Year.	Tons of freight carried.	Number of tons carried one mile.
1911.....	10,108,201	635,848,335
1912.....	10,262,029	590,484,292
1913.....	10,782,735	609,041,241
1914.....	10,021,312	575,436,019
1915.....	10,671,509	634,692,863

Answer No. 8.

PASSENGER SERVICE.

	Number of passengers carried.	Number of passengers carried one mile.
1911.....	24,007,922	353,363,726
1912.....	22,863,822	342,445,646
1913.....	22,601,758	347,965,408
1914.....	21,989,531	343,506,342
1915.....	21,395,827	337,482,056

CENTRAL RAILROAD COMPANY OF NEW JERSEY.

Answer No. 7.

Year.	Freight train mileage.	Tons freight moved.
1911.....	2,244,113	25,506,896
1912.....	2,366,062	26,541,825
1913.....	2,458,911	28,787,800
1914.....	2,311,151	28,010,356
1915.....	2,247,436	26,894,863
1916.....	2,633,648	31,965,364

Answer No. 8.

	Passenger train mileage.	Passengers carried.
1911.....	4,075,960	25,101,054
1912.....	4,154,537	25,703,020
1913.....	4,138,678	26,178,785
1914.....	4,276,812	26,399,005
1915.....	4,216,248	24,845,703
1916.....	4,271,502	27,222,343

THE LEHIGH & HUDSON RIVER RAILWAY COMPANY.

Answers Nos. 7 and 8.

We are unable to supply the data as to tonnage and number of passengers carried in New Jersey. We are also unable to separate the mileage between passenger and freight. Our total train mileage, passenger and freight, in New Jersey for the years 1911 to date, are as follows:

1911	439,314
1912	502,380
1913	548,571
1914	523,772
1915	499,932
1916	550,220

PHILADELPHIA & READING RAILWAY COMPANY.

Answer No. 7.

Year.	Freight tonnage.	Freight mileage.
1911.....	712,731,774	1,223,138
1912.....	869,699,627	1,202,577
1913.....	836,581,844	1,177,524
1914.....	835,695,714	1,243,544
1915.....	912,778,649	1,205,942
1916.....	707,793,591	882,195

Answer No. 8.

	Passengers carried.	Passenger mileage.
1911.....	4,508,547	1,788,232
1912.....	4,650,819	1,896,382
1913.....	5,528,976	1,922,719
1914.....	5,253,186	1,958,381
1915.....	4,900,374	1,920,655
1916.....	4,572,330	1,689,367

Summary and Conclusions.

The casualty list of 1913 (first "full-crew" year) shows a reduction of 147 as compared with the list for 1912. A segregation of casualties by months shows that all but 23 of this reduction was effected by a combination of other preventatives before the law became effective in 1913. The only considerable numerical reduction in 1914 and 1915 among relevant classes was in the class, "Other Causes." But not over 3% of this whole class was such in 1912 as could be considered relevant, consequently not over 3% of the reductions could conceivably have been effected by the law. The marked decrease in casualties in irrelevant classes would indicate that some other potent and effective safety measures are greatly reducing the casualty list.

Summary of New Jersey

There are two methods along which it is quite possible to test out the merits of the New Jersey "full-crew" law as a safety measure. The one involves an exhaustive analysis of the causes for railroad casualties, as they normally occurred in that state prior to the law. The object of this study is to determine whether those causes are such as might conceivably have been prevented by a "full-crew" law. The other involves a comparison of casualties occurring subsequent to the enactment of the law with those occurring previously. In order to effect these two studies, expert investigators were set to the task of examining the individual cause for each railroad casualty which occurred in New Jersey during the last year without the law (1912) and the first year under the law (1913).

An examination of the cause for each of the eleven hundred and sixty-six (1166) casualties which occurred in New Jersey during 1912 shows that at least 1134 of those 1166 casualties had their origin in such a cause as could not conceivably have been prevented by a "full-crew" law. This makes it clear that at least 97.3% of the New Jersey casualties may be brushed off the board as having no solution in the law. Whether the remaining 2.7% (32 casualties) were relevant or not cannot be said for lack of more definite information. But assuming that they are all relevant, there would still be left the tasks of ascertaining whether or not they actually occurred on trains which were manned below the "full-crew" requirements, and if so, whether the additional brakeman would actually have prevented them.

A comparison of the casualties occurring in New Jersey during the year 1912 (ending Nov. 30), the year just prior to the enactment of the "full-crew" law, with those occurring during the year 1913, the first year under the law, shows that there was a reduction of 147 casualties (1166-1019). It would seem on its face that the "full-crew" law had effected a reduction of 147 casualties during the first year of operation. But the reduction of 124 of those 147 casualties was effected before May 1, 1913, when the law went into effect, and must, therefore, have been reduced through other media.

Pennsylvania

The legislature of the Commonwealth of Pennsylvania enacted one of the first and more stringent of the "full-crew" laws at its bi-ennial session in 1911 and the statute became operative on July 19th of that year. The long experience with the law in Pennsylvania, the fact that it represents "full-crew" statutory regulation at its best, and the unusual accuracy and completeness of the official records in Pennsylvania, all go to make that state an ideal ground upon which to test the efficacy of the law as a safety measure. There are few states which afford the possibility for as scientific an investigation of this subject as does Pennsylvania.

A comparison has been made below of railroad casualties in Pennsylvania for the years 1908, 1909, 1910 and 1911, before the statute became operative, with the casualties for 1912, 1913 and 1914, subsequent to its operation (*a*). This data, which has been compiled officially by the Commonwealth, may be found in the annual reports of the Pennsylvania State Railroad Commission up to the year 1913, when that Commission was abolished, and after that date in the reports of the then created Public Service Commission.

(a) The 1915 report has not yet been published.

Annual Casualties in Pennsylvania.

A list of the total railroad casualties in the Commonwealth of Pennsylvania as shown by the state reports (*a*) is given for the last several years, beginning with 1908. The reports from 1908 to 1912, inclusive, show casualties as of the year ending December 31, but in 1912 the fiscal year was changed to as of June 30, and for that reason the 1913 report shows casualties for from January 1st to July 26th only, and the 1914 report from July 26, 1913 to June 30th only. The later reports will show casualties for each year ending June 30th.

RAILROAD CASUALTIES IN PENNSYLVANIA.

Year ending Dec. 31, 1908	9,273	casualties
" " " " 1909	9,867	"
" " " " 1910	11,144	"
" " " " 1911	9,563	"
" " " " 1912	12,213	"
Jan. 1 to July 26, 1913 (7 mo.)	7,279	"
July 26 to June 30, 1914 (11 mo.)	10,190	"

A curve of the Pennsylvania casualties shows that there has been an unmistakable increase since the enactment of the 1911 law. When the law was passed in that year it was expected that a great reduction would be effected in the year immediately following. Any merit which the law might have should have shown then. The decline, in other words, should have been evident suddenly. But instead of a decline, there was a decided jump of almost three thousand in the casualty list in the year just subsequent to the enactment of the law.

There was another increase in the casualties during the second "full-crew" year of 1913, and in 1914 there was an increase in casualties over the four years preceding the enactment of the law. The apparent declines which show in the total casualties for 1913 and 1914 in the above table are not real, but appear because the 1913 report covered seven months only and the 1914 report eleven months.

The railroads have sometimes been unfair in attributing the increase in casualties since the enactment of the law to the operation of the law itself. There would seem to be no factual basis, however, to blind one's eyes to the very marked jump in the Pennsylvania casualty list which appeared just after the passage of the "full-crew" law and has been sustained since. This does not prove that the increases were attributable to the law. It does mean, other factors considered, that the law has been a conspicuous failure in reducing the whole number of railroad casualties in that commonwealth.

Railroad Mileage in Pennsylvania.

The common explanation given for the increase in casualties in Pennsylvania is that there has been such an increase in mileage, that while numerically the casualties have not been reduced by the "full-crew" law, yet proportionately they have been. This contention does not hold, however. In 1910, which was one year before the passage of the law, Pennsylvania had 11,290.17 units of railroad line; in 1913 that mileage had been increased to only 11,507.59 miles, and in 1914 to only 11,634.05 miles (*b*)

Traffic on Railroads.

The only other explanation, aside from an increase in mileage, which has been advanced to prove that the casualty list in Pennsylvania has had only a numerical and not a propor-

(a) The reports of the Railroad Commission for the years 1908, 1909, 1910, 1911 and 1912, and the reports of the Public Service Commission for the years 1913 and 1914.

(b) Statistical abstract of the United States for 1915, page 271, No. 183. This mileage is exclusive in each case of switching and terminal companies.

tional increase since the advent of the "full-crew" law is the increases in traffic. The Public Service Commission, although requested, have not as yet worked out comparative railroad traffic tables. (a)

Computations for the Commonwealth.

A study of the comparisons of the number of passengers reported as carried, however, the passengers carried per mile, the passengers carried one mile per mile of line, the tons carried, the mileage of revenue passenger trains, average number of passengers in train, mileage of revenue freight trains, average tonnage, average haul per ton and the total revenue train mileage and total mileage of freight cars for the country, as prepared by the Department of Commerce, does not seem to substantiate that argument. (a)

(a) Letter from Public Service Commission, signed by Coleman J. Joyce, Chief of Bureau of Accounts and Statistics, and dated August 9, 1916.

(a) The following is an excerpt from the United States Statistical Abstract for 1915, page 276.

Traffic on Railroads: Analysis of Statistics of Passenger and Freight Services, Years Ended June 30, 1910 to 1914

ITEM	1910	1911	1912	1913	1914
Number of passengers reported as carried	971,683,199	997,409,882	1,004,081,346	1,033,679,680	1,053,138,718
Passengers carried 1 mile	32,338,496,329	33,201,694,699	33,132,354,783	34,575,872,980	35,258,497,509
Passengers carried 1 mile per mile of line	138,169	139,191	136,699	143,067	144,278
Tons carried:					
Number of tons reported as carried	1,849,900,101	1,781,638,043	1,844,977,673	2,058,035,487	1,976,138,155
Number of tons reported as carried, excluding tonnage received from connecting roads and other carriers	1,026,491,782	1,003,053,893	1,031,206,606	1,160,862,756	1,109,271,040
Tons carried 1 mile	255,016,910,451	253,783,701,839	264,080,745,058	301,398,752,108	288,319,890,210
Tons carried 1 mile per mile of line	1,071,086	1,053,566	1,078,580	1,245,158	1,176,923
Mileage of revenue passenger trains	549,015,003	572,929,421	585,853,528	593,061,212	602,388,660
Average number of passengers in train	56	55	53	55	56
Average journey per passenger, miles	33.50	33.48	33.18	33.58	33.61
Mileage of revenue freight trains	635,450,681	626,496,025	612,345,112	643,841,292	605,923,249
Average number of tons in train	380.38	383.10	406.76	445.43	451.80
Average haul per train:					
Typical haul of the average railway, miles	138.31	142.88	143.44	146,59	146.04
Typical haul of all the railways regarded as a system, miles	249.68	254.10	256.87	259.99	260.19
Mileage of revenue mixed trains	35,807,207	36,461,466	37,127,992	32,907,378	32,565,313
Total revenue train mileage	1,221,852,647	1,237,500,138	1,236,758,715	1,271,220,178	1,242,080,241
Total mileage of freight cars	18,981,573,779	19,315,156,130	19,466,402,067	21,034,670,482	20,796,894,831

Analysis of Casualties in Pennsylvania.

A general study has been made above to determine the effect of the "full-crew" law of 1911 on the casualty list of Pennsylvania. It was found that that law has not operated to reduce the whole number of railroad casualties in the commonwealth during the last five years; but statistical totals often belie their own significance and it is important that no stone be left unturned in testing out the truthful merits of the Pennsylvania law as a practical safety measure. A detailed segregation, accordingly, of the above totals will be made to determine whether the law has had merits that did not show in the overwhelming totals. This is really a more detailed extension of the first study and involves an investigation of the classes or causes for all Pennsylvania casualties to determine the prevalence of those casualties which might conceivably have been prevented by a "full-crew" law and also a study of the actual effect which the law has had in reducing these classes of casualties.

The following classification, which was compiled from the reports of the Railroad Commission of Pennsylvania and the Public Service Commission segregates all railroad casualties for the last several years into their fifteen chief causes. (a)

Pennsylvania Casualties.

Causes.	1909	1910	1911	1912	(b) 7 mo. 1913	(c) 11 mo. 1914
Collision	438	526	440	531	250	552
Grade crossing	362	262	266	358	219	301
Derailment	256	315	209	322	101	116
Parting of trains	26	43	48	37	25	30
At stations or loading platforms	118	360	429	545	333	287
Defect or failure of roadway or equipment	200	254	260	256	103	146
Switching	358	521	482	597	334	701
Struck by overhead or side obstruction	233	299	265	321	206	224
Repairing track or roadbed	631	914	844	1,085	641	925
Handling freight or baggage	794	845	727	1,025	675	739
Coupling or uncoupling cars	311	380	415	347	188	246
Falling from train	999	1,200	920	1,099	660	1,022
Struck by train	1,474	1,479	1,246	1,371	778	1,212
Miscellaneous causes	2,427	2,567	1,973	3,008	1,986	2,242
Jumping on or off train	1,240	1,279	1,039	1,311	780	1,247
Total	9,867	11,144	9,563	12,213	7,279	10,190

(a) The reports of the Railroad Commission of the Commonwealth of Pennsylvania for 1909, 1910, 1911 and 1912 and the reports of the Public Service Comission for 1913 and 1914. The report for 1915 is not yet completed.

(b) This includes the seven months from Jan. 1, 1913, to July 21, 1913.

(c) This includes eleven months, from July 26, 1913, to June 30, 1914.

A perusal of the fifteen classes of casualties in 1911 makes it evident that at least eight (a) classes have no conceivable relation to the size of the train-crew, and that there were increases in all of the important remaining classes in 1912. A tabulation is given of the remaining classes of casualties below showing the number occurring in 1911 just prior to the enactment of the law and the numbers in 1912 just subsequent.

	1911.	1912.	Increase.	Decrease.
1. Collisions	440	531	91	..
2. Derailments	209	322	113	..
3. Parting of trains	48	37	..	11
4. Switching	482	597	115	..
5. Coupling or uncoupling	415	347	..	68
6. Miscellaneous	1973	3008	1035	..
7. Defect or failure of roadway or equipment	260	256	..	4
Totals	3827	5098	1354	83

Conclusion for Pennsylvania

The official statistics of railroad casualties in Pennsylvania show that despite the enactment of an unusually rigid "full-crew" law in 1911 to reduce casualties, that list bounded from 9,563 to 12,213 deaths and injuries during the first year under the law. This was for 1912, the year which had been expected to register a sudden reduction since the casualties would have been reduced immediately if ever. The increase, moreover, was real and not explained by mileage and traffic increases. The casualties in Pennsylvania have been steadily higher since the enactment of the law. It is not here intended to attribute the increase in Pennsylvania casualties to the "full-crew" law. It is clear, however, that in so far as the law was enacted as a safety measure designed to reduce the whole number of railroad casualties in Pennsylvania, it has been a conspicuous failure.

New York

The legislature of New York enacted its first and present "full-crew" law at the annual session in 1913. The passage of the bill was based upon the cry against the enormous casualty

(a) Those occurring of grade crossings, at stations or loading platforms, being struck by overhead or side obstructions, repairing track or roadbed, handling freight or baggage, falling from train, and jumping on or off trains and those due to being struck by trains.

list and the desire to secure greater safety on the railroads. The new law went into effect in the Spring of 1913, and it is interesting to note at the outset that there were 7,432 casualties during the year just prior to the enactment of the law (year ending June 30, 1913) and 5,704 casualties during the year just subsequent (year ending June 30, 1914). The significance of this reduction has been proclaimed by the proponents and denied by the opponents of the law. There is no better method by which to determine the efficacy of the law as a safety measure than through an intensive study of the causes for railroad casualties in New York and through an analytical comparison of casualty statistics for a period prior to the enactment of the law with those for a period subsequent.

New York Casualties.

Year ending June 30, 1912	5211
" " " 30, 1913	7432
" " " 30, 1914	5704

Year ended	Number	Passengers K.	Passengers I.	Employees K.	Employees I.	Trespassers K.	Trespassers I.	Non-Trespassers K.	Non-Trespassers I.	Total K.	Total I.
June 30, 1912	5,272	*45	945	280	2,690	422	358	124	347	871	4,340
June 30, 1913	7,626	†51	1,748	250	3,760	393	409	129	692	823	6,609
June 30, 1914	6,249	14	956	197	3,031	344	353	143	666	698	5,006
June 30, 1915	4,988	9	833	142	2,144	333	382	103	506	587	3,865

*This includes 28 passengers killed at Manchester on L. V. R. R. on Aug. 28, 1911, when a train was derailed by broken rail.

†This includes 39 passengers killed July 4, 1912, near Corning on the D. L. & W. R. R., when the engineman disobeyed the signal set against him.

A general perusal of the casualties in New York shows that during the years 1912-1913 and 1913-14, the above totals may be grouped into twenty-three general classes. (*a*)

(*a*) The reports of the Public Service Commission for the Second District, New York, for the year ending June 30, 1913 (pages 178-187) and that ending June 30, 1914 (pages 138-145) segregate the annual casualties of those years into the following twenty-three general classes:

	1912-13.	1913-14.
1. Personal injuries received while on or about trains, but not resulting from an accident to a train	3614	3094
2. Personal injuries received while on track or adjacent thereto, either from contact with trains or other causes	2270	2063
3. Derailments to passenger trains	414	48
4. Derailments to freight trains	79	80
5. Derailments of engines and cars while switching	None	None
6. Butting collisions between passenger trains	77	None
7. Butting collisions between passenger and freight trains	70	54
8. Butting collisions between freight trains	42	17
9. Rear-end collisions between passenger trains	197	6
10. Rear-end collisions between passenger and freight trains	127	50
11. Rear-end collisions between freight trains	115	43
12. Side collisions between passenger and freight trains	18	1
13. Side collisions between freight trains	58	34
14. Switching collisions between passenger trains	23	58
15. Switching collisions between passenger and freight trains	26	None
16. Switching collisions between freight trains	52	4
17. Switching collisions between cars	1	None
18. Collisions with hand cars	9	10
19. Collisions at grade crossings, steam railroads	None	1
20. Collisions at grade crossings, steam with electric	12	15
21. Collisions with movable objects adjacent to tracks	6	None
22. Accidents resulting from defective equipment	122	92
23. Other accidents	100	34
	7432	5704

The number of casualties. The following table shows the annual casualties of the railroads in the second district of New York State for the years ending June 30, 1912, 1913, 1914 and 1915. (*a*) It is not possible to tabulate the earlier casualties since railroad accidents were not reported comprehensively in that state prior to July 1, 1911. (*b*)

(*a*) The Second District embraces all territory outside of New York City. No tabulation for the First District, which is New York City, is here included because the number of steam railroad casualties in the city is comparatively negligible. The "full-crew" law, moreover, does not materially affect the city of New York.

(*b*) Reports of New York Public Service Commission for Second District for 1912-13-14 and 15.

Year ending June 30, 1915 ..... 4452 (*c*)

(*c*) In a letter from Francis X. Disney, Secretary to the Public Service Commission of New York (Second District), dated May 17, 1916, the following segregations of the above totals is made:

It is very evident that there were decreases in a majority of the various classes of casualties just following the enactment of the "full-crew" law in that state. Some of the decreases are the natural decline only which might be expected by reason of a corresponding decrease in traffics or mileage (*d*) and some indicate far greater decreases than could be accounted for in that manner. (*e*).

(*d*) The statistical abstract of the United States for 1915 (p. 271) shows that railroad mileage in New York increased from a total of 8,511.38 miles in 1913 to a total of 8,530.14 in 1914. This represents an increase of 18.8 miles or about .21 percentum over 1913. The freight traffic decreased both as to tons of revenue freight carried and ton units of freight carried. The former decreased from 504,108,057 tons to 473,327,605 tons, or decrease of 6.1 percentum over 1913 and the latter decreased from 75,499,482,601 tons to 70,653,903,305 tons, or a decreasing 6.4 percentum over 1913. (b) The number of passengers carried increased from 404,766,797 in 1913 to 409,209,267 in 1914, or an increase of 1.1 percentum, and the total revenue passenger miles increased from 9,754,389,107 to 9,902,213,423, or an increase of 15. percentum over 1913. It may be said in summary that the mileage in 1914 increased .21 percentum over that in 1913, the freight traffic decreased 6.25 percentum, and the passenger increased 1.25 percentum. Rating these three factors (mileage, freight traffic and passenger service) as equal bases, it may be said that the combined mileage, freight traffic and passenger service of 1914 represents a collective decrease of 3.85 percentum over 1913.

(*e*) The eighth annual report (1914) of the Public Service Commission, p. 124, shows the following statistics relative to the traffic conditions in New York in 1913 and in 1914:

	1913.		1914.
1. Tons of revenue freight carried	504,108,057		473,327,605
Increase or decrease over preceding year	I 56,133,006		D 30,780,452
Per cent. of increase or decrease	I 12.5%		D 6.1%
2. Ton-miles of freight carried	75,499,482,601		70,653,903,305
Increase or decrease preceding year	9,387,619,873	D	4,845,579,296
Per cent. of increase or decrease	14.2%	D	6.4%
3. Passengers carried	404,766,797		409,209,267
Increase or decrease over preceding year	17,022,796	D	4,442,470
Per cent. in increase or decrease	4.4%		1.1%
4. Total revenue passenger miles	9,754,389,107		9,902,213,423
Increase or decrease over preceding year	503,056,217		147,824,316
Per cent. of increase or decrease	5.4%		1.5%

The precise effect which the "full-crew" law of New York has had upon railroad casualties of that state may be determined rather accurately by two methods. The one test involves careful analysis of each general and minor cause which occasioned the casualties during the year just prior to the operation of the law, and the elimination of irrelevant casualties. The study should itself show whether those causes were such as had even a conceivable solution through the law. The other test involves an intensive comparison of the number of casualties occurring in each general and minor class during the year just prior to the enactment of this law with those occurring in the year just subsequent. That study should show as a matter of fact and in juxtaposition to a matter of theory, whether the law has effected reductions and how many. These two tests, although very much related, are quite distinct and separate methods. The second method has been adopted in this study.

COMPARISON OF NEW YORK CASUALTIES BEFORE AND AFTER THE "FULL-CREW" LAW.

I.

PERSONAL INJURIES RECEIVED WHILE ON OR ABOUT TRAINS, BUT NOT RESULTING FROM AN ACCIDENT TO A TRAIN.

	1912-13.	1913-14.	Decrease.	Increase.
1. Falling from trains, engines, or cars	422	372	50	..
2. Getting on or off trains while in motion	479	436	43	..
3. Getting on or off trains while not in motion	246	249	..	3
4. Injured in getting on or off trains by turning ankle, etc	125	74	51	..
5. Coming in contact with overhead bridges, wires, etc.	59	46	13	..
6. Striking signal poles, water cranes, coaling stations or other objects adjacent to tracks	115	53	62	..
7. Striking switch stands or interlocking appliances	44	16	28	..
8. Striking misplaced portions of passing trains, or cars not into clear	36	31	5	..
9. Striking cars etc. on adjacent tracks in proper position	59	50	9	..
10. Coming in contact with objects because of putting heads or arms out of windows	10	14	..	4
11. Struck by missiles thrown in windows	37	32	5	..
12. Injured by windows falling	42	34	8	..
13. Injured by parcels, bags, etc., falling from racks	17	18	..	1
14. Falling over bags, etc. placed in aisles	14	12	2	..
15. Catching fingers in doors, passenger cars	68	68	..	3
16. Catching fingers in doors, freight cars	14	17	..	3
17. Occurring while coupling or uncoupling	71	73	..	2
18. Caught between cars, buffer plates, couplings, etc.	148	107	41	..
19. Minor injuries to employees resulting from handling equipment where no defect in equipment existed	547	629	..	82
20. Resulting from setting hand brakes, no defect in equipment	96	80	16	..
21. Resulting from effect of emergency application of brakes	40	29	11	..
22. Injured on account of parting of train	11	35	..	24
23. Resulting from heavy service application of brakes	81	100	..	19
24. Resulting from taking up or letting out slack	63	41	22	..
25. Thrown from cars by unexpected movement	33	..	33	..
26. Thrown in passenger cars on account of sudden lurch, etc.	40	23	17	..
27. Falling out of berths in sleeping cars	6	6	..	..
28. Resulting from rough handling of cars	189	266	..	77
29. Resulting from loads shifting	31	25	7	..
30. Resulting from side stakes breaking, slipping or falling	2	2	..	..
31. Falling on tops of cars due to physical condition of same	20	17	3	..
32. Slipping or falling on tops of cars without cause	17	..	17	..
33. Resulting from handling freight while on trains	74	78	..	4
34. Other miscellaneous accidents	356	60	296	..
Totals	3614	3094	739	219

II.

PERSONAL INJURIES RECEIVED WHILE ON TRACK OR ADJACENT THERETO, EITHER FROM CONTACT WITH OTHER CAUSES.

	1912-13.	1913-14.	Decrease.	Increase.
1. Struck while on track by train	663	556	107	..
2. Suicide	6	5	1	..
3. Alighting from one train directly in front of another	14	13	1	..
4. Found dead on track, definite cause unknown	107	133	..	26
5. Found injured on track, definite cause unknown	21	25	..	4
6. Pedestrians at unprotected highway grade crossings	47	26	21	..
7. Pedestrians at highway grade crossings protected by bells	11	9	2	..
8. Pedestrians at highway grade crossings protected by flagmen	29	30	..	1
9. Pedestrians at highway grade crossings protected by gates	34	39	..	5
10. Vehicles at unprotected highway grade crossings	183	177	6	..
11. Vehicles at highway grade crossings protected by bells	33	47	..	14
12. Vehicles at highway grade crossings protected by flagmen	62	33	29	..
13. Vehicles at highway grade crossings protected by gates	25	24	1	..
14. Resulting from catching foot in frog	5	1	4	..
15. Resulting from catching foot in guard rail	1	4	..	3
16. Resulting from catching foot in switches or accessories	11	12	..	1
17. Resulting from catching foot in other track appliances	11	10	1	..
18. Stumbling over rails or ties in track	78	77	1	..
19. Stumbling over rails or ties not in track but adjacent thereto	82	13	69	..

20. Slipping on ice, etc. on station platform, stairs, etc.	106	108	..	2
21. Slipping on ice, etc., on track, bridges, etc.	72	76	..	4
22. Walking into turntable or engine pits	24	13	11	..
23. Coal, etc., falling from trains	34	36	..	2
24. Struck while standing on platform too close to track	6	2	4	..
25. Struck by open or loose car doors	10	4	6	..
26. Caught under cars while repairing them	21	18	3	..
27. Handling freight, tools or track material	173	132	41	..
28. Resulting from exploding of torpedoes	3	5	..	2
29. Other miscellaneous accidents	398	219	179	..
30. Resulting from vehicles running into sides of trains	..	8	..	8
31. Coming in contact with crossing gates	..	28	..	28
32. Mail pouch thrown from passing trains	..	11	..	11
33. Injured while throwing switch	..	70	..	70
34. Injured while engaged in construction work	..	99	..	99
Totals	2270	2063	487	280

25. Defective locomotive machinery trucks	..	..	..	..
26. Defective or broken locomotive trucks	..	..	..	..
27. Defective or broken locomotive wheels	..	..	..	..
28. Defective or hot locomotive journal	18	..	18	..
29. Defective locomotive axles	..	17	..	17
30. Defective or broken passenger car brakes	..	..	..	..
31. Defective or broken passenger car trucks	37	..	37	..
32. Defective or broken passenger car wheels	..	..	..	..
33. Defective or hot passenger car journals	..	..	..	..
34. Running off dead-ends or into bumping blocks	7	..	7	..
35. Foreign matter or snow and ice on tracks	..	..	..	..
36. Excessive speed	1	..	1	..
37. Unknown or unascertainable cause	49	2	47	..
38. Other miscellaneous accidents	5	1	4	..
39. Defective or broken freight car trucks	..	1	..	1
Totals	414	48	396	30

III.

DERAILMENTS TO PASSENGER TRAINS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Broken rails, main track	10	9	1	..
2. Poor alignment, main track	..	..	..	..
3. Poor surface, main track	234	..	234	..
4. Poor surface, yard or sidetracks	..	..	..	..
5. Rails spreading, yard or sidetracks	..	..	..	..
6. Track out of gauge, yard or sidetracks	..	..	..	..
7. Failure of roadbed, washouts, slides	35	..	35	..
8. Open switches	17	5	12	..
9. Switch or derail thrown under train	..	..	..	..
10. Picking switch	..	..	..	..
11. Switch improperly adjusted or locked	1	8	..	7
12. Swtich having been run through	..	..	..	..
13. Defective frog	..	..	..	..
14. Defective switch	..	..	..	..
15. Sharp flange	..	..	..	..
16. Switch set wrong, failure to observe signal governing	..	..	..	..
17. Too sharp curvature	..	..	..	..
18. Trucks too stiff, or failure of trucks to curve	..	..	..	..
19. Rolling off car	..	..	..	..
20. Running off derails, failure to observe position	..	..	..	..
21. Running off derails, failure to observe signal governing	..	..	..	..
22. Running off derails, failure of brakes to hold	..	..	..	..
23. Running off derails, failure of derail to operate properly	..	..	..	..
24. Running off derails, failure to stop early enough	..	5	..	5

IV.

DERAILMENTS TO FREIGHT TRAINS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Broken rail, main track	..	..	..	..
2. Broken rail. side track	..	..	..	..
3. Poor alignment, main track	..	..	..	..
4. Poor alignment, side track	..	..	..	..
5. Poor surface, main track	..	7	..	7
6. Insufficient superelevation	..	..	..	..
7. Rails spreading, main track	..	..	..	..
8. Rails spreading, side track	1	2	..	1
9. Track out of gauge, side track	..	..	..	..
10. Failure of roadbed, washouts, slides	3	1	2	..
11. Open switches	3	..	3	..
12. Switch or derail thrown under train	2	1	1	..
13. Picking switch	2	5	..	3
14. Switch improperly adjusted or locked	2	1	1	..
15. Switch having been run through	..	3	..	3
16. Defective frog	..	..	..	..
17. Defective switch	..	1	..	1
18. Defective or broken track appliances	1	2	..	1
19. Sharp flange	..	2	..	2
20. Switch set wrong, failure to observe signal governing	1	..	1	..
21. Too sharp curvature	4	..	4	..
22. Trucks too stiff, or failure of trucks to curve	2	..	2	..
23. Rolling off car	..	..	..	..
24. Load shifting	..	..	..	..
25. Running off derails, failure to observe position	1	1	..	..
26. Running off derails, failure to observe signal governing	2	3	..	..
27. Running off derails, failure of brakes to hold	..	..	..	..
28. Running off derails, failure to stop early enough	..	..	..	..
29. Running off end of rail, account rail removed from track	1	..	1	..

30. Defective locomotive brakes...	..	..	..	..
31. Defective or broken locomotive machinery	..	..	..	..
32. Defective or broken locomotive trucks	..	..	..	..
33. Defective or broken locomotive draft rigging	..	..	..	..
34. Defective or broken locomotive wheels	..	..	..	..
35. Defective or hot locomotive journals	..	..	..	..
36. Defective locomotive axles....	..	..	..	..
37. Defective or broken passenger car wheels	..	..	..	..
38. Defective or broken freight car brakes	6	13	..	7
39. Old or weak car bodies.....	1	..	1	..
40. Defective or broken freight car trucks	3	6	..	3
41. Defective or broken freight car draft rigging	7	2	5	..
42. Defective or broken freight car wheels	7	3	4	..
43. Defective or hot freight car journals	1	1	..	..
44. Defective or broken freight car axles	2	1	1	..
45. Running off dead-ends or into bumping blocks	..	1	..	1
46. Foreign matter or snow and ice on tracks	..	13	..	13
47. Emergency application of air-brakes	3	..	3	..
48. Buckling of trains, or slack running in	..	..	..	..
49. Train parting	3	..	3	..
50. Excessive speed	1	..	1	..
51. Unknown or unascertainable cause	12	8	4	..
52. Other miscellaneous accidents..	8	3	5	..
53. Poor surface, side track.....	..	1	..	1
Totals	79	80	42	43

V.

BUTTING COLLISIONS BETWEEN PASSENGER TRAINS.

	1912-13.	1913-14.	De-crease.	In-crease.
1. Short or improper flagging....	77	..	77	..
2. Failure of hand-brakes to hold.	..	..	..	..
Totals	77	..	77	..

VI.

BUTTING COLLISIONS BETWEEN PASSENGER AND FREIGHT TRAINS.

	1912-13.	1913-14.	De-crease.	In-crease.
1. Disobedience of orders.....	42	7	35	..
2. Disobedience of rules.....	23	4	19	..
3. Switch misplaced or incorrectly set	4	37	..	33
4. Short or improper flagging....	..	..	..	..
5. Not obeying instructions or warning	1	..	1	..
6. Careless running	..	1	..	1
7. Other miscellaneous accidents.	..	2	..	2
8. Disobedience of signals.....	..	3	..	3
Totals	70	54	55	39

VII.

BUTTING COLLISIONS BETWEEN FREIGHT TRAINS.

	1912-13.	1913-14.	De-crease.	In-crease.
1. Disobedience of orders.....	5	..	5	..
2. Disobedience of signals.....	3	..	3	..
3. Disobedience or rules.....	4	4	..	..
4. Improper signal displayed....	1	1	..	..
5. Switch misplaced or incorrectly set	3	1	2	..
6. Misunderstanding signals.....	..	1	..	1
7. Short or improper flagging....	7	7	..	..
8. Failure to observe train account of fog or snow.....	9	1	8	..
9. Not obeying instructions or warning	..	..	..	..
10. Careless running	3	2	1	..
11. Poor judgment or distance....	2	..	2	..
12. Loss of air through successive applications of brakes.....	..	..	..	..
13. Failure to set hand-brakes....	..	..	..	..
14. Breaking in two, cars running back and colliding with train behind	..	..	..	..
15. Unknown or unascertainable cause	..	..	..	..
16. Other miscellaneous accidents..	5	..	5	..
Totals	42	17	26	1

VIII.

REAR-END COLLISIONS BETWEEN PASSENGER TRAINS.

	1912-13.	1913-14.	De-crease.	In-crease.
1. Disobedience of signals.....	192	..	192	..
2. Switch misplaced or incorrectly set	5	..	5	..
3. Breaking in two and coming together	..	..	..	..
4. Short or improper flagging....	..	6	..	6
Totals	197	6	197	6

IX.

REAR-END COLLISIONS BETWEEN PASSENGER AND FREIGHT TRAINS.

	1912-13.	1913-14.	De-crease.	In-crease.
1. Disobedience of signals.....	55	46	9	..
2. Disobedience of rules.....	14	..	14	..
3. Switch misplaced or incorrectly set	26	..	26	..
4. Short or improper flagging....	9	4	5	..
5. Failure to observe train account of fog or snow.....	17	..	17	..
6. Careless running	6	..	6	..
Totals	127	50	77	..

X.

REAR-END COLLISIONS BETWEEN FREIGHT TRAINS.

	1912-13.	1913-14.	De-crease.	In-crease.
1. Disobedience of signals.....	8	..	8	..
2. Disobedience of rules.....	4	5	..	1
3. Defective signal system.....	..	..	..	..

4. Improper signal displayed.....	1	..	1	..
5. Switch misplaced or incorrectly set	3	6	..	3
6. Short or improper flagging....	11	6	5	..
7. Failure to observe train account of fog or snow.....	1	..	1	..
8. Not obeying instruction or warning	..	..	..	..
9. Careless running	39	18	21	..
10. Poor judgment of distance....	..	..	..	..
11. Failure to observe cars on sidetrack	..	..	..	..
12. Defective or inoperative air-brakes	3	..	3	..
13. Failure to set hand-brakes.....	..	..	..	..
14. Train in advance stopped suddenly by parting, collided with pusher following to couple up..	3	2	1	..
15. Loss of air through successive applications of brakes.....	..	2	..	2
16. Breaking in two and coming together again	35	2	33	..
17. Other miscellaneous accidents..	7	1	6	..
18. Misunderstanding signals.....	..	1	..	1
Totals	115	43	79	7

XI.

REAR-END COLLISIONS BETWEEN CARS BEING CAUSED BY SWITCH MISPLACED OR INCORRECTLY SET.

	1912-13.	1913-14.	Decrease.	Increase.
	1	..	1	..
Totals	1	..	1	..

XII.

SIDE COLLISIONS BETWEEN PASSENGER TRAINS CAUSED BY MISUNDERSTANDING SIGNALS.

	1912-13.	1913-14.	Decrease.	Increase.
	1	..	1	..
Totals	1	..	1	..

XIII.

SIDE COLLISIONS BETWEEN PASSENGER AND FREIGHT TRAINS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Disobedience of signals..	3	..	3	..
2. Defective signal system.....	..	..	..	..
3. Misunderstanding of signals...	..	..	..	..
4. Switch set wrong.....	14	..	14	..
5. Careless running	..	..	..	..
6. Cars, etc., not into clear.....	..	..	..	..
7. Other miscellaneous accidents.	1	1	..	..
Totals	18	1	17	..

XIV.

SIDE COLLISIONS BETWEEN FREIGHT TRAINS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Disobedience of orders	..	..	..	..
2. Disobedience of signals.....	15	1	14	..
3. Disobedience of rules.....	2	6	..	4
4. Improper signal displayed or incorrect instruction given.....	..	..	..	..
5. Switch set wrong	3	2	1	..
6. Misunderstanding signals	8	3	5	..
7. Lack of proper protection.....	5	2	3	..
8. Failure to observe train account of fog or snow.....	..	1	..	1
9. Not obeying instructions or warning	1	..	1	..
10. Careless running	7	6	1	..
11. Failure of hand-brakes to hold.	..	..	..	..
12. Failure to set hand-brakes.....	3	1	2	..
13. Loss of air through successive applications of brakes.....	..	..	..	..
14. Cars not into clear.....	11	7	4	..
15. Other miscellaneous accidents.	3	4	..	1
16. Moving without authority or signal	..	1	..	1
Totals	58	34	31	7

XV.

SWITCHING COLLISIONS BETWEEN PASSENGER TRAINS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Misunderstanding signals	1	..	1	..
2. Defective or inoperative air-brakes	10	..	10	..
3. Cars pushed heavily against others or into bumping posts...	12	..	12	..
4. Cars colliding while being switched	..	58	..	58
Totals	23	58	23	58

XVI.

SWITCHING COLLISIONS BETWEEN PASSSENGER AND FREIGHT TRAINS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Disobedience of signals.....	8	..	8	..
2. Switch misplaced or incorrectly set	2	..	2	..
3. Careless running	10	..	10	..
4. Failure to set hand-brakes.....	6	..	6	..
Totals	26	..	26	..

XVII.

SWITCHING COLLISION BETWEEN FREIGHT TRAINS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Disobedience of rules.....	1	..	1	..
2. Improper signal desplayed.....	1	..	1	..
3. Switch misplaced or incorrectly set	1	..	1	..
4. Misunderstanding signals	..	..	..	..
5. Short or improper flagging....	2	..	2	..
6. Failure to observe train account of fog or snow.....	..	..	..	..
7. Not obeying instructions or warning	..	..	..	..
8. Careless running	8	..	2	..
9. Poor judgment of distance.....	..	..	..	..
10. Failure to observe cars on sidetrack	..	..	..	..
11. Defective or inoperative air-brakes	..	..	..	..
12. Failure of hand-brakes to hold.	2	..	2	..
13. Cars colliding while being bumped	..	4	..	4

14. Failure to set hand-brakes.....	1	..	1	..
15. Breaking in two and coming together again	1	..	1	..
16. Breaking in two. cars running back and colliding with train behind	..	..	..	..
17. Cars pushed heavily into others or against bumping posts.....	3	..	3	..
18. Cars colliding while being bumped or switched hard.....	30	..	30	..
19. Cars uncoupling and running together	2	..	2	..
20. Other miscellaneous accidents.	6	..	6	..
Totals	52	4	52	4

XVIII.

SWITCHING COLLISIONS BETWEEN CARS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Disobedience of signals.....	..	..	..	..
2. Misunderstanding signals.....	..	..	..	..
3. Not obeying instructions or warning	..	..	..	..
4. Careless running	..	..	..	..
5. Failure to observe cars on side-track	..	..	..	..
6. Cars, etc.. not into clear.....	1	..	1	..
7. Other miscellaneous accidents.	..	..	..	..
Totals	1	..	1	..

XIX.

COLLISIONS WITH HAND-CARS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Various causes such as failure to notice approach of train, etc.	9	10	..	1
Totals	9	10	..	1

XX.

COLLISIONS AT GRADE CROSSINGS, STEAM RAILROADS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Disobedience of signals.....	..	..	..	..
2. Improper signal displayed or incorrect instructions given....	..	..	..	..
3. Careless running.....	..	..	..	..
4. Defective or inoperative air-brakes	..	..	..	..
5. Other miscellaneous accidents	..	1	..	1
Totals	..	1	..	1

XXI.

COLLISIONS AT GRADE CROSSINGS, STEAM WITH ELECTRIC RAILROADS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Failure of motormen to stop car before crossing	4	..	4	..
2. Disobedience of rules.....	6	..	6	..
3. Improper protection at crossing	1	..	1	..
4. Careless running	1	..	1	..
5. Cause undertermined	..	15	..	15
Totals	12	15	12	15

XXII.

COLLISIONS WITH MOVABLE OBJECTS ADJACENT TO TRACKS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Baggage trucks, etc., left standing too close to track	6	..	6	..
Totals	6	..	6	..

XXIII.

ACCIDENTS RESULTING FROM DEFECTIVE EQUIPMENT.

	1912-13.	1913-14.	Decrease.	Increase.
Locomotives:				
1. Boilers or fittings	..	..	..	..
2. Crown sheets dropping due to low water	5	14	..	9
3. Flues bursting	6	9	..	3
4. Water-glass bursting	10	6	4	..
5. Steam pipe connections coming loose	2	8	..	6
6. Injector pipe bursting.....	9	..	9	..
7. Collar on injector pipe blowing off	2	1	1	..
8. Injector valve-stem blowing out	1	..	1	..
9. Squirt pipe breaking off or bursting	4	7	..	3
10. Bracket or other studs blowing out	1	..	1	..
11. Patch bolt blowing out.....	1	1	..	..
12. Steam pipe bursting.....	2	..	2	..
13. Air-hose bursting	..	..	..	..
14. Brake chains breaking.....	2	..	2	..
15. Machinery (side rods, etc.)...	1	..	1	..
16. Eccentric rods	..	..	..	..
17. Cylinder head blowing out.....	1	..	1	..
18. Journals	..	..	..	..
19. Reverse lever defective.....	2	..	2	..
20. Grab-iron lag screws giving way	2	1	1	..
21. Ladder lag screws giving way.	1	..	1	..
22. Steps	2	..	2	..
23. Loose doors or defective fittings	1	..	1	..
24. Broken flange.....	..	..	..	..
25. Tire coming off	..	..	..	..
26. Axles	..	..	..	..
27. Other miscellaneous accidents.	1	..	1	..
28. Steam pipe packing blowing out	..	2	..	2
29. Injector priming valve blowing out	..	2	..	2
30. Rivet in fire box blowing out..	..	1	..	1
31. Lubricator blowing out.....	..	2	..	2
32. Miscelleanous boiler accidents	..	1	..	1
33. Plugs blowing out.....	..	2	..	2
34. Side rods or crossheads.....	..	4	..	4
35. Broken tires	..	1	..	1
Totals	56	62	30	36
Passenger cars:				
36. Air-hose bursting.....	1	..	1	..
37. Brake staff breaking.....	2	..	2	..
38. Grab-iron lag screws giving way	2	..	2	..
39. Loose doors or defective fittings	2	..	2	..

40. Draft rigging	1	..	1	..
41. Tire coming off	..	..	..	..
42. Cars collasping due to weakness or overload	..	..	..	..
43. Steps	..	1	..	1
Totals	8	1	8	1
Freight cars:				
44. Brakes or brake equipment	1	..	1	..
45. Air-hose bursting	5	4	1	..
46. Brake staff breaking	5	2	3	..
47. Brake pipes breaking or bursting	1	..	1	..
48. Defective dog or ratchet	1	1	..	..
49. Brake chains breaking	3	2	1	..
50. Brake wheels coming off	2	..	2	..
51. Grab-iron lag screws giving way	11	7	4	..
52. Ladder lag screws giving way	3	4	..	1
53. Steps	2	2	..	..
54. Loose doors or defective fittings	5	1	4	..
55. Hand railing	1	1	..	..
56. Grab-irons breaking or missing	4	2	2	..
57. Draft rigging	14	3	11	..
58. Other miscellaneous accidents	..	..	..	..
Totals	58	29	30	1

XXIV.

OTHER ACCIDENTS.

	1912-13.	1913-14.	Decrease.	Increase.
1. Coming in contact with live overhead conductor	9	1	8	..
2. Coming in contact with other wires carrying high tension current	13	5	8	..
3. Burned while making repairs to lighting plant	..	2	..	2
4. Other miscellaneous electrical accidents	..	1	..	1
Totals	22	9	16	3
5. Other accidents reported not classified under the above	78	25	53	..

Study by Comparison Method.

The method through which it is quite possible to estimate almost mathematically the effectiveness of the New York "full-crew" law, as a casualty preventative measure, is by a comparative study of the various general and minor classes which showed reductions in the year just subsequent over the year just prior to the enactment of the law.

During the year 1913, just prior to the operation of the law, there were 7,432 railroad casualties in New York and during the year 1914, just following the enactment of the law, there were 5,704 casualties. There was a total reduction in the one year of 1,728 casualties. The question in point is whether the elimination of these 1,728 casualties was due to the intervening enactment of the "full-crew" law, or whether to other irrelevant causes.

The following table makes a classification of the twenty-four general and three hundred and thirty-four minor groups of railroad casualties occurring in New York State, and indicates the increase or decrease which obtained in each group just after enactment of the "full-crew" law. It is quite possible from this table to see in which classes the net decrease of 1,728 casualties occurred and whether they might conceivably have had that reduction through the instrumentality of the law. (*a*)

(*a*) Report of Public Service Commission for the Second District, New York, for 1913, Vol. 1, pages 178-187; and also for 1914, Vol. 1, pages 138-145.

RECAPITULATION OF NET DECREASES AND INCREASES.

	Decrease.	Increase.
1. Personal injuries on or about trains	520	..
2. Personal injuries on track or adjacent	207	..
3. Derailments to passenger trains	366	..
4. Derailments to freight trains	..	1
5. Butting collisions between passenger trains	77	..
6. Butting collisions between passenger and freight trains	16	..
7. Butting collisions between freight trains	25	..
8. Rear-end collisions between passenger trains	191	..
9. Rear-end collisions between passenger and freight trains	77	..
10. Rear-end collisions between freight trains	72	..
11. Side collisions between passenger and freight trains	17	..
12. Side collisions between freight trains	24	..
13. Switching collisions between passenger trains	..	35
14. Switching collisions between passenger and freight trains	26	..
15. Switching collisions between freight trains	48	..
16. Switching collisions between cars	1	..
17. Collisions with hand-cars	..	1
18. Collisions at grade crossings, steam railroads	..	1
19. Collisions at grade crossings, steam with electric railroads	..	3
20. Collisions with movable objects	6	..
21. Accidents resulting from defective equipment	30	..
22. Other accidents	66	..
Totals	1769	41
Grand net reduction	1728	..

Conclusion on New York Casualties.

The above tables show just what happened to the New York casualty list after the enactment of the "full-crew" law, and indicate in which sub-classes there were decreases and in which increases. The total decrease over 1913 in railroad casualties which shows in the 1914 list is 1,769 and the total increase is 41 casualties. This represents a net decline in casualties for the year of 1,728 casualties, or the difference between a total of 7,432 casualties in 1913 and 5,704 casualties in 1914. But these declines did not always come within these classes which conceivably might have been amenable to a reduction by reason of the law.

There was a net decrease of 520 casualties in the first general class known as personal injuries received while on or about trains but not resulting from an accident to a train. But there were actual increases in two of the three sub-classes only (getting on or off trains while not in motion, coupling or uncoupling cars and caught between cars, buffer plates, couplings, etc.) which might conceivably have a relation to the size of the train-crew. Those three sub-classes show a net decrease of 36 casualties and it is not possible to imagine that the law was responsible for all of that number. It is necessary, therefore, to brush off the table at least 484 (520-36) of the total net decrease of 1,728 casualties as not having been prevented by reason of the "full-crew" law.

There was a net decrease of 207 casualties in the second general class known as personal injuries received while on track or adjacent thereto either from contact with trains or other causes. But there were actual decreases in eighteen and actual increases in sixteen of the sub-classes and in no sub-class which has a conceivable relation to the size of the train-crew was there a decrease. The net decrease of 207 casualties is not then relevant. It is necessary, therefore, to

brush aside at least 691 (the 484 already eliminated plus 207) of the net decrease of 1,728 casualties as not conceivably having been reduced by reason of the law.

There was a net decrease of 366 casualties in the third general class known as derailments to passenger trains. But in only two of the six sub-classes which have a conceivable relation (running off derails because of failure to stop early enough, defective or broken passenger car brakes, defective or broken passenger car trucks, defective or broken passenger car wheels, defective or broken passenger car journals and running off dead-ends or into bumping blocks) were these actual reductions and in one other there was an actual increase. The net decrease showing in these six classes was 39 casualties. It is not possible to say how many or whether any of these 39 reductions were due to the law, but it is clear that the reduction of the remaining 357 casualties was effected by other means. It is necessary, therefore, to eliminate at least 1,048 (the 691 already eliminated plus 356) of the net total reduction of 1,728 casualties as having been reduced through other agencies than the law.

There was a net increase of one casualty in the fourth general class known as derailments to freight trains,—the class which would naturally be expected to show one of the greatest changes. It is surprising to find that only three of the nine relevant sub-classes (running off derails because of failure to stop early enough, defective or broken freight car wheels, defective or broken freight car brakes, defective or broken freight car trucks, defective or broken freight car draft rigging, defective or broken passenger car wheels, defective or broken freight car journals, defective or broken freight car axles and running off dead-ends or into bumping blocks) show decreases and that the other six show increases. Considerable emphasis has been placed by the proponents of "full-crew" legislation upon the reductions which would follow in a reduction of freight train derailments and it is surprising to find that in New York there was not only a net increase of one casualty in the aggregate of freight derailments but that there was an increase of one casualty within the relevant sub-classes. Since there was no net reduction in this general class it is not possible to eliminate any from the aggregate net reduction.

There was a net decrease of 77 casualties in the fifth general class known as butting collisions between passenger trains. This reduction occurred within a sub-class which has no conceivable relation to the size of a passenger train-crew. It is necessary, therefore, to eliminate 1,125 (the 1,048 already eliminated plus 77) from the total net reduction of 1,728 casualties as having been reduced through other means than the "full-crew" law.

There was a net decrease of 16 casualties in the sixth general class known as butting collisions between passenger and freight trains. But there was no reduction within the only sub-class (short of improper flagging of freight trains) within this group which has a conceivable relation to the size of a train-crew. It is necessary, therefore, to eliminate 1,141 (the 1,175 already eliminated plus 16) from a total net reduction of 1,728 casualties as having been reduced in other ways than through the "full-crew" law.

There was a net decrease of 25 casualties in the seventh group known as butting collisions between freight trains. But there appears no reduction whatever within the only two sub-classes (short of improper flagging of freight trains and failure to set hand-brakes) which have a conceivable relation to the size of a train-crew. It is necessary, therefore, to eliminate at least 1,166 (the 1,141 already eliminated plus 25) casualties, from a net reduction of 1,728 casualties as having been reduced through other means than the "full-crew" law.

There was a net decrease of 191 casualties in the eighth group known as rear-end collisions between passenger trains. But it is peculiar to find that in the only sub-class (short or improper flagging) which has a conceivable relation to the size of the train-crew there was, not a decrease, but an increase of six casualties. It is, moreover, the only sub-class which shows an increase. A strictly scrupulous inquiry would perhaps require that these six casualties be charged to the law, but there are so many other factors that no attempt is here made to do that. It is necessary, to eliminate at least 1,357 (the 1,166 already eliminated plus 191) from an aggregate reduction of 1,728 casualties as having been reduced in other ways than through the "full-crew" law.

There was a net decrease of 77 casualties in the ninth general group known as rear-end collisions between passenger and freight trains. But only one of the sub-classes (short or improper flagging) could be considered relevant and it showed a reduction of five casualties. The reduction of the remaining 72 casualties has no possible relation to the size of the train-crew. It is necessary, therefore, to eliminate at least 1,429 (the 1,357 already eliminated plus 72) from an aggregate reduction of 1,728 casualties, as having been reduced through other agencies than the "full-crew".

There is a net decrease of 72 casualties in the tenth general group known as rear-end collisions between freight trains. This class of casualties has been mentioned as the one which would show greater reductions than any other by reason of the employment of additional trainmen. It is interesting to note in that connection that not more than two of the sub-classes (short or improper flagging and failure to set hand-brakes) have any reasonable relation to the size of the train-crew and that only five of the net reduction of 72 casualties obtained within these alleged peculiarly relevant divisions. The reduction of the remaining 67 casualties has no conceivable relation to the size of the train-crew. It is necessary, therefore, to eliminate at least 1,496 (the 1,429 already eliminated plus 67) from an aggregate reduction of 1,728 casualties as having been attributable to other agencies than the "full-crew law.

There was a decrease of one casualty in the eleventh group known as rear-end collisions between cars being switched, caused by switch misplaced or incorrectly set. There is no relation between this reduction and the size of the train-crew. It is necerrary, therefore, to eliminate at least 1,497 (the 1,496 already eliminated plus one) one of the total reduction of 1,728 casualties as wholly irrelevant.

There was a decrease of one casualty in the twelfth general class known as side collisions between passenger trains caused by misunderstanding signals. Since no sub-cause is given this may or may not be relevant and it will not, therefore, be subtracted as irrelevant.

There was a reduction of 17 casualties in the thirteenth general group known as side collisions between passenger and freight trains. There is no reduction in any relevant class. It is necessary, therefore, to eliminate at least 1,514 (the 1,497 already eliminated plus 17) from an aggregate reduction of 1,728 casualties as having been reduced through other agencies than the "full-crew" law.

There was a net reduction of 24 casualties in the fourteenth group known as side collisions between freight trains. But within the only sub-class showing a reduction and in which there is a conceivable relation to the size of the train-crew (failure to set hand-brakes), there was a reduction of only two casualties. The reduction of the remaining casualties has no possible relation. It is necessary, therefore, to eliminate at least 1,536 (the 1,514 already eliminated plus 22) from an aggregate reduction of 1,728 casualties as having been reduced through other agencies than the "full-crew" law.

There was a net increase of 35 casualties within the fifteenth general group known as switching collisions between passenger trains. There was, moreover, no decrease within any sub-class relevant to the size of the train-crew. Since there is no net decrease represented here it is not possible to subtract any from the aggregate net reduction of 1,728 casualties.

There was a net decrease of 26 casualties in the sixteenth general group known as switching collisions between passenger and freight trains. But only five of those reductions appear within the only sub-class (failure to set hand-brakes)

which has a possible relation to the size of the train-crew. The reduction of the remaining 21 casualties has no possible relation. It is necessary, therefore, to eliminate at least 1,557 (the 1,536 already eliminated plus 21) from an aggregate net reduction of 1,728 casualties, as having been reduced through other agencies than the "full-crew" law.

There was a net decrease of 48 casualties in the seventeenth general group known as switching collisions between freight trains. But a study of the sub-classes shows that only three (short or improper flagging, failure to set hand-brakes and cars pushed heavily into others or against bumping posts) have any reasonable relation to the size of the train-crew and that a reduction of only 6 casualties was effected within these sub-classes. The reduction of the remaining 42 casualties bears no relation. It is necessary, therefore, to eliminate at least 1,599 (the 1,557 already eliminated plus 42) from an aggregate reduction of 1,728 casualties as having been reduced through other agencies than the "full-crew" law.

There was a net decrease of one casualty in the eighteenth general group known as switching collisions between cars. No reduction appeared in any sub-class bearing a relation to the size of the train-crew. It is necessary, therefore, to eliminate at least 1,600 (the 1,599 already eliminated plus 1) from an aggregate reduction of 1,728 casualties as having been reduced through other agencies than the "full-crew" law.

There was an increase of one casualty in the nineteenth general group known as collisions with hand-cars. No reduction appears in any sub-class, moreover, which has a conceivable relation to the size of the train-crew.

There was a net increase of one casualty in the twentieth general group known as collisions at grade crossings between steam railroads. No reduction appears in any class bearing a relation to the size of the train-crew.

There was a net increase of three casualties in the twenty-first general group known as collisions at grade crossings between steam and electric railroads. No reduction, moreover appears in any sub-class bearing a relation to the size of the train-crew.

There was a net decrease of six casualties in the twenty-second general group known as collisions with movable objects adjacent to tracks. No reductions appear, however, in any class having a relation to the size of the train-crew. It is necessary, therefore, to eliminate at least 1,606 (the 1,600 already eliminated plus 6) from an aggregate net decrease of 1,728 casualties as having been reduced through other agencies than the size of the train-crew.

There was a net decrease of 30 casualties in the twenty-third general group known as accidents resulting from defective equipment. But only five sub-classes (defects in freight car brakes or brake equipment, defective dog or ratchet on freight cars, grab-iron lag screws giving way on freight cars, ladder lag screws giving way on freight cars and freight grab-irons breaking or missing) have a possible relation to the size of the train-crew and these groups only represent a net reduction of only six casualties.

The reduction of the remaining 24 casualties bears no possible relation. It is necessary, therefore, to eliminate at least 1,630 (the 1,606 already eliminated plus 24) from an aggregate net reduction of 1,728 casualties, as having been reduced through other agencies than the "full-crew" law.

There was a net reduction of 66 casualties in the twenty-fourth general group known as other accidents. The sub-classes within this group have no reasonable relation to the size of the train-crew. It is impossible to tell definitely the sources of those classified under the last miscellaneous sub-division, but it is conservative to assume that they bear no relation since they were not grouped under the regular sub-classes relating to trainmen. It is necessary, therefore, to eliminate at least 1,696 (the 1,630 already eliminated plus 66) from an aggregate net reduction of 1,728 casualties as having been reduced through other agencies than the "full-crew" law.

The above analyses show by a continued process of eliminating one by one, each sub-class which has no conceivable relation to the size of the train-crew that the reduction of 1,728 casualties during the year following the enactment of the "full-crew" law was not due to that law. It shows certainly that at least 1,696 of those 1,728 casualties could not conceivably have been reduced through the agency of the law. Their causes do not even have any relation to the size of the train-crew. There has been no attempt to do other than brush off the table all reductions which palpably could not have been effected by the law. This does not mean that 32 casualties were relevant. They do not appear clearly irrelevant and are, therefore, conceivably relevant. But it cannot be assumed that their reduction was due to the law. That conclusion would need to be premised upon a knowledge that that occurred altogether on "full-crew" trains and on trains which would not have otherwise been adequately manned.

Opinion of the Public Service Commission. The Bureau of State Research addressed a letter to the Public Service Commission of New York, Second District, stating that an impartial investigation of the effect of the "full-crew" law on accidents was under way, and asking for an expression of opinion relative to the New York law. The Commission replied:

> "Our railroad division expresses the opinion that it is impossible to predict any certain or even probable relation between the number of accidents which have occurred and the passage of the legislation referred to. (*a*)

In their annual report of 1912 the Public Service Commission of the Second District, New York, states that during the year it has made investigations of 185 of the accidents reported and that:

> "Of the accidents investigated by this department, 147 were caused by defective equipment, and it is the opinion of the supervisor of equipment that a considerable proportion of these accidents could have been avoided by more careful inspection at repair and other terminals and by a higher standard of maintenance of car and locomotive equipment. The preceding data does not include the investigation of accidents made by the locomotive boiler inspector."

In their annual report of 1913 the Commission says:

> "It will be observed that there has been an increase in nearly every type of accident, and this is particularly true of accidents in which the personal element enters prominently, as in the first two classes tabulated. Practically all of the forms of accidents included in those two groups are avoidable accidents, and result either from carelessness on the part of the persons involved or through disregard of instructions. The "Safety First" movements which are being assiduously conducted by the railroads are distinctly directed to this class of accidents and the above figures indicate eloquently that there is plenty of room for such a movement."
>
> "This table is of interest as indicating the large increase in derailments due to the failure of brakes or brake rigging on freight cars and to the failure of draft rigging. Improved inspection should reduce these failures, but the best inspection can not be relied upon to reveal all the types of local defects which bring about the general failure of the apparatus. It should be stated in connection with the derailments of freight trains that the injuries resulting were comparatively few, the number killed in 1911-1912 being six and in 1912-1913, three. The number injured in 1911-1912 was 128, in 1912-1913, 77. The majority of the injuries were caused by employes being thrown down in the cabooses by the sudden stopping of trains, and all were of a minor nature."
>
> "A thorough investigation has been made of each collision which has resulted in death or serious injury, and of a large number in which no fatalities occurred. It has seemed clear

(*a*) Letter signed by Francis X. Disney, Secretary of the Commission and dated May 17, 1916.

to the Commission that improvement in respect to this class of accidents should be secured by methods of diminishing the accidents rather than of minimizing their effect. In other words, it appears to us that every effort should be made to keep trains apart by improved signalling, or by securing in some way better observance of signals by enginemen through improved discipline or otherwise, rather than to give exclusive consideration to the reduction of fatal results of such accidents by the use of steel cars."

In their annual report of 1914, which was the year after the enactment of the "full-crew" law in New York and the year in which there was a decrease in railroad casualties, the Public Service Commission says:

"Accidents: The past year has shown a marked improvement in the number of accidents, together with fatalities and injuries. This condition is in a measure attributable to the continuous attention which the officials of the railroads have paid to the subject and the educational programs which have been undertaken. However, the decreased train mileage which now exists should not be overlooked, and no doubt this in a measure is responsible for the reduction. Too much satisfaction should not be taken in the improvement, and the energies of those responsible for the safe conduct of transportation should be increased to eliminate all preventable accidents."

"The derailments of freight trains continues to be the principal general cause of accidents to trains; the definite causes are as follows:

Cause	1911-12	1912-13	1913-14
Failure of track material	29	30	26
Poor track maintenance	22	38	24
Failure of equipment	429	619	541
Failure of employees	68	130	100

"Failures of equipment predominate as heretofore, although there is a decrease in the number from that which was given last year."

"In their annual report for 1915 the Public Service Commission after calling attention to the decreased number of accidents explains that by saying:

"It will be seen that there is a marked decrease in the total number of accidents, and in casualties to all classes of persons save that of trespassers. The Commission believes that only a small part of this reduction is attributable to decreased train mileage, but rather to increased efficiency and watchfulness of the employees. The subject of trespassing is a live one, and concerted efforts should be made to cause a decided reduction in this class of casualties."

Conclusion for New York

There was a marked drop in the casualty list of New York just following the enactment of the "full-crew" law. There were 7,432 casualties during the year just preceding the operation of the law (year ending June 30, 1913) and 5,704 casualties during the year just subsequent (year ending June 30, 1914). It would seem on its face that the law, enacted as a safety measure, had been effective in reducing the list by 1,728 casualties. It has been so contended by proponents of the law. But a close study of the three hundred and thirty-four sub-classes in which that net reduction of 1,728 casualties appears shows that at least 1,696 could not conceivably have been reduced through the agency of the "full-crew" law. They were occasioned by causes known to be quite irrelevant to the size of the train-crew. The remaining 32 casualties have a conceivable relation. But some of the relevant sub-classes, which would be expected to show enormous decreases showed actual increase. And it cannot, moreover, be shown that these few remaining unexplained reductions were wrought by the law. It cannot even be shown that they occurred on so-called "full-crew" trains, much less on trains which would have been inadequately manned without the law. It seems impossible to find any reasonable ground upon which to hold that the New York "full-crew" law has been a material factor in reducing railroad casualties.

Wisconsin

The legislature of the State of Wisconsin enacted the present law regulating the size of freight and passenger crews in 1911 and that relative to switching crews in 1913. The Wisconsin requirements, although not as stringent as those in Pennsylvania, New Jersey and New York, are typical "full-crew" regulations. (*a*) The effect which that law has had upon Wisconsin casualties should, therefore, be significant in testing out the practical merits of the law in general as a safety measure.

Annual casualties in Wisconsin. A study of the railroad casualties of Wisconsin, as given by the annual reports of the Railroad Commission, throws some light upon the effects in that state of the law of 1911. The following table gives a summary of the annual casualties for the years from 1910 to 1914 inclusive: (*b*)

WISCONSIN CASUALTIES.

1910	2874	injured and	killed.
1911	2896	" "	"
1912	3699	" "	"
1913	4530	" "	"
1914	3885	" "	"

The natural expectation of the statistician, if he accepts the premise upon which the Wisconsin "full-crew" law was enacted, is that the casualty list of that state should show a drop immediately after the enactment of the 1911 law. But instead, in 1912, he finds a marked increase of 803 casualties (or 28 percentum over 1911) in the first year of operation under the "full-crew" law. In 1913, there was an increase of 1634 casualties (or 56 percentum over 1911); and in 1914, the third year under "full-crew" there was an increase of 986 casualties (or 34 percentum over 1911).

A study of the corresponding increase in traffic and mileage for the two-year period subsequent to the enactment of the law, moreover, makes clear that the increase in casualties has kept more than a normal pace with the increase in traffic and mileage. The increase cannot be construed, therefore, into real decreases. In the face of these decided bounds in the casualty list since the enactment of the "full-crew" law, there would seem to be little basis, in the four years of Wisconsin experience, upon which the law can stand as a practical safety measure.

Traffic and mileage. The enormous leaps in the Wisconsin casualty list subsequent to the enactment of the "full-crew" law have provoked two quite different explanations. Some railroad sympathizers have contended that the increase in casualties is a natural result of the "full-crew" law itself and the irresponsibility which it creates. Some trainmen sympathizers have contended that the apparent increases in casualties is due to an increase in traffic and mileage and is in reality a decrease. A close study makes it evident that both of these contentions are fallacious, at least in part. The only contention which here merits consideration is that advanced relative to traffic and mileage.

While the increase in traffic and mileage, during the period showing an increase in casualties, has been sufficient to explain partially the numerical increase in casualties, it has not been sufficient to disturb the relation proportionately between the traffic and mileage and the number of casualties. In the year just prior to the operation of the "full-crew" law the increase in the number of casualties was fairly com-

(*a*) Annual Report of the Illinois Railroad and Warehouse Commission for 1913, p. 26.

(*b*) Reports of the Wisconsin Railroad Commission for 1910, pp. 334-6; 1911, pp. 264-6; 1912, pp. 961-5; 1913, pp. 1041-5, and 1914, pp. 948-51.

mensurate with the increase in traffic and mileage. The 1911 statistics show, in other words, that with an increase over 1910 of .7 percentum in casualties, there was an increase in passenger traffic of 5 percentum, a decrease in freight traffic of 5 percentum and an increase in mileage of 3 percentum. (*a*) The "full-crew" law was enacted in 1911 and the following year (1912) there was an increase over 1911 in casualties of 28 percentum; but there was a corresponding increase in passenger traffic of 41 percentum, in freight traffic of 42 percentum and in mileage of 36 percentum. These percentages would seem to indicate, at first glance, that the law effected a reduction since the increase in casualties was not as great as the increase in traffic and mileage. (*b*) But during the second year of operation under the "full-crew" law this balance in favor of that law was quite reversed. In 1913 there was an increase in casualties (over 1911) of 56 percentum, and the corresponding increase in passenger traffic was only 21 percentum, in freight traffic 45 percentum and in mileage 18 percentum. These proportions will seem to indicate, at first glance, that the law had defeated its own purpose since the increase in casualties far out-proportioned the increase in traffic and mileage.

In conclusion it may be noted that in the year just prior to the enactment of the "full-crew" law in Wisconsin the numerical increase in casualties was fairly commensurate with the numerical increase in traffic and mileage. During the first year of operation under the law, however, the casualties did not increase proportionately to the increase in traffic and mileage by 11 percentum. But during the second year under the law the casualties increased more than proportionately to the increase in traffic and mileage by 28 percentum. A balance between the two years of operation under the law shows that, on the whole, there has been not only an increase in casualties, but that that increase has been greater proportionately than the corresponding increase in traffic and mileage would naturally explain. The increase is not a mere numerical one, therefore, commensurate only with traffic and mileage increase, but represents a real casualty increase. (*a*)

WISCONSIN TRAFFIC AND MILEAGE.

	1910.	1911.	1912.	1913.	1914.
1—Number of passengers carried earning revenue	11,751,099	12,524,445	16,478,025	17,626,581	18,525,556
2—Number of passengers carried one mile	524,455,409	554,597,397	785,140,197	772,950,950	818,557,081
3—Number of tons of freight earning revenue	57,486,164	51,975,379	71,245,533	79,909,553	75,314,849
4—Number of tons freight carried one mile	4,526,491,438	4,272,248,346	6,095,007,726	6,234,866,311	5,933,484,020
5—Average mileage operated during year	5,247.2	5,414.8	7,403.3	6,429.6	6,359.1

Analysis of Wisconsin casualties. It has been made very evident that, for some reason or reasons, there has been a decided increase in the casualties of Wisconsin since the enactment of the "full-crew" law in 1911. The law has apparently not been an effective safety measure. There remains a still more significant method by which to tell the merits of that law as a safety measure. That method is an analysis of the total annual casualties into their several class causes. Such an analysis will make it possible to see in which particular classes of casualties there have been increases and in which decreases. It will be a most valuable chart by which to trace the practical effectiveness of the "full-crew" law.

The following table has been prepared from the reports of the Wisconsin Railroad Commission to show the various causes which have occasioned all casualties for the last five years reported. The periods recorded are for the year ended June 30: (*b*)

ANALYSIS OF RAILROAD CASUALTIES IN WISCONSIN.

	1910	1911	1912	1913	1914
A. Accidents resulting from movements of trains, locomotives or cars:					
1. Coupling or uncoupling	89	78	82	117	121
2. Collisions	126	125	159	120	87
3. Derailments	97	109	161	225	138
4. Parting of trains	6	15	13	13	7
5. Locomotives, etc., breaking down	15	7	3	2	23
6. Falling from trains, etc.	208	156	207	194	153
7. Jumping off trains	227	254	311	321	292
8. Struck by trains, locomotives or cars	343	310	430	432	311
9. Overhead obstructions	18	29	21	26	13
10. Other causes	706	659	866	939	751
B. Accidents from causes other than movements of trains, etc.					
11. Handling of traffic	78	72	205	136	129
12. Handling tools, machinery, etc.	289	322	447	773	823
13. Handling supplies, etc.	225	144	220	214	287
14. Getting on or off locomotives at rest	22	26	29	30	31
15. Other causes	425	964	545	988	716
Total	2,874	2,896	3,699	4,530	3,882

A cursory reading of the above fifteen classes of Wisconsin casualties shows that there are at least nine of those classes which have no possible relation to the train-crew, four which have a conceivable relation and two which are specified as "other causes" and do not permit of classification. It would be impossible, obviously, for additional trainmen to prevent those casualties resulting from locomotives breaking down, falling from trains, jumping off trains, struck by trains, locomotives or cars, overhead obstructions, handling of traffic, handling of tools and machinery, handling supplies and getting on or off locomotives at rest. The only classes of casualties which have a conceivable relation to the train-crew are those grouped as coupling or uncoupling, collision, derailment and parting of train accidents. No other classes would permit of any modification through a change in the size of the train-crew. The accidents under these four

(*a*) The Wisconsin Railroad Commission reports for 1910 and 1911 show that there were 524,455,409 passengers carried one mile in 1910, and 554,597,397 carried one mile in 1911; there were 4,526,491,438 tons of freight carried one mile in 1910, and 4,272,248,346 tons carried one mile in 1911; and there was an average of 5,247.2 miles operated in 1910, and 5414.8 miles in 1911. On the other hand, there were 2874 casualties in 1910, and 2896 in 1911.

(*b*) The Wisconsin Railroad Commission reports for 1911 and 1912 show that 554,597,397 passengers were carried one mile in 1911, and 785,140,197 in 1912; that 4,272,248,346 tons of freight were carried one mile in 1911, and 6,095,007,726 tons in 1912; that an average of 5,414.8 miles of road were operated in 1911, and 7403.3 miles in 1912. There were, on the other hand, 2896 casualties in 1911, and 3699 casualties in 1912.

(*a*) There has been an attempt below to collect from the report of the Wisconsin Railroad Commission data relevant to the traffic and mileage during the period 1910-1914, inclusive. This data may be found in and tabulated from the reports of 1910, pp. 244-257; 1911, pp. 182-195; 1912, pp. 888-901; 1913, pp. 992-1014; and 1914, pp. 902-915. The periods represent the year ending June 30.

(*b*) Reports of the Wisconsin Railroad Commission for 1910, pp. 334-6; 1911, pp. 264-6; 1912, pp. 961-5; 1913, pp. 1041-5; and 1914, pp. 948-51.

classes might or might not be decreased by an increase in the train-crew. But with one exception only there was a jump in the casualties in each of these four classes immediately after the enactment of the "full-crew" law. That would seem at least to indicate that the law did not operate to reduce casualties in the only four classes for which it offered a conceivable reduction.

Conclusion for Wisconsin

The so-called "full-crew" law of Wisconsin enacted in 1911 did not, as anticipated, decrease the casualty list in the years following. There was, on the other hand, a jump of 803 casualties (or 28 percentum over 1911) in the first year under the law; another increase of 1,634 casualties (or 56 percentum over 1911) in the second year of its operation and an increase of 986 casualties (or 34 percentum over 1911) in the third year of its operation. A study of the corresponding increase in traffic and mileage does not show that these increases in casualties are only numerical increases proportional to the traffic. They are real increases. A further analysis of all of the casualties of Wisconsin into their fifteen chief class causes for the last five years reported shows that only four of the fifteen classes have any conceivable relation to the size of a train-crew. It is quite possible theoretically to conceive how coupling or uncoupling accidents, collision accidents, derailment accidents or separating of trains accidents might be reduced by the aid of additional trainmen. But the first three of these classes were not actually reduced after enactment of the law and the fourth class was reduced by only two casualties. These three classes were, on the other hand, materially increased. It would seem, therefore, that in the experience of Wisconsin the "full-crew" law has not effected a decrease in the three of the four only classes of casualties for which it offered a conceivable solution.

Indiana

The "full-crew" law of Indiana was approved on February 13, 1907. A comparison of railroad casualties before with those subsequent to its passage should throw much light on the value of that statute as a remedial safety measure. The Railroad Commission did not begin to issue their quarterly accident bulletins, however, until the quarter beginning July 1, 1907, and there is no available data by which to compare Indiana casualties for the year just prior with that subsequent to the enactment of the law. It is possible, on the other hand, to make from these quarterly bulletins a detailed study of the casualties occurring in Indiana in 1908, the first year under the "full-crew" requirement, and in 1909, the second year under that law.

Annual casualties in Indiana. The Railroad Commission of Indiana, in compilation of their annual and quarterly reports, found that the total railroad casualties occurring in that state for the years beginning with that ending June 30, 1906, to that ending June 30, 1912, were as follows: (*a*)

INDIANA ANNUAL CASUALTIES.

1906	342 killed	4313 injured
1907	413 "	4657 "
1908	346 "	1407 "
1909	312 "	1373 "
1910	317 "	1925 "
1911	390 "	2179 "
1912	359 "	2149 "

The above totals are included here for reference, although they have no great value to the question in point. The Railroad Commission did not begin to classify or keep accurate records of casualties until those appearing above in 1908. The totals for 1906 and 1907 include not only persons killed and injured by railroads but those killed or injured "in connection with the business of railroads." (*a*) There is then no sure basis for a comparison of casualties for a period prior to the enactment of the "full-crew" law with a period subsequent. The Commission itself, after attempting a comparative study of this earlier period, despairs of the task, and says in its first bulletin, "this being our first bulletin, we have no measure of comparison with the three months just preceding. . . . Any comparison, however, is necessarily imperfect with the data we have." (*b*)

The various quarterly bulletins of the Indiana Commission do make possible a close analysis of all railroad casualties occurring after July 1, 1907. It has been thought valuable, therefore, to include a study of the casualties for the years ending June 30, 1908 and 1909, which were the first years of the operation of the "full-crew" law. It has been noted that a reduction was effected from a total of 1753 casualties in 1908 to 1685 casualties in 1909. (*c*) This variation was made during the operation of the "full-crew" law. An analysis of the causes for casualties of these two years has been prepared to assist in determining scientifically whether the law has accounted for or contributed to that variation or whether it was only coincidental. (*d*)

CAUSES OF INDIANA CASUALTIES.

	1908.	1909.
Passenger:		
Collisions	78	128
Derailments	13	31
Getting on or off moving trains	31	30
Getting on or off trains after stops are made	16	18
Defective and unlighted stations and platforms	0	0
Miscellaneous	57	70
Travelers on Highways:		
Struck on crossings	109	116
Teams frightened	13	14
Defective crossings	0	1
Miscellaneous	20	20
Employees:		
Coupling and uncoupling	61	58
Collisions	131	111
Derailments	85	55
Getting on or off trains	98	80
Caught in frogs and switches	2	2
Use of tools and machinery	14	23
Overhead obstructions	4	6
Falling from cars	107	130
Side obstructions	29	38
Miscellaneous	535	519
Defective tools and appliances	10	9
Trespassers:		
On tracks	201	208
On trains	102	112
Miscellaneous	5	3
(*e*) Grand Total	1721	1782

(*a*) For the years 1906 and 1907, see Indiana Railroad Commission Annual Reports, and, for years subsequent, see quarterly bulletins of that Board, Nos. 1 to 21, inclusive.

(*a*) Annual report of Indiana Railroad Commission for 1906, p. 21.
(*b*) Indiana Accident Bulletin No. 1, issued to cover quarter ending Sept. 30, 1907.
(*c*) It is to be noted that although the Commission states that there was a reduction from a total of 1753 casualties in 1908 to a total of 1685 in 1909 (a reduction of 68 casualties), there arises a discrepancy, for a summary of the various casualties given by the Commission itself shows that there was no such decrease. It shows, on the other hand, that there was an actual increase from 1721 casualties in 1908 to 1782 in 1909 (an increase of 61 casualties). This is a point which would afford meat to the railroad interests, but which has not been taken into consideration in this investigation.
(*d*) This data was compiled from the Indiana Railroad Commission quarterly bulletins, Nos. 1 to 8, inclusive, and covering the period from the year ending June 30, 1908, to that ending June 30, 1909.
(*e*) See page 2, note (c).

After summarizing and grouping the above casualties by their causes and ascertaining the increase or decrease obtained in 1909 over that in 1908, the following result will be found:

CASUALTIES.

	1909. Decrease from 1908.	1909. Increase over 1908.
Collisions		30
Derailments	12	
Getting on or off trains	17	
Struck on crossings		7
Teams frightened		1
Defective crossings		1
Coupling or uncoupling	3	
Use of tools and machinery		9
Overhead obstructions		2
Falling from cars		23
Side obstructions		9
Defective tools and appliances	1	
Trespassers on tracks		7
Trespassers on trains		10
Micellaneous	5	
Totals for 1909	38	99

Recapitulation:

Total increase	99	casualties
Total increase	38	"
1908	61	"

This comparison shows that there was an actual increase in collision casualties of 30 over the year previous, an increase of 23 casualties resulting from falling from cars and increases in casualties resulting from being struck on crossings, frightened teams, defective crossings, use of tools and machinery, overhead obstructions, side obstructions, trespassesers on tracks and trespassers on trains. The only decreases which resulted were a decrease of 12 derailment casualties, 17 getting on or off train casualties, 3 coupling or uncoupling casualties, 1 defective tools and appliance casualty and 5 miscellaneous casualties. There is not available sufficient data relative to variations in traffic to make any intelligent comparison on that basis.

Summary for Indiana

It is not possible to make an intelligent comparison of Indiana casualties for the year ending June 30, 1907 (the year prior to the operation of the "full-crew" law) and that ending June 30, 1908 (the year just subsequent to the law). A detailed study may be made, however, of the casualties occurring after July 1, 1907. An analysis of the causes for all railroad casualties for the two years following the enactment of the "full-crew" law does not show any marked decline or increase. There are increases in some classes of casualties for which the law might seem remedial and there are decreases in some which the law obviously could not have affected. The only conclusion that can be reached is that the law has had no known effect on casualties in Indiana.

California

An attempt has already been made to determine the effect of "full-crew" legislation on the casualty lists of New Jersey, Pennsylvania, New York, Wisconsin, and Indiana. An analysis needs yet to be made of the California casualties to determine what effect, if any, the "full-crew" statute, which became operative there in 1911, has had upon railroad casualties. It is well to have, as a background for such a study, a general picture of the number and kind of casualties which have been occurring in California since 1910.

A summary of all California casualties by fiscal years, covering the period from the year ending June 30, 1910, to that ending June 30, 1915 (with the exception of the year ending June 30, 1912, for which an accurate statement is not available), is given below for steam and electric roads combined. (*a*)

	Killed	Injured
Year ending June 30, 1911....	321	3282
Year ending June 30, 1913....	406	4108
Year ending June 30, 1914....	450	4129
Year ending June 30, 1915....	346	3672

In order to make possible a study of the aggregate increases and decreases for steam railroads, a segregation has been made of steam and electric casualties in California. Unfortunately, the reports of the Railroad Commission do not permit for such a classification for the year ending June 30, 1911. (*b*)

STEAM CASUALTIES IN CALIFORNIA—SEGREGATION OF CALIFORNIA CASUALTIES—STEAM RAILROADS.

1913.

Collisions	145
Derailments	63
Accidents to cars, trains or engines	32
Bursting of, or defects in boiler or flue	6
Accidents to roadway, not causing derailment	1
Coupling or uncoupling	46
Other work about train	251
Overhead obstruction	41
Falling off cars or engine	187
Getting on or off cars or engine	280
Other accidents on or around train	224
Struck by locomotive at station or yard	145
At crossings	240
At other places	147
Other causes	80
Total	1888

1914.

Collisions	142
Derailments	69
Accidents to trains, cars and engines	19
Bursting of, or defects in boiler	4
Accidents to roadway	1
Coupling or uncoupling	29
Doing other work about trains	191
Overhead or side obstruction	24
Falling from cars or engine	168
Getting on or off cars or engine	266
Other accidents on or around trains	170
Struck at station or yards	123
Struck at highway	197
Struck at other places	161
Other causes	43
Total	1607

1915.

Collisions	201
Derailment	165
Accidents to trains, cars or engine	8
Bursting or defects of boiler	1
Accidents to roadway	7
Coupling or uncoupling	22
Doing other work about train	182
Overhead or side obstruction	22
Falling from car or engine	183
Getting on or off trains	230
Other accidents on or around trains	236
Struck at station or yard	87

(*a*) The California Railroad Commission's report shows casualties as follows.

(*b*) Reports of the California Railroad Commission for the years 1913, 1914 and 1915.

Struck at highway crossings	158
Struck at other places	139
Other causes	87
Total	1728

Electric Railroads.

Below is given a summarized tabulation of the total casualties occurring on electric roads as shown by the report of the Railroad Commission for the same period.

1913	2626
1914	2967
1915	2289

It will be noticed at once that the greatest total number of accidents occurred during the third year of the "full-crew" law. Each succeeding year since the passage of the law has shown a larger number of casualties than the year previous to to the passage of the law. (*a*)

It is valuable to make a comparative study of the classifications for those years which are given above. In view of the fact that there has been considerable variation in the total number of casualties occurring during these periods, it is necessary to determine in what classes the greatest changes have occurred. At the outset it is conservative to eliminate certain classes (e. g., accidents to trains, cars or engine, bursting of or defects in boiler, accidents to roadway, being struck by overhead or side obstructions, falling from cars or engines, being struck at station or yard, being struck at highway crossings, being struck at other places), as being casualties which would not be increased or decreased by a "full-crew" law. Inasmuch as the reports of the California Commission do not go into sufficient details, it is expedient to group other causes with collisions, derailments, getting on and off train, and coupling and uncoupling accidents as having a possible relevance.

It cannot be determined whether there was a reduction in the number of casualties in the years since the law was passed over the number during a number of years immediately preceding its passage, because the commission reports do not give enough information regarding casualties occurring prior to the law. It is possible, however, to make a comparison in the number of accidents due to possibly relevant causes for the three years for which the classified tables are given.

Collisions.

In the year ending June 30, 1913, there were 503 casualties due to collisions, and in the year ending June 30, 1914, there were 742 casualties due to collisions, while in the year ending June 30, 1915, there were only 378 casualties due to collisions. There was a slight increase in the number of freight car miles as well as the number of passengers carried. It is difficult to draw any definite conclusion from these figures, and the fact that there was a large increase in 1914 over 1913 would seem to deny the contention that "full-crews" tend to diminish all classes of casualties.

Derailments.

In the year ending June 30, 1913, there were 120 derailment casualties. In 1914 there were 126 and in 1915 there were 179 casualties due to derailments. With a comparatively small increase in freight and passenger service there appears a tremendous increase in the number of casualties due to a cause conceivably relevant to the size of the crew. It is evident that derailment casualties are not being gradually or abruptly reduced in California under the operation of a "full-crew" law.

Coupling and Uncoupling.

There were 55 casualties due to coupling or uncoupling cars in the year ending June 30, 1913, 36 in 1914 and 25 in 1915. The statement that coupling or uncoupling casualties are being reduced in California under a "full-crew" law would be supported by these figures. It is not possible to say whether the reduced number was due to the "law" or improved signalling and automatic devices.

Other causes.

During the year ending June 30, 1913, there were 149 casualties due to other causes; in 1914 there were 115 casualties, and in 1915 there were 150 casualties due to other causes. In view of the fact that the last year shows a considerable increase over 1914, while there was only a small increase in train service, it cannot be said that there is a decided tendency toward a decreasing casualty list due to other causes.

Getting on or off trains.

In the year ending June 30, 1913, there were 1131 casualties to passengers due to getting on or off trains. In 1914 there were 925 casualties, and in 1915 there were 758 casualties. These figures show a very material decrease from year to year. It is interesting to note, however, that the number of casualties from this cause occurring during the year ending June 30, 1913, was almost one-third as many as the total number, 3603, occurring during the year ending June 30, 1911, while this number, 1131, was only equal to about a fourth of the 4514 casualties occurring during the year ending June 30, 1913. It is evident that the proportion of casualties due to this cause during 1913 (subsequent to enactment of the law), was much greater than in 1911, before the law was passed. However, the figures show a material reduction in successive years under "full-crew" operation.

Conclusion on California

It is evident from a comparative analysis of California casualties that the total number of collisions was unusually large during the second year under the "full-crew" law, thus failing to show either a gradual or decided reduction of collision casualties after the adoption of that law;that in the number of casualties due to derailments there was a very decided increase in the total number of derailment casualties during the third year considered, over the other two years; that the total number of casualties due to coupling and uncoupling was decreased decidedly from year to year; that the total number due to other causes was smallest during the second year considered, while the totals for the first and third years were practically the same; and that the total number of casualties occurring to people in getting on or off trains shows a decided decrease from year to year. It is practically impossible to draw indisputable conclusions from this analysis. While the total number of casualties due to causes which might possibly be affected by the size of train-crews has shown a gradual reduction from year to year, it is also true that the total number of casualties due to several of the irrelevant causes have also shown a similar gradual reduction. The gradual reductions cannot, therefore, be definitely ascribed to the law. If a larger crew were the explanation of the reduction, it would seem that it should have shown an immediate, rather than a gradual effect on the total number of casualties. The total number of casualties occurring during each of the three "full-crew" years considered was from one-fifth to one-eighth greater than the total number occurring during the year immediately preceding the passage of that law.

3—Casualties in States Which Have no "Full-Crew" Law

There are many states which have never enacted a train-crew law but in which there has been much agitation for such legislation. Although no attempt has ever been made to do so, it is not a difficult task to pre-calculate the effect which a "full-crew" law will have on the casualties of any such state. The legislators in their madness to check railroad casualties have never stopped to analyze the causes for casualties or to determine the sort of remedy needed. An effort has been made in this chapter to set out the causes for railroad casualties in the non-"full-crew" states of Illinois, Massachusetts,

(*a*) A possible exception would be the year ending June 30, 1913, for which accurate figures are not available.

Michigan and Iowa. These analyses should enable the legislator to see whether the accidents in this state are due to an undermanning of the trains or to other irrelevant causes. No train-crew law should be enacted in any state until a similar study is made.

Illinois

The leaders of the Brotherhood of Railroad Trainmen have been actively interested in securing the passage of a "full-crew" law in the State of Illinois, but no such bill has as yet been successful. No one can rightfully doubt the need for some remedial measure or measures. The only question in point is, whether the casualties have been due to an undermanning of the trains or to other irrelevant causes. An analysis of the causes for Illinois casualties should stand as a background by which to judge whether a "full-crew" law is the safety measure needed for their prevention.

Annual casualties in Illinois. The railroad casualties of Illinois beginning with 1908, when they had reached a total of 6602 casualties, had been steadily on the increase until 1913, when the last report of the Railroad and Warehouse Commission shows they had reached a total of 16,123 casualties. A summary is given below of the total casualties in that state for the period beginning with the year ending June 30, 1907, and running to that ending June 30, 1913. (*a*)

Year	Killed	Injured	Casualties
1907	953	6,162	7,115
1908	836	5,766	6,602
1909	829	6,265	7,094
1910	835	7,360	8,195
1911	908	10,989	11,897
1912	900	12,498	13,398
1913	995	15,128	16,123

Analysis of Illinois casualties. No adequate basis can be had from a study of the increasing totals of Illinois casualties for a judgment relative to the need of a "full-crew" law. The only scientific method by which to determine whether the trains have been undermanned to the hurt of safety, is to study the causes for the casualties that have actually happened. This should serve as a means to decide relatively how many, if any, of the casualties might have been prevented if Illinois had had a "full-crew" law. The year 1913 is a most fortunate year to analyze, from the standpoint of the trainmen, at least, as it was the banner casualty year and spanned a greater diversity in kinds of casualties than any other year.

An analysis of the 16,123 railroad casualties which occurred in Illinois in 1913 shows that they may be clasified under the following general causes: (*b*).

Analysis of Illinois Casualties for 1913.

A. Accidents resulting from the movement of trains, locomotives or cars:

Employes:	Killed	Injured
1. Coupling or uncoupling	24	349
2. Collisions	29	284
3. Derailments	13	236
4. Parting of trains		22
5. Locomotives or cars breaking down		23
6. Falling from trains, locomotives or cars	23	580
7. Jumping on or off trains, locomotives or cars	13	544
8. Struck by trains, locomotives or cars	172	253
9. Overhead obstructions	8	109
10. Other causes	28	2,375
Total	310	4775

Passengers:	Killed	Injured
1. Collisions	12	287
2. Derailments	1	265
3. Parting of trains		
4. Locomotives or cars breaking down		
5. Falling from trains, locomotives or cars	4	47
6. Jumping on or off trains, locomotives or cars	8	178
7. Struck at highway grade crossings		1
8. Struck at stations	4	13
9. Struck at other points along track	1	49
10. Other causes	1	208
Total	31	1048

Postal Clerks, Express Messengers and Pullman Employees:	Killed	Injured
1. Collisions	1	15
2. Derailment		18
3. Parting of trains		
4. Locomotives or cars breaking down		
5. Falling from trains, locomotives or cars	1	1
6. Jumping on or off trains, locomotives or cars		5
7. Struck at highway grade crossings		
8. Struck at stations		
9. Struck at other points along track	1	1
10. Other causes		36
Total	3	76

Other Persons:	Killed	Injured
1. Collisions	1	31
2. Derailments	3	8
3. Parting of trains	1	
4. Locomotives or cars breaking down		1
5. Falling from trains, locomotives or cars		
6. Jumping on or off trains, locomotives or cars	46	147
7. Struck at highway crossings	103	275
8. Struck at stations	47	61
9. Struck at points along tracks	358	230
10. Other causes	29	123
Total	622	989

B. Accidents arising from causes other than those resulting from the movement of trains, locomotives or cars: Employees, Passengers and Other Persons:

	Killed	Injured
1. Handling traffic	1	1036
2. Handling tools and machinery	8	2287
3. Handling supplies	2	1395
4. Getting on or off cars or locomotives at rest	1	120
5. Other causes	17	3402
Total	29	8240
Grand totals	995	15,128
Casualties		16,123

It is not possible to designate which of the above casualties would have been prevented under the operation of a "full-crew" law. It is only possible to eliminate all which have no conceivable relation to the train-crew.

A cursory study of the class causes for Illinois casualties is convincing that a large number have no possible relation to the size of the train-crew and must be at once eliminated. It would be conservative to say that an increase in the size of a train-crew affords no real preventative for casualties

(*a*) The reports of the Illinois Railroad and Warehouse Commission for 1907 to 1913, inclusive.
(*b*) Annual report of the Illinois Railroad and Warehouse Commission for 1913.

occurring by reason of parting of trains, locomotives or cars breaking down, falling from trains, locomotives or cars, jumping on or off trains, struck by train at highway grade crossings, struck by trains at stations, struck by trains at other points along the track, overhead obstructions, handling traffic and handling tools and machinery, handling supplies and getting on or off cars or locomotives at rest. This study of causes makes it necessary, therefore, at the outset to sweep off the the table at least 90.2 percentum of all casualties (or 14,546 from a total of 16,123 for 1913) as wholly irrelevant and having no possible preventative in a "full-crew" law. (*a*)

There are still on the table, so to speak, all casualties occurring in Illinois in 1913 due to derailment, collision and coupling or uncoupling accidents. These casualties in that year, fruitful for accidents, constituted 9.8 per centum (1577) of all casualties. It remains to be determined whether they were due to such causes as might have been prevented under a "full-crew" law or whether they too must be brushed aside with the remaining 90.2 per centum as irrelevant. These three remaining classes will be taken up separately.

Derailments.

The State Public Utilities Commission of Illinois gave more attention to investigating the causes and nature of train accidents during 1913 than it had in any other year. (*b*) It made an investigation of the causes for the more important derailments and gave the following summary of the causes for all derailments investigated by the Commission in that year: (*c*)

Summary of Causes for Illinois Derailments:

Passenger trains.	Employees killed.	Employees injured.	Passengers killed.	Passengers injured.	Cause.
1	..	2	..	3	Sharp flange
2	..	..	..	4	Excessive speed
3	..	..	..	4	Excessive speed
4	..	3	..	3	Tender derailment
5	..	..	..	..	Tender derailment
6	..	2	..	..	Disregarded signal
7	..	1	..	24	Not determined
Freight trains.					
8	..	2	..	..	
9	1	1	..	..	Excessive speed
	—	—		—	Switch set wrong
Total	.. 1	11	..	38	

It is to be noted that although the Public Utilities Commission has undertaken to investigate the causes for the more important accidents in Illinois and made an especial study of of those of 1913, it did not find one derailment accident which was due to any cause relative to the size of the train crew. They were due to sharp flanges, excessive speed, tender derailment, disregard of signal and switch set wrong—not one of which could have a conceivable preventative in "full-crew" legislation. The only conclusion that can be reached upon the data available is that a law would afford no solution for derailment casualties. This eliminates 544 more from the 1577 casualties which were still remaining for analysis at the beginning of this sub-study. There were then at least 15,000 (15,546 plus 544) from a total of 16,123 casualties (or 93.5 percentum in 1913) which must be rejected. There are still left for further analysis all collision and coupling or uncoupling casualties, which together constitute only 6.5 percentum of all casualties.

Collisions.

The records do not indicate the final cause for every collision which occurred in Illinois in 1913, but the Public Utilities Commission made a very exhaustive study of the causes for the more important and typical collision casualties. A summary is here given of the causes which the Commission found were responsible for all collisions investigated in that year. (*a*)

Summary of Causes for Illinois Collisions:

Passenger trains.	Employees killed.	Employees injured.	Passengers killed.	Passengers injured.	Cause.
1	..	..	..	4	Disregarded signal
2	..	..	..	9	Disregarded signal
3	..	..	..	6	Disregarded train order
4	1	1	1	21	Improper flagging
Freight trains.					
5	..	..	2	..	Disregarded signal
6	2	..	..	..	Disregarded signal
7	1	1	..	..	Disregarded signal
8	1	12	..	..	Violation of flagging rules
9	2	..	..	..	Error of dispatcher
10	2	..	..	..	Error of switching crew
	—	—	—	—	
Total	.. 9	14	3	40	

The Illinois Public Utilities Commission, after reviewing the above summary of the causes for collision casualties, makes the following statement:

> "A perusal of the causes of these train collisions very prominently shows that the majority are directly chargeable to error of employes. The same condition has been very noticeable in previous years, which is very conclusive evidence that their prudence and vigilance are unreliable and to further rely upon the assiduity of the person to avert collisions in very wrong and only invites peril and destruction. Disregarding signal indications seem to be the result of momentary thoughtlessness and this fact suggests the installation of mechanical devices to guard against such conditions as soon as financial and other conditions will permit. Nine of the eleven collisions referred to would have been averted if an approved automatic train control device had been in operation."

All collisions investigated, except one, were due to disregard of signal, violation of flagging rules, error of dispatcher or error of switching crew. It is obvious that not one of these classes of accidents call for a remedy through an increase in the size of the train crew. The one accident due to improper flagging and causing 24 casualties might seem to indicate a need for more flagmen. It takes an alert imagination, however, to construe "improper" to men "insufficient," and there is no basis to assume that even this one accident was due to an undermanning of the train. The Commission distinctly intimates, in fact, that it was "chargeable to errors of employes" and not to an insufficiency in the number of employes. The remedy which the Commission suggested in the above comment was not an increase in the train-crew but the installation of automatic signals. But there were 660 collision casualties in 1913, and this eliminates that number more from the 6.5 percentum of all casualties which were still remaining for further analysis at the beginning of this sub-study. These

(*a*) The annual report of Illinois Railroad and Warehouse Commission for 1913 gives the number of casualties for each of the various causes. Those classes which bear no relation to the size of the train-crews and account for 14,546 casualties are as follows: Parting of trains, locomotives or cars breaking down, falling from trains, jumping on or off trains, struck by trains at grade crossings, struck by trains at stations, struck by trains at other points along the track, overhead obstructions, handling traffic, handling tools and machinery, handling supplies, and getting on or off cars or locomotives at rest, and other causes.

(*b*) See Illinois R. R. & Warehouse Commission report for 1913, p. 24.

(*c*) IBID.

(*a*) Annual report of Illinois Railroad & Warehouse Commission for 1913, p. 25.

660 casualties must be added to the number which has been already registered as irrelevant. There are then at least 15,750 (15,090 plus 660) from the total of 16,123 casualties (or 97.6 percentum for 1913) which had causes that would not call for a solution through "full-crew" legislation. There are still left for further analysis all coupling or uncoupling casualties which constituted 2.4 percentum of all casualties in 1913.

Coupling and Uncoupling Casualties

The Public Utilities Commission of Illinois has made no particular study of coupling or uncoupling casualties, but it is fair to assume that the causes for coupling or uncoupling casualties for 1913 in that state were about the same as those found for the country as a whole by the Interstate Commerce Commission for the same year. (*a*) Such a study shows that practically all of the coupling and uncoupling casualties in this country are occasioned while adjusting coupler with foot, cars accidentally starting, careless manipulation of lever, coupling damaged cars, catching fingers or hand between coupling lever and body of car, uncoupling without using lever, miscalculating speed, engine accidently starting, defective couplers falling on foot, losing footing, slipping off cars, being struck by object at side of car, caught by unexpected movement of car, delay in moving difficult parts, going between the cars unnecessarily and contrary to rule and other causes. It is conservative to say that not over four of these classes of casualties have any conceivable material relation to the size of the train-crew. If a train had been undermanned before, (an assumption at the outset) it is possible that a "full-crew" law would be beneficial in reducing casualties in these four classes —casualties due to unexpected movement of cars, defective couplers falling on foot, coupling damaged cars and delay in moving difficult parts. But the casualties due to these four causes constitute about sixteen percentum only of all coupling and uncoupling casualties, and that would make it necessary to reject at least 84 percentum of all coupling and uncoupling casualties in Illinois as irrelevant. (*b*) This means that 313 (84 percentum of 373 coupling or uncoupling casualties) must be rejected as known to be wholly irrelevant. The remaining 60 coupling or uncoupling casualties cannot be analyzed any further. They may or may not have been prevented by an additional brakeman.

There are then at least 16,063 (15,750 plus 313) from a total of 16,123 casualties which could not have been prevented by a "full-crew" law on the basis of an analysis of the casualties for 1913. Although it is possible, therefore, to conclude definitely that at least 99.6 percentum of all casualties must be rejected as due to causes which do not permit of prevention through "full-crew" legislation, it is not possible to estimate how many of or whether any of the remaining 4. percentum would be so prevented under such a law.

The real solution for the Illinois casualty problem. It is significant to bear in mind that the Public Utilities Commission of Illinois has made a comprehensive study of their own casuality problem and should know, better perhaps than any one else, the most expedient solution. In this connection it is interesting to read their explanation and recommendations relative to Illinois casualties in the following paragraph:

"As the majority of accidents are chargeable to the failure of the human, the solution seems to be a system of education which will operate to remedy these failures. Education should begin at the time the new recruit enters the service, and before he is allowed to perform any task, he should be impressed with the thought of safety and cautioned to observe it under all conditions. Adequate facilities should be provided to instruct and familiarize the new employe with his work. It is gratifying to know that so many of the railroads have organized, and are promoting a department for the education of their employes and patrons in the conservation of life and limb."

Conclusion for Illinois

A very careful study of the causes which account for the railroad casualties in Illinois, based on the banner casuality year of 1913, shows clearly that at least 99.6 percentum of all casualties (or 16,063 from a total of 16,123) must be brushed off the table as having no conceivable preventive in a "full-crew" law. It is not possible to analyze the remaining 4. per centum in sufficient detail to calculate how many, if any, would have been prevented by such a law. The accidents are due largely to the stupidity and negligence of a human and the real solution lies in the installation of more mechanical devices and the training of present employes.

Massachusetts

The Commonwealth of Massachusetts empowered its Public Service Commission in 1913 to regulate the size of train-crews, but as the Commission has not yet seen any necessity to exercise that power, the casualties of Massachusetts are here classed with other states which have no "full-crew" requirements.

The third annual report of the Public Service Commission of Massachusetts shows the following total railroad casualties for the last eight years. (*a*)

NUMBER OF PERSONS KILLED AND INJURED ON RAILROADS IN MASSACHUSETTS, 1907-1915.

Year Ended June 30	Passengers.		Employees.		Travellers on Highway at Grade Crossings.		Trespassers.		Other.		Total		
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Total
1907,....	8	87	96	716	22	23	158	61	16	19	300	906	1,206
1908,....	11	50	92	633	27	30	146	75	15	21	291	809	1,100
1909,....	11	123	74	367	22	13	131	64	12	12	250	579	829
1910,....	9	65	89	210	29	9	164	50	12	15	303	349	652
1911,....	11	52	87	181	25	29	162	48	18	21	303	331	634
1912,....	15	103	91	144	24	19	132	60	17	14	279	340	619
1913,....	14	167	97	205	23	19	175	71	10	20	319	482	801
1914,....	10	38	64	138	20	11	148	73	16	5	258	265	523
1915,....	10	48	45	102	26	18	138	67	13	13	232	248	480

(*a*) See Accident Bulletin, No. 48, for 1913, p. 33, in Interstate Commerce Commission reports.

(*b*) The percentages figured from Accident Bulletin No. 48 for 1913, p. 33, in Interstate Commerce Commission reports.

(*a*) The Third Annual Report (1915) of the Public Service Commission of Massachusetts contains the above table on p. xcii.

ANNUAL CASUALTIES IN MASSACHUSETTS.

	Injured and Killed
1907	1206
1908	1100
1909	820
1910	652
1911	634
1912	619
1913	801
1914	523
1915	480

It will be observed that in Massachusetts, despite that there has been no train crew requirements, the casuality list shows (except for the year 1913) a consistent and steady decline from 1907 to 1915. During that period and in the face of an increasing traffic and mileage, (*a*) the railroad casualties have been reduced from 1206 in 1907 to 480 in 1915—a reduction of sixty percentum. This unusual decline has been effected in Massachusetts casualties by other methods than an increase in the size of the train-crew.

Although the Massachusetts annual casualties have been reduced from 1206 to 480, there may still be opportunity for further reduction and it remains, therefore, to determine whether that could be accomplished through "full-crew" requirements. But an analysis of the 480 casualties occurring in 1915 shows that 51.88 percentum of them must be brushed aside, at the outset, as due to trespassing and traveling on highway at grade crossings. (*b*) Those casualties, at least, could not possibly have been prevented through additional trainmen. The remaining casualties occurring to passengers and trainmen require further analysis.

Analysis of casualties to passengers. There were 10 passengers killed in Massachusetts in 1915 and 48 injured. The State Commission declares that all of those 10 fatalities "occurred as the result of their own imprudence or negligence," (*c*) and at least 22 of the total 48 injuries occurred "through their own imprudence or negligence." (*d*) It found further that not only was no passenger killed by a cause beyond his own control in 1915, but that only one passenger to every 4,901,083 passengers carried or 85,489,087 passenger miles traveled was injured by cause beyond his own control. (*e*) In consideration of the many irrevelant causes which accounted for the few remaining casualties it is clear that no material, if any, reduction in passenger casualties could have been effected by a "full-crew" requirement.

Casualties to employees. A total of 147 casualties (45 killed and 102 injured) from the 480 casualties occurring in Massachusetts in 1915 were accidents to employes. The character of these 147 casualties may be learned from the following table: (*f*)

CASUALTIES TO EMPLOYES.

Character of Accident	1915 Killed	1915 Injured
Collisions	1	3
Derailment	2	2
Overhead and side obstruction	4	13
Coupling and uncoupling	5	7
Falling	8	24
Engine accidents	..	4
Walking on or crossing tracks	13	5
Getting on or off cars, trains, etc	2	7
Working on tracks	5	12
Other	5	25
Total	45	102

It is obvious, at a first glance, that at least 127 from the total of 147 casualties have no relation whatever to the train-crew. (*a*) The probability is very remote that any of the remaining 20 casualties (4 collision, 4 derailment and 12 coupling or uncoupling casualties) could have been prevented by an increase in the size of the train-crew.

Conclusion

The Public Service Commission of Massachusetts, although empowered by the law to require additional trainmen on passenger and freight trains, has not found any occasion to administer that requirement. The railroad casualties of the state have been reduced, however, by other methods from 1206 in 1907 to 480 in 1915. There may be opportunity for a still further reduction in the total of 480 casualties but an analysis of the causes of those casualties does not show that any such reduction could be effected by "full-crew" requirements.

Michigan

There has been some agitation for a "full-crew" law, as a remedial measure for railroad accidents in Michigan. No such law has as yet been enacted. However, whether a law is needed or not cannot be honestly ascertained by simply looking at the report of the Railroad Commission and noting the variation in the total number of accidents from year to year. It is necessary to analyze those summaries into their various groups.

A summary of the total number of casualties recorded by the Michigan Railroad Commission covering the period from 1909 to 1913 by years is given below. (*b*)

MICHIGAN CASUALTIES.

1909	2,915	casualties.
1910	3,699	"
1911	2,910	"
1912	2,990	"
1913	3153	"

These figures show a high water mark during the year 1910 with a much reduced figure occurring since that time. Each succeeding year after 1911 shows, however, a slight increase in the total number of casualties. No idea can be had of the causes for these casualties from the lump totals.

If the trains in Michigan have been undermanned, and this undermanning has been directly responsible for a big percentage of these casualties then a "full-crew" law is the most expeditious solution.

An analysis has been prepared below to show the causes for the 3153 casualties which occurred in Michigan in 1913. (*c*)

(*a*) Third Annual Report of Public Service Commission of Massachusetts (1915), pp. xxxv. to xcl., inclusive.

(*b*) The percentage of passengers, employees, travellers on highway at grade crossings, and trespassers killed and injured during the year ended June 30, 1915, to the total number of casualties, is shown by the following tables:

	Killed	Injured	Total
Passengers	4.31	19.35	12.08
Employes	19.40	41.13	30.62
Travellers on highway at grade Crossings	11.21	7.26	9.17
Trespassers	59.48	27.02	42.71
Other	5.60	5.24	5.42
	100.00	100.00	100.00

(*c*) Third Annual Report (1915) of Public Service Commission of Massachusetts, p. xciii.

(*d*) IBID

(*e*) IBID, p. xciv.

(*f*) Third Annual Report of the Public Service Commission, p. xcvi.

(*a*) A larger train-crew could not affect casualties resulting from overhead and side obstructions, falling, engine accidents, walking on or across tracks, getting on or off cars and trains, working on tracks and other causes.

(*b*) Reports of the Michigan Railroad Commission for 1909 to 1913, inclusive. No more recent reports are available.

(*c*) Annual Report of the Michigan Railroad Commission for the year ending December 31, 1913.

	Killed.	Injured.
At stations or loading platforms	3	10
Coupling or uncoupling cars	3	92
Collision	16	484
Derailment	15	227
Defect or failure of road bed or equipment	6	131
Falling from locomotive or cars	18	232
Getting on or off cars	6	262
Grade crossings	60	161
Handling freight or baggage	2	57
Jumping on or off locomotive or cars	8	69
Overhead or side obstruction	7	43
Parting of trains	3	10
Repairing track or roadbed	2	84
Switching	2	34
Struck by locomotive or cars	238	441
Miscellaneous	6	421
(a) Grand Total	395	2758

In the above table the 3153 casualties are classed into 16 groups according to their causes. Considering these classified figures we can select such casualties as might possibly have a remedy in the enforcement of a "full-crew" law. It will be seen at once that all casualties caused by falling from locomotive or cars, being struck at grade crossings, handling freight or baggage, jumping on or off locomotives or cars, being struck by overhead or side obstructions, parting of trains, repairing of track or roadbed, being struck by locomotive or cars, and switching can have no remedy whatever in the enactment of a "full-crew" law. This means that we can disregard as entirely irrelevant 1471 of our 3153 casualties. This leaves 1682 casualties due to coupling or uncoupling, collisions, derailments, defects or failure of roadbed or equipment, getting on or off locomotive or cars, switching at stations or loading platforms, and those classed as miscellaneous. These remaining classes will be considered separately to determine whether they are such that a "full-crew" law could have a conceivable bearing.

Failure of Roadbed or Equipment.

Taking first of all those due to failure of roadbed or equipment it is evident that any casualty resulting from a defect in roadbed could not be prevented by an additional man. There is no reason, moreover, to assume that a larger train crew would detect a weak piece of equipment before it gave way because trains are commonly inspected at terminals. It would seem necessary to eliminate all of the 137 casualties due to this cause as not preventable by an additional man. This eliminates 1608 of the 3153 casualties as irrelevant.

Getting on or off Trains.

Taking up those casualties resulting from getting on or off trains, and those occurring at stations or loading platforms it may be concluded that any accidents occurring from the handling of freight or baggage at loading platforms or stations could not be avoided by an additional trainman. If any additional help is needed in this connection it should be employed at the stations and loading platforms. Those casualties occurring while people are getting on or off trains are of three varieties getting on moving trains, getting off of moving trains and falling while alighting from standing trains.

It might be reasonable to compel railroads to so construct coaches and platforms that people could not attempt to get on or off of moving trains, or to require additional men at stations to assist, absentminded or intoxicated persons to alight from standing trains without slipping. With such precautions it would be difficult to see any appreciable decline in this class of casualties through the agency of the law.

(a) Michigan Railroad Commission Report for 1913, p. 17.

Disregarding the 281 casualties from this cause as irrelevant we have still 1264 of the 3153 casualties to consider.

Miscellaneous.

Taking up next those casualties classed as miscellaneous, the records show that they are of such a conglomerate nature that they will not yield readily to a more definite classification. Only 6 of the 427 casualties in this class were fatal, and 5 of those 6 were trespassers. Approximately 14/17 of these casualties were injuries to employees and were due to such minor mishaps as occur to employees in the performance of duties, and to employees and passengers such as the dropping of car windows, throwing of missiles at trains and sudden stopping of trains. This leaves 837 or 26.5% of the 3153 casualties yet to be considered as having a possible relation to the size of the crew.

Collisions.

The Michigan Commission does not enumerate the sub-causes of the collision casualties in 1913. However, the Interstate Commerce Commission has made a careful study of the sub-causes of collisions for the country as a whole. All the collisions investigated by the Interstate Commerce Commission during the year 1915 were found to be due to the following causes, error of dispatches, failure of motorman to observe signal, disobeying orders, failure of crew to keep clear of superior train, failure of crew to properly protect train, excessive speed, failure of brakes, train moving without signal, crossingman giving misleading signals to motorman. Of these nine causes only three could possibly have been prevented by a larger crew and it is highly probable that they would not have been prevented. Those three classes include casualties due to failure of brakes, train moving without signal, and failure of crew to properly protect train. The casualties in the country at large resulting from these three causes constitute just a little less than 5 per cent. of the total number of collision casualties. The number of casualties in Michigan due to these three causes may have been a little above or a little below 5 per cent, of all the collision casualties; but on that basis it may be said that not over 5 percentum of Michigan collisions were related to the size of train crew. This further eliminates 475 of the 500 collision casualties as being irrelevant. All but 362 or 11.4 percentum of the 3153 casualties occurring during the year have been eliminated up to this point.

Coupling or Uncoupling.

The Michigan Report gives no sub-causes for coupling casualties. But applying the sub-classification of the Interstate Commerce Commission as it was applied to collisions it is evident that only four of the sub-causes could be relevant, those due to unexpected movements of cars, defective coupler falling on foot, coupling damaged cars, delay in moving difficult ports. The coupling casualties in the country at large due to these causes constituted approximately 17 percentum of all coupling casualties. Assuming that the same propotion of Michigan coupling casualties were due to the same causes, it would eliminate 79 of the 95 coupling casualties. This elminiates all but 283 or 8.9 percentum of the total number of casualties as having no connection with the size of train crew.

Derailment.

The Railroad Commission report does not give a detailed classification of derailment casualties, but applying the same line of reasoning to derailments as was applied to collisions and coupling casualties it is evident that only those sub-causes of derailments classed as broken wheels, broken bottom brake, not ascertained, and conductor failing to have sufficient hand brakes set when train broke in two, could have had any possible preventive in a "full-crew." The casualalties resulting from these causes constitute only 1 percentum of the total number of derailment casualties found by the Interstate Commerce Commission during the year 1915. Assuming that the derailment casualties in Michigan due to

these causes were in about the same proportion, it is necessary to eliminate 240 derailment casualties. This leaves approximately not more than 43 casualties or about 1.3 percentum of the total number as having any probability of being related to the size of the train crews.

Conclusion

There were 3153 casualties reported in Michigan during the year 1913. These fall into sixteen main classes; of these classes at least eight, e. g., those due to falling from locomotives or cars, being struck at grade crossings, handling freight or baggage, jumping on or off locomotives or cars, being struck by overhead or side obstruction, parting of trains, repairing track or roadbed, being struck by locomotives or cars and switching, could have had no remedy in a "full-crew" law. This eliminates 1471 the total number. On further consideration it is made evident that casualties due to defect in roadbed or equipment, getting on or off locomotives or cars, switching, miscellaneous causes or occurring at stations and platforms, could be in any way affected by the number of men on a train. This leaves 837 out of a total of 3153 casualties as possibly related to the size of train crew. Considering that only 5 percentum of all collision casualties occurring in the United States in 1915 could possibly have been due to undermanned trains, it is probable that about the same proportion of Michigan casualties in 1913 might have had some conceivable relation to the size of train crews. Applying this proportion to Michigan casualties, it would eliminate 475 of the remaining 837 casualties as being irrelevant, leaving then 362 as being possibly relevant.

Not over 17 percentum of all coupling or uncoupling casualties found by the Interstate Commerce Commission in 1915 could possibly have been in any way due to undermanned trains. Applying the proportion of possibly relevant casualties to coupling accidents in Michigan, eliminates 79 more of the 362, leaving for consideration 283 of the total number. Considering further that approximately only 1 percentum of all derailment casualties found by the Interstate Commerce Commission in 1915 could have been in any possible way related to a "full-crew," and assuming that the same proportion would hold for Michigan in 1913, there would be left only 43 or 1.3 percentum as being possibly relevant to the "full-crew." This does not mean that 1.3 percentum of the Michigan casualties were related, but it is conceivable that approximately this many might possibly have been avoided by a different train crew. The fact that they could or could not have been avoided cannot be established.

Iowa

The proponents of the "full-crew" legislation have not been successful thus far in securing the enactment of their law in the state of Iowa. It remains, in this study, to determine in a scientific way whether the casualties in that state have been due to such causes as might be remedied through the employment of additional trainmen or to other irrelevant causes. It is possible that in the event of one finding there should be recommended some form of "full-crew" legislation and in the event of the other not.

A summary of Railroad Casualties as recorded by the Iowa Railroad Commission is given below.

Year ending	Killed	Injured
Dec. 4, 1911	214	2998
Dec. 2, 1912	211	3232
Dec. 1, 1913	271	3759
Dec. 7, 1914	261	4166

It will at once be observed that the total number of casualties is apparently increasing at a rather rapid rate. But upon further and more careful examination we find that these figures include casualties of two classes, those resulting from movement of trains, cars or engines (designated in the following as A), and those resulting from causes other than the movement of trains or Industrial Accidents (designated as B).

Below is a table showing the Iowa casualties divided into these two classes:

Year Ending		Killed	Injured
Dec. 4, 1911	A	202	1522
	B	12	1476
Dec. 2, 1912	A	200	1662
	B	11	1570
Dec. 1, 1913	A	257	1891
	B	14	1868
Dec. 7, 1914	A	249	1852
	B	12	2314

It is quite evident that consideration should be given to only the first class railroad accidents designated above as "A". The Industrial Accidents of "B" are palpably irrelevant to the size of the train crew. This elimination gives the following summary.

Year Ending	Killed	Injured
Dec. 4, 1911	202	1522
Dec. 2, 1912	200	1662
Dec. 1, 1913	257	1891
Dec. 7, 1914	249	1852

This shows a much smaller total as well as a much lower rate of increase; but the need for a "full-crew" law cannot be based upon an increase or a decrease in the total number of casualties occurring from year to year, because there are other factors, e. g., more thorough investigation and reporting of accidents, resulting in a larger number of minor accidents being reported, and the increase in traffic from year to year both in car mileage and in number of passengers carried which are significant. These factors might show a numerical increase in the total number of accidents reported even in the presence of a real proportional decrease. These considerations are mentioned simply to emphasize the fact that the only fair and scientific determination of the effectiveness of an accident prevention measure is to analyze the accidents that have occurred. In view of the fact that the greatest total number of accidents reported in Iowa was in 1914, that year has been selected for study. Below is a table showing a classification of the causes for the 4427 railroad casualties occurring in Iowa in 1914. (*a*)

Accidents resulting from movements of trains or engines.

	Killed	Injured
A		
Coupling or uncoupling	7	71
Collision	8	249
Derailment	10	236
Parting of trains		4
Engine or cars breaking down		2
Falling from train	25	148
Jumping on or off	22	216
Struck at Highway	43	98
Struck at Station	34	33
Struck at other points	87	88
Other causes	14	675
Overhead or side obstruction		27
B		
Causes other than movement of trains	12	2314
Grand Total	261	4166

Certain general causes can at once be eliminated as having no conceivable bearing upon the size of the train crew, namely, all accidents resulting from causes other than the moving of trains; jumping on or off trains; being struck at highway, station or at other points; falling from trains; being struck by overhead or side obstruction, engine or cars breaking down; and parting of trains. This will at once cast aside as

(*a*) Report of the Iowa Railroad Commission for 1914, pp. 460-7.

irrelevant 3153 of all our casualties, including 223 of the 261 fatalties.

Accidents recorded as due to "other causes" are those usually of minor significance which occur in connection with the moving of trains, such as might occur to trainmen or passengers because of missiles thrown at moving trains, falling because of sudden acceleration of train and minor defects in equipment. They are such as will not lend themselves readily to definite classification and are not such as could be avoided by additional men having definite duties. According to the kinds of accidents classed here by railroad commissions we are justified in disregarding these as having no possible prevention in a larger crew, thus establishing as irrelevant 3846, or 86.7% of the 4427 casualties. This leaves for further consideration all of those casualties due to collisions, coupling or uncoupling.

Collisions.

The Iowa Commission does not give a detailed account of collision casualties. In order to make a reasonable estimate of the number of collisions casualties in Iowa, which might possibly be related to a full-crew, we will assume that the proportion of relevant casualties due to collision is to the total number of collision casualties in Iowa as the relevant casualties in the country as a whole are to the whole number of collision casualties. Of all the sub-causes of casualties investigated by the Interstate Commerce Commission in 1914 only those due to failure of brakes, train moving without signal, failure of crew to properly protect train, could have had any possible relation to the size of train-crews. These four causes account for 5% of the total number of collision casualties in the country at large. That percentage applied to the 257 Iowa collision casualties would eliminate 244 of the 581 casualties remaining for analysis at the beginning of this sub-study. This eliminates from further consideration 4096 or 92.5% of the 4427 casualties occurring in Iowa during the year in question.

Derailments.

There is no detailed analysis of derailment casualties in the Report of the Iowa Commission for 1914. It is, however, reasonable to assume that the casualties occurring in Iowa on account of derailments were of the same varieties as those in the country at large. Of all the derailments resulting in casualties which were investigated by the Interstate Commerce Commission during the year 1914 only those due to broken wheels, broken brakes, train breaking in two, those not ascertained, and failure to properly protect train while making repairs could have had a conceivable preventative in a larger train crew. The sum of the derailment casualties due to these causes constitute 1% of all derailment casualties investigated. Applying this percentage to the Iowa derailment casualties for the year 1914 we can disregard at least 243 of the 246 as irrelevant to the size of the train crews and as having no conceivable remedy in an additional brakeman. Of the 581 casualties remaining at the start of this sub-study this eliminates 244 plus 243, leaving 94 casualties, or 3.8% of the total number, unaccounted for.

Coupling or Uncoupling.

In the absence of a detailed coupling casualty sub-classification, the percentage of conceivably relevant coupling casualties for the country at large as deducted from the Interstate Commerce Commission Report of 1914 will be applied to the 1914 Iowa coupling casualties. Of all coupling casualties investigated by the Interstate Commerce Commission only those due to unexpected movements of cars, defective coupler falling on foot, coupling damaged cars, and delay in moving difficult parts could have had any possible relation to the size of the train crews. These constitute 17% of all coupling casualties investigated in 1914. Applying this percentage to the 78 Iowa coupling casualties it would eliminate 65. This eliminates 552 of the 581 casualties remaining at the start of this sub-study, or 4398 (99.3 percentum) of the 4427 casualties occurring in Iowa during the year 1914. The remaining .7 per cent. may or may not be relevant. It is impossible to decide whether they are or whether they are not.

Conclusion

There were 4427 people killed or injured in connection with the Railroad Industry in Iowa in 1914. These casualties were those due to or occurring in connection with train operation, or industrial accidents not in connection with train operation.

The 2101 casualties occurring in connection with train operation were due to the following causes:

Coupling or uncoupling, collision, derailment, parting of trains, engine or car breaking down, falling from trains, jumping on or off, struck at highway, struck at station, struck at other places, overhead or side obstruction, and other causes.

The remaining 2326 are due to industrial causes or casualties occurring not in connection with train operation and are undeniably irrelevant to the size of train crew.

Of the 2101 casualties occurring in connection with the operation of trains in Iowa, 827 or those due to overhead or side obstructions, being struck at highways, stations, or other places, falling from trains, engine or cars breaking down, parting of trains and getting on or off trains, are casualties which could not reasonably have been avoided by an additional man on the trains. Those classed as other causes are casualties which do not lend themselves to any definite classification and are those usually minor accidents, due to unexpected, uncontrollable causes and carelessness and are irrelevant to the size of train-crew. Eliminating the above classes as being irrelevant to the size of train-crew there are still 581 casualties which have a possible relation to the size of train-crew.

Assuming that the same proportion of collision, derailment, and coupling and uncoupling casualties in Iowa are conceivably relevant to the size of train-crew as obtains in the country as a whole, it is evident that not more than 5% of the collision casualties, plus 1% of the derailment casualties and 17% of the coupling and uncoupling casualties have a conceivable relation to the size of train-crew. These percentages make it necessary to eliminate 552 of the remaining 581 casualties.

Altogether there have been eliminated 4398 of the 4427 casualties occurring in Iowa during the year 1914. This means that approximately 99.3 per cent. of the Iowa casualties in 1914 were irrelevant to the size of train-crew and could have had no possible remedy through a larger train-crew. The remaining .7 per cent. may or may not be such that an additional man would have prevented them.

CHAPTER VI

The Need of an Additional Brakeman

1—The Standard Size of a Train-Crew

Recent discussion of the "full-crew" legislation has indicated that there is a standard size of train-crew. The "full-crew" laws have been supported by those wishing to change the ordinary train-crew into a larger one. In order to determine the relation of various members of the crew to train operation it is necessary to establish a correct understanding of what is generally conceded by both trainmen and railroads to be the standard size.

Passenger. The number of men employed upon passenger trains varies with conditions. In some parts of the country, especially the South, many two-car trains are run with crews behind the engine consisting of a conductor, brakeman and negro porter, the conductor or brakeman acting as baggageman and the brakeman acting as flagman when the rare occasion demands. On many local trains containing only two or three cars the crew behind the engine consists merely of the conductor, acting also as baggageman, and one man who serves as flagman and brakeman.

Throughout the country, however, on trains of four or five cars, the crew behind the engine ordinarily consists of a conductor, baggagemaster, brakeman or flagman, and frequently a porter; there are additional brakemen or trainmen for trains with a greater number of cars. On trains of four or five cars having no baggagemaster, another trainman, usually designated as a brakeman, is ordinarily employed. When passenger trains are composed of passenger cars with also a number of Pullman cars or any other than ordinary passenger coaches, these Pullman or other cars carry a porter for every car. The testimony brought out at "full-crew" hearings and the statements published by the Bureau of Railroad Economics (*a*) establish the standard train-crew as being composed of a conductor and two other trainmen on a passenger train of four or five cars with a flexible, discretionary arrangement which adds additional brakemen to longer or heavier loaded passenger trains.

Freight. Modern freight trains are divided roughly into two classes—through and local trains. The broad distinction is that through freight trains ordinarily run from terminal to terminal without stops, except for water or in cases of emergency. The train is "made up" before starting and remains intact between terminal points but for breaks or accidents. On the other hand local freight trains are those intended to take care of shippers between terminals. They are sent out to stop at intermediate points and gather up small quantities of freight from small shippers, pick-up loaded cars and set-out empty cars at stations and sidings where they are wanted for shipping purposes.

On a through freight there are usually five men, an engineer, fireman, conductor, and two brakemen (one of the brakemen usually being called a flagman). At the point of origin the train made up and ready for its run is delivered by a switching-crew to the train-crew. The place of one of the brakemen is on the engine, the other goes into the caboose with the conductor. It is the contention of the railroad executives that this is the logical, standard size of train-crew on through freight trains for both safe and expeditious operation.

While it is customary to employ three men behind the engine on through freight trains, it is usual to employ a conductor and three or more brakemen on local freight trains, whether they are way freights or pick-up trains. Notwithstanding the fact that these local trains have a fewer number of cars than the through freight trains. These local freight train-crews are usually coincident with or larger in size than the legislative requirements. The standard train-crew on through freight trains is made up of five men, while the standard crew on local freight trains varies from five to seven men, depending not upon the length of the train but upon the nature and amount of the work to be done by the local train.

(*a*) Bulletin consecutive No. 73—March, 1915, pages 10-14.

2—The Work of a Brakeman Under Present Conditions of Operation

The operation of any train imposes certain important as well as minor duties upon the various members of the train-crew. There is a general familiarity with the duties of the fireman and engineer and a discussion of their duties would be irrelevant to the question at hand. It is, however, well to emphasize the fact that the engineer is the captain of the train by virtue of his complete control over its movements and speed. In general, the conductor is responsible for the care, repair, and general condition of the train behind the engine, and he is the commercial agent of the company on the trains, with the necessary duties of clerking and routine bookkeeping therein involved. In order to better understand the exact relation of the brakemen or flagmen to train operation and to the safe as well as to the expeditious operation of trains it will be well to briefly review the duties of brakemen under the old link and pin, and hand-brake system.

Until a comparatively recent time, trains were made up at the point of origin by the same employees who subsequently handled them on the road. The trainmen switched the cars into place, coupled them and did all the work necessary to prepare the train for its run, including the inspection of its condition before starting. Cars were coupled to each other and to the engine by the link and pin couplers. Brakemen had to carry links and pins to supply couplers lacking them, and to carry those unused back to the caboose or engine. Coupling was effected by hand for which purpose the employees had to go between the cars. Trains were controlled entirely by hand brakes, which had to be worked from the tops of freight cars and from the platforms of passenger cars. Practically, all trains rendered local as well as through service, e. g., they not only carried through traffic between terminals but also stopped at stations along the line to take on and put off passengers and freight. When a car was taken out of a train or taken into a train at one of these local stations, it was necessary to use the hand brake in the switching needed to make the requisite changes. The number of cars in a train was considerable. More than thirty years ago, before the introduction of air brakes or automatic couplers, it was the custom of many railroads to handle regularly freight trains of forty cars with a conductor, and two brakemen behind the engine. The labor of controlling the train exposed the brakemen to all kinds of weather and involved strenuous physical exertion for the application of hand brakes sufficient to hold a train. The brakemen had to spend most of their time on the tops of the cars, which in winter were often slippery with snow and ice. Going between cars to couple by hand necessarily involved danger so that accidents to trainmen were numerous.

In 1893 the Railway Safety Appliance Act was passed. This law provided that after January 1, 1898, it should be unlawful for any common carrier to use in interstate commerce any car "not equipped with coupler coupling automatically by impact, and which can be uncoupled without the necessity of men going between the ends of the cars." It further provided that it would be unlawful for any carrier to use

in interstate commerce any locomotive "not equipped with the power driving wheel brake, and appliance for operating the train brake system, . . . or to run any train after said date that has not a sufficient number of cars in it so equipped with power or train brakes that the engineer on the locomotive drawing such train can control its speed without requiring brakemen to use the common hand brakes for that purpose." Subsequent amendments (*a*) require that 85% of all cars in any train shall be equipped with power brakes.

In consequence of these requirements, there were on June 30, 1912, 99.05 per cent. of all locomotives and cars fitted with train brakes and 99.67 per cent. with automatic couplers. (*b*)

The fulfilment of these requirements has had a far-reaching effect upon the work of railway trainmen. The engineer has really become the brakeman (*c*), while the term "brakeman" is a misnomer, because only on detached cars in switching operations does the brakeman do much with the brakes.

Any necessary adjustment of the coupler can be made, and ought to be made, before the cars are put in motion to effect the coupling. In uncoupling the pin that locks the coupling can be removed by a rod extending to the side of the car. Thus not only is the work reduced but the danger from breaking or coupling on trains is greatly reduced.

The brakemen on passenger trains announce stations, help the passengers as they get on and off, set switches, load and unload baggage, look out for hot boxes and other defects, and flag. When there are both a porter and a flagman or a brakeman and a flagman, as is the case on most main-line passenger trains, the flagman's sole duty is to flag and to set switches behind the trains. As has been mentioned before, the work of inspection is now taken care of largely by the crew preparing the train. On fast through passenger trains these inspectional duties of the brakemen are exercised less often than on local passenger trains, making many stops.

On a through freight train the place of one of the brakemen is on the engine while the other rides on the caboose with the conductor. The ordinary duties of the forward brakeman are to transmit signals from the conductor to the engineer and to open switches in front of the train when it is necessary for the train to go on a siding at a meeting point. The ordinary duties of the rear brakeman are to flag at the rear end of the train when it stops and to close switches behind the train when it has gone on a siding. In an emergency caused, for example, by a drawhead pulling out or the air hose parting, the conductor may need the direct assistance of one of the brakemen. In such a case the rules require the rear brakeman to flag the rear of the train and the fireman to flag the front of the train, while the forward brakeman assists the conductor. Failure in the braking apparatus that cannot be remedied promptly is usually due to some defect in or on the engine and necessitates traveling slowly to the next point where another engine can be supplied.

Local freight trains carry a standard crew usually of three or more brakemen. This is a matter of expediency rather than safety. Local trains set out and pick up cars at way stations and load and unload a large amount of less-than-carload freight. Hence there is much switching to be done and much handling of freight at way stations and the additional brakemen are ordinarily necessary that the trains may not be unduly delayed. Inspection work outside of yards is done by the front brakeman watching the train go by, boarding the caboose, and walking over the train to the engine thus completing the inspection. (*d*)

(*a*) "Bureau of Railway Economics." Bulletin consecutive No. 73, page 12.

(*b*) IBID.

(*c*) Letters received by State Chamber of Commerce from New Jersey Engineers.

(*d*) Statement of Mr. J. C. Tucker, of Erie Railroad.

3—The Number of Brakemen Required

There are many casualties which occur in connection with train operation and industrial accidents classed as railroad accidents, which any fairminded person will admit have no conceivable relation to the size of a train-crew. It is contended that no casualties relevant to the size of train-crews would occur under the standard size train-crew, which would not also occur under a larger crew, if trainmen could be brought to continually and thoughtfully obey the rules of train operations. But a study of the conditions of train operation would seem to make clear that there is a distinction between the number of trainmen required for the safe and the number required for the expeditious operation of a train. It seems further evident that almost invariably the number of trainmen which a railroad will carry for the expeditious operation of its trains will exceed the number which would be necessary if only the safe operation were in mind.

The number of men necessary for the safe operation of a train is a somewhat varying quantity, depending upon the number of people carried and the nature of the schedule and cargo. Considering first a through freight train going from terminal to terminal, with no setting out or picking up of cars to be done and only regular stops for water to be made, it is generally true that five men can safely operate such a train. In a case of emergency while out on the road the one thing necessary to insure safety is to flag the front and the rear of the train. Whether this is done by the two brakemen or by the fireman and rear brakeman, the main opportunity for an accident due to anything but carelessness is eliminated. Now it is reasonable that two or three or more men would be desirable from the conductor's point of view speedily to repair the break, in order to get the train underway with as little delay as possible. But legislation to supply this extra help to repair a break in an emergency, when the train was protected at the front and rear, could not be held to be an exercise of the police powers of the state.

Considering a through passenger train it would seem that five men could handle a train, making only one or two stops in the state of New Jersey or perhaps no stops whatever, as safely as a larger crew. As for local passenger trains of considerable length there are cases where more than five men would be needed for the expeditious operation. As has been mentioned before no great amount of inspection work is done on passenger trains by the crew behind the engine, whether it be a "full-crew" or no. When on the road, if an emergency arises, flagging the front and the rear of the train will insure safety to the train and passengers. An extra man to help repair the damage would be highly desirable, but this would be a matter not of safety but of expediency. When local passenger trains are carrying a large number of passengers, necessitating their alighting from several cars at one time, it is a matter of safety to the traveling public that they be assisted in alighting. On most ordinary main-line passenger trains the crew of three men behind the engine can take care of the passengers.

An exhaustive study of casualties occurring in New Jersey while people were getting on or off trains shows that a large percentage of these casualties were casualties to employees; while a very large number were due to attempts to board or alight from a moving train. (*a*) Obviously the best preventative for such casualties would be raised platforms, and doors remaining closed until the train stopped, and being closed again before starting. Mechanical remedies would be more effective than additional men. However, with present station facilities, the fact remains that additional men are needed when trains are carrying large crowds, to assist the passengers in boarding the trains and in alighting therefrom.

On local freight trains, whether they are way freight trains or pick-up trains, a larger number of men are usually carried than the New Jersey full "crew-law" requires. The conten-

(a) A detailed study of New Jersey casualties made by the State Chamber of Commerce and discussed above in this report.

tion is made by the railroads that additional men are placed upon these trains simply to expedite their work and that they are not needed for the sake of safety. In view of the fact that the railroad standard crew on most local freight trains does meet, without legislation, the "full-crew" (*a*), any extensive discussion of the need for an additional man on trains where he is already placed would be irrelevant. It would be difficult to determine just when a sixth man on a local or way freight would be necessary for safety and when he would be desirable for expediency.

Summary.

There is a strong tendency to confuse safety with expediency. Additional men can be legislated onto trains for the sake of safety constitutionally, but any law placing men on trains simply for expediency could not be upheld as an exercise of the police power. Five men generally can operate safely a through passenger or a through freight train. In case of emergency safety is insured if the train is flagged in the front and in the rear. An additional man is often convenient in such emergencies but simply from the standpoint of expediency. Five men can operate safely any local passenger train (excepting commuter trains) ordinarily used in New Jersey, except when carrying heavy passenger traffic which makes it necessary for passengers to alight from three or more vestibules at one time. When additional men are needed to assist the passengers in boarding or alighting from trains, they might be employed on the trains or at the stations. On local freight trains the normal practice of railroads is to carry as many or more men than the "full-crew" laws ordinarily require. The reason for this is, that railroads determine the need for men by the nature of the train and its work, while legislation determines the need for men on trains by the length of the trains. It is hard to say just when more than five men are needed for purposes of safety and when for expediency.

4—The Duties of the Additional Brakeman in the "Full-Crew" State of New Jersey

New Jersey has a statute requiring that passenger and freight trains of a certain length or over carry one or more additional men. This law is constitutional as an exercise of the police power of the State if the additional man, on the trains in New Jersey, adds to the safety of passengers or employees. Whether or no he adds to the safety of train operation can be concluded from a survey of the duties he performs.

Each of the New Jersey conductors have been asked what the additional brakeman does and the answers show that his duties are varied. These numerous replies indicate that the additional brakeman on passenger trains is supposed to, and ordinarily does, perform the following duties:

Assists passengers on and off the trains; gives information to the people traveling on the trains; helps the conductor take tickets; regulates heat and ventilation; announces stations; assists in case of accidents, and sometimes helps get the train made up. Many conductors replied that their additional brakeman was useless and contributed nothing to the operation of the train.

According to these replies the additional brakeman on various freight trains performs the following duties:

Helps pass signals on very long trains; assists in loading and unloading freight on heavy package trains; rides cars on grades for safety in case of air brakes failure; looks for broken flanges and broken brake riggings and cools hot boxes; loads and unloads freight and drills out cars.

The additional man has no distinct duty to perform on freight trains which adds to the safety of other employees, except possibly in cases where he rides the train on grades so as to be on hand in case of failure of the air brakes, and possibly in cases where he helps to pass signals on very long trains. However, in this connection, Mr. Mantell, Superintendent of the Wyoming Division of the Erie Railroad, testified at the "full-crew" hearing at Harrisburg, March 23, 1915, that in running 2,220,000 trains in nine years the Erie had five air-brake failures and at least three of these had been failures because the crews of the trains had failed properly to connect the air hose. The additional man does come in handy to assist in repairing breaks when one man could not do it alone. However, that is not a matter of safety but rather a matter of expediency.

5—The Need for Governmental Regulation of the Size of a Train-Crew

The exhaustive survey of the causes for railroad casualties in this county or in any particular state, has not shown that there are many casualties which might possibly have been due to an undermanning of train. But there are some such instances and it is believed that the insured safety of the public and the employees demands that the state retain power to require that trains be manner always to the surety of safety. This power may or may not be applied invariably, but the state should, in some form, have the regulation of the size of train-crews in the bounds of possibility.

6—Conclusion on the Need for an Additional Brakeman

A survey of the present-day conditions of train operation under the automatic coupler and air-brake systems, which make it no longer necessary for brakemen to go between cars to couple or on the tops of cars to brake, would seem approximately to make possible a standard size train-crew. Throughout the country it was the practice before the enactment of the "full-crew" laws for railroads normally to man their through freight and passenger trains with a crew of five trainmen (engineer, fireman, conductor, brakeman and flagman). The number of trainmen carried on local freight and passenger trains varied with the changing conditions, but usually exceeded the number carried on through service.

There is a clear distinction between the number of trainmen which should be carried on a railroad when viewed entirely from the standpoint of the safe operation of a train and when from the standpoint of its expeditious operation. It is constitutional, under the police power, for a state to require a crew of sufficient size to insure the safe operation of any interstate train and palpably unconstitutional for a state to ever attempt to require a crew sufficient to insure the expeditious operation of any interstate train; but it is almost invariably true that the number of trainmen which the railroads place upon the trains for their expeditious operation is in excess of the number which would be necessary strictly from the standpoint of its safe operation.

A letter addressed to every conductor operating in New Jersey, in which a request was made for a survey of the duties of the additional brakeman, brought replies of varying kinds. Some conductors indicated that the additional brakeman was indispensable and some declared that he was useless and contributed no benefit.

In view of the possibility, which is ever present, that the railroads may underman their trains to the hurt of safety, it would seem that the government should retain in its own hands the power to always require that trains be adequately manned.

(*a*) "Bureau of Railway Economics." Bulletin consecutive No. 73, page 19, March, 1915.

CHAPTER VII

The Methods of Statutory Regulation and Administrative Regulation of the Size of Train-Crews

A history of the rise of the "full-crew" movement, a digest of the laws, a statement of their object to reduce railroad casualties, and an estimate of their effectiveness as accident measures have been sent forth. The data which is grouped under these various heads and their sub-heads, is a substantial basis upon which to determine whether the government should interfere with the railroads in the manning of their freight and passenger trains. The facts have seemed to point toward the desirability of some kind of regulation. There remains the lesser, but important problems of determining what sort of regulation, in the light of past experiences, that should be.

There have been several attempts made by the "full-crew" protagnists to secure a federal law which would regulate, or provide for the regulation of the size of interstate commerce train-crews throughout the country. That legislation, if passed, would become effective in all the states and, Congress having acted, would make void and supplant the "full-crew" state statues in so far as they apply to interstate, as opposed to intra-state, commerce. But since Congress has not yet seen clear its way to take over the regulation of train-crews in interstate commerce, that function is still left to the jurisdiction of the state legislatures. There are twenty-three states which have passed, and twenty-two which still have legislation relative to train-crews.

There are, summarily speaking, two distinct ways in which a state may interpose its hand to require railroads to man their trains properly. These two alternative methods are commonly known as statutory regulation and administrative regulation. The legislative power of the state being vested in the legislautre, it remains for that body to determine whether it shall seek to lay down rigidly and specifically in the statute all the lines along which it desires regulation, or whether it shall, by that statute, simply empower an administrative body to work out the lines of regulation as the emergencies arise. Each method affords its peculiar opportunities for exploitation as well as beneficial regulation. Legislatures which have preferred to maintain not only complete control, but the detailed supervision of the situation, in their own hands have attempted to cover all possible contingencies by statute. This is known as statutory regulation. Legislatures which have, on the other hand, preferred to work out the general policy only and leave its immediate application and supervision to more expert heads, have delegated regulatory powers to other state officials. This is known as administrative regulation. There has, up and until the present time, been a marked partiality on the part of the legislators for retaining details of regulation in their own hands. That attitude has prompted twenty of the twenty-two "full-crew" states to make their regulation statutory rather than administrative. It was in 1913 that two states broke away from the usual method and provided for the administrative regulation of the size of their freight and passenger crews. In the digest of "full-crew" laws which has preceded it was observed that Arizona, Arkansas, California, Indiana, Maine, Maryland, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Texas, Washington and Wisconsin (in part) regulate by statute, and that Massachusetts, Connecticut, West Virginia and Wisconsin (in part) regulate through administrative organs.

STATES WHICH HAVE STATUTORY REGULATION

There can, perhaps, be no better way to construct an intelligent opinion of the respective merits of statutory and administrative regulation than to enter upon a critical analysis of some of the practical problems which have arisen under each system in the states that have done the testing. A study of the operation of the statutory regulation of train-crews in Arizona, Arkansas, California, Indiana, Maine, Maryland, Mississippi, Nebraska, Nevada, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Texas, Washington and Wisconsin, reveal several interesting problems. These problems seem to group themselves naturally under the same two heads—the underlying theory and the size of the train-crew should be determined by, and vary according to, the number of cars in a train, and the practical difficulties of operation which have arisen.

(*A*) The Theory of Determining the Number of Trainmen Solely by the Number of Cars

It is of no little interest that almost every "full-crew" law of the nineteen states which have statutory regulation, does make the number of trainmen upon any passenger or freight train depend upon, and vary with the number of cars in that train. And it is of great significance that really no other factor is taken into account. Since the number of brakemen in the "full-crew" states is made entirely contingent upon the length of the train, it would seem clear that the legislation is premised and rests quite upon the underlying theory that railroad hazards vary directly with the number of cars in a train.

The "full-crew" and train-limit laws based on same theory.

That the railroad brotherhoods are earnest and logical in this premise, there can be little doubt as they are eagerly attempting at the same time to increase the number of trainmen on a train and to decrease the length of the train. Following directly upon the heels of the "full-crew" movement was the movement by the same proponents to limit the number of cars in a train. The alleged object of these train-limit bills was and is to promote safety to employes by setting an arbitrary limit to the length of all freight trains. The limit varies—being in some cases one half mile and in some fifty cars. The brotherhoods seem for the moment, indeed, almost to have abandoned their active "full-crew" propaganda in order to push the train-limit legislation. It is a fact that train-limit bills, during the winter and spring of 1914-1915 were introduced into the legislatures of twenty states—namely California, Colorado, Georgia, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nevada, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Carolina, South Dakota, Utah and Wisconsin. The only state in which such legislation has been passed is Arizona, which limits freight trains to seventy cars. The fact that these movements have followed so closely, one upon the other, has made only more clear the theory underlying each. The "full-crew" laws, and the train-limit bills, which are both designed for safety, take their basic and only theory in the promise that railroad casualties vary directly with the number of cars in a train.

1—Practices of States in Determining the Size of the Crew

It needs only a cursory reading of each law, in the nineteen states having statutory regulation, to see that they are all based upon the premise that casualties vary directly with the length of the train. A not much more careful reading shows that the number of cars is, moreover, the only criterion set forth upon which to determine the prevalence of casualties. The laws of Arizona, Arkansas, California, Indiana, Maryland, Nebraska, Nevada, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Washington and Wiscon-

sin attempt to secure the sefety of trainmen by gauging the number of trainmen required by the number of cars pulled.

There is, moreover, no regularity of the laws in agreement upon the number of trainmen needed on a train of any given length. New York requires freight trains of 25 cars or more to carry 6 trainmen. But Pennsylvania does not require as many as 6 trainmen until a freight train has 30 cars, Oregon not until it has 40 cars and Indiana not until it has more than 50 cars. California requires passenger trains of 4 cars to carry 6 trainmen. But New Jersey does not require as many as 6 trainmen until a passenger train has 5 cars, Nevada not until it has over 50 cars and Oregon, Nebraska, Arkansas and several other states not on a passenger train of any length. There is, in fact, no agreement in the laws except on the underlying principle in all that the casualties vary with the length of the train and that, therefore, the number of trainmen required must be determined somehow by the length of the train.

2—The Lengthening of Freight Trains and Increase in the Train Load

No adequate examination of the theory underlying the "full-crew" laws can be made until it is first determined whether, as the Brotherhood contends, freight trains have been greatly lengthened. If there is a finding that freight trains have been lengthened it will still remain to be determined whether that accounts for the increase in casualties to trainmen.

The increase in length. There seems no ground to dispute the contention of the trainmen that there has been a gradual and consistent lengthening of freight trains during the last several years. An examination of the table below shows that the average number of cars per freight train on all the railroads of the United States increased 26.8 cars in 1904 to 34.3 cars in 1914, an increase of 28 percentum. (*a*)

Year	United States	Freight Cars Per Train. Eastern District	Southern District	Western District
1904	26.8	28.6	23.8	26.1
1905	27.6	28.8	24.4	27.5
1906	27.9	29.3	24.4	27.8
1907	27.2	28.8	23.1	27.0
1908	28.7	30.9	24.3	28.1
1909	30.2	32.4	26.5	29.3
1910	29.9	32.0	26.8	28.9
1911	30.8	32.8	27.8	30.1
1912	31.8	33.9	28.3	31.1
1913	32.7	34.7	29.1	32.0
1914	34.3	36.4	30.7	33.8
Increase 1914 over 1904	7.5	7.8	6.9	7.7

These averages, it will be understood, include many roads with comparatively light traffic and the larger railroads would show much greater average. In such instances and in those sections of the country where the traffic is heavy, freight trains not infrequently include 75 and sometimes 100 cars.

Capacity of freight cars. The average capacity of freight cars on the railways of the United States increased from 30 tons in 1904 to 39 tons in 1914, and the average load carried by freight cars increased from 17.7 tons in 1904 to 21.1 tons in 1914. Here again the average falls far short of indicating the capacity and loading attained in sections of greatest density of freight business, as is shown by the fact that in 1914, 30 per cent. of all freight cars had a capacity of 50 tons or over.

Average capacity of cars and tons carried per loaded car. (*b*)

Year	Average capacity (tons)	Average load per car (tons)
1904	30	17.7
1905	31	18.1
1906	32	18.9
1907	34	19.7
1908	35	19.6
1909	35	19.3
1910	36	19.8
1911	37	19.7
1912	37	20.2
1913	38	21.1
1914	39	21.1

Train loads. The summary effect of an increased number of cars per freight train and an increased tonnage, per car, is shown in and results in an increase in the number of average tons per train. In 1904 the average load carried per freight train on the railways of the United States was 307.8 tons and in 1914 it was 451.8 tons, an increase of nearly 50 per cent.

Average tons per train. (*a*)

Year.	Tons per train	Year.	Tons per train
1894	179.8	1905	322.3
1895	189.7	1906	344.4
1896	198.8	1907	357.4
1897	204.6	1908	351.8
1898	226.5	1909	362.6
1899	243.5	1910	380.4
1900	270.9	1911	383.1
1901	281.3	1912	406.8
1902	296.5	1913	445.4
1903	310.5	1914	451.8
1904	307.8		

Increase 1894 to 1914, 151.3% Increase 1904 to 1914, 46.8%

Again it must be said that in the Eastern District, including the region of heaviest traffic, the average train load in 1914 was 537.3 tons, and that on some lines the average train load is over 1000 tons and that train loads of 5000 tons are not uncommon.

Conclusion

It has been made apparent by the just previous studies that the railroad brotherhoods are correct in their contention that freight trains have been greatly lengthened in recent years. It remains to be determined whether that increase in train length has itself caused an increase in hazards to the trainmen thereon.

3—The Relation of Trainmen Casualties to the Length of Trains

The finding made just above that there has been a marked increase in the train length and load. does not necessarily fix that as the cause for the increase in casualties to trainmen. It remains still to make a detailed analysis of the causes which account for casualties to trainmen in this country, in order to determine whether the lengthening of the train crew has been a large contributing cause or whether it has not. If the length of the train has accounted, directly or indirectly, for a large part of the casualties to trainmen there would seem to be a most significant testimonial to the soundness of the underlying theory of the "full-crew" legislation. But if it is found that no great number of trainmen casualties were occasioned by the length of the train, the practice of gauging a safety requirement (the "full-crew" legislation) by the length of the train proves itself fallacious and the theory of the laws would seem to be grounded in error.

The arguments of the railroad brotherhoods, designed to show that long freight trains are less safe than short, are based, in the main upon the following points:

(*a*) Computed from Statistics of Railways in the United States, Interstate Commerce Commission, 1904 to 1914, by the Bureau of Railway Economics at Washington, D. C. Averages exclude mixed train mileage.

(*b*) Computed from Statistics of Railways in the United States, Interstate Commerce Commission, 1904 to 1914, by the Bureau of Railway Economics at Washington, D. C., and Bulletin 81 of the Bureau of Railway Economics.

(*a*) Computed from Statistics of Railways in the United States, Inter state Commerce Commission, 1904 to 1914, by the Bureau of Railway Economics at Washington, D. C., and Bulletin 81 of the Bureau of Railway Economics.

First—It is claimed that it is difficult to transmit intelligible signals from the rear of a long train to the engineman in the front.

Second—It is claimed that increasing the number of cars in a train increases the liability of accidents to trainmen on account of the greater danger of failure of draft gear or brake rigging, or of parting of trains.

Third—It is claimed that long trains are subject to greater risk of buckling than short trains.

Fourth—It is claimed that breakages in draft, gear or brake rigging, or other defects, occurring on the road are more liable to escape detection in long trains than in short.

Fifth—It is claimed that long trains can be stopped or started only with comparative slowness.

There is no point in such an impartial ivestigation as this purports to be to argue either in favor or in opposition to the several points here advanced. There are very potent arguments which can be mustered on both sides. Is is of scientific value, however, to exhibit an intelligible table of the causes of casualties to trainmen for the last year in order to assist in determining whether those casualties were caused by the increase in the length of the train or because of other unrelated causes. Such a table should itself answer the five issues raised above.

The following table shows all casualties to trainmen for the year ending June 30, 1915 and the fifteen main causes together with their respective second causes as found by the Interstate Commerce Commission. Those particular causes which have any possible or conceivable relation to the length of a freight train are italicized. This does not mean that all italicized causes are attributable to long trains. For the table included long and short trains and obviously many of the italicized casualties were found on short trains and many even of those which were on long trains did not have their occasion in the fact that it was a long train. But, in order to be absolutely fair, all causes which have any conceivable relation to the length of a train are marked. A study of this table, therefore, should go a long way toward sounding out the basic theory of the "full-crew" laws—namely that railroad hazards to trainmen depend largely upon the length of the train.

CAUSES OF CASUALTIES TO TRAINMEN. (a)

Year Ended June 30, 1915.

Cause.	Number of accidents.	Number of casualties to trainmen. Killed.	Injured.
1. Collisions	3,538	60	1,199
a. Rear (b), (p. 30)	435	....	....
b. Butting (p. 30)	282	....	....
c. Trains separating (p. 30).	303	....	....
d. Miscellaneous (p. 30)	2,518	....	....
2. Derailments	6,849	114	1,174
a. Defects of roadway (p. 32)	1,507	....	....
b. Defects of equipment (p. 32)	3,416	....	....
(1) Broken or burst wheel	335	....	....
(2) Broken flange	346	....	....
(3) Loose wheel	100	....	....
(4) Miscellaneous wheel defects	86	....	....
(5) Broken or defective axle or journal	367	....	....
(6) Broken or defective brake rigging	390	....	....
(7) Broken or defective draft gear	280	....	....
(8) Broken or defective side bearings	141	....	....
(9) Broken arch bar	222	....	....
(10) Rigid trucks	177	....	....
(11) Failure of power brake apparatus, hose, etc.	353	....	....
(12) Failure of couplers	219	....	....
(13) Miscellaneous causes	400	....	....
c. Negligence of trainmen, signalmen, etc. (p. 30)	297	....	....
d. Unforeseen obstruction of track, etc. (p. 30)	244	....	....
e. Malicious obstruction of track, etc. (p. 30)	70	....	....
f. Miscellaneous causes p. 30)	1,315	....	....
3. Accidents to trains, cars or engines, except 1, 2 and 4 (p. 24)	....	4	203
4. Bursting of, or defects in, locomotive boilers, etc. (p. 24)	....	13	429
5. Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, etc. (p. 24)	....	....	....
6. Coupling or uncoupling cars (exclusive of accidents with air or steam hose) (p. 33)	....	88	1,949
a. Adjusting coupler with foot	....	....	176
b. Adjusting coupler, cars accidentally started	....	4	60
c. Careless manipulation of uncoupling lever	....	....	39
d. Cars not equipped with automatic coupler	....	....	2
e. Coupler broken, using link and pin or chain	....	5	35
f. Coupling damaged cars	....	2	43
g. Coupling with chain or other emergency appliance on curve too sharp for automatic coupling	....	....	16
h. Coupling with chain or other emergency appliance because of uneven track	....	....	....
i. Coupling or uncoupling safety chain	....	2	28
j. Fingers or hand caught between uncoupling lever and body of car	....	....	309
k. Uncoupling without using lever (unnecessary)	....	....	38
l. Uncoupling without using lever (lever out of order)	....	4	107
m. Foot caught in frog switch, or guard rail	....	4	422
n. Opening or closing knuckle when cars were near together, miscalculated speed	....	15	160
o. Opening knuckle when cars were near together,			

(a) This table was taken from Accident Bulletin No. 56 (1915) of the Interstate Commerce Commission, and corresponds to one prepared by the Bureau of Railway Economics of Washington, D. C. The page numbers refer to Accident Bulletin No. 56.

(b) Some rear-end collisions may conceivably have occurred to long trains after being forced to stop by reason of breakage due to their great length. Some rear and butting collisions may conceivably have happened because of greater delay in stopping or starting trains of great length. But it is not believed, as a practical matter, that such accidents could have been numerous enough to deserve recognition in this table.

Cause.	Number of accidents.	Number of casualties to trainmen. Killed.	Injured.
engine accidentally started	....	9	93
p. Opening knuckle, part of defective coupler fell on foot	....	....	54
q. Opening knuckle, lost footing	....	4	68
r. Riding on car to uncouple, slipped off	....	4	45
s. Struck by object at side track	....	1	41
t. Caught by unexpected movement of car, due to slack running in	....	12	155
u. Caught by unexpected movement of car, due to misunderstanding in giving hand signals	....	3	27
v. Uncoupling moving cars and lost footing	....	6	125
w. Parts hard to move, causing delay	....	1	45
x. Went between cars unnecessarily and contrary to rule	....	8	82
y. Hand caught between projecting load and end of next car	....	....	9
z. No witness (fatal accident)	....	4	....
aa. Other causes	....	....	112
bb. Unexplained	....	....	58
7. While doing other work about trains (not in shops or engine houses) or while attending switches (p. 35)	....	76	17,770
a. Shaking grates	....	....	704
b. Firing engine (raking fire, shoveling coal into fire, etc.)	....	....	1,831
c. Coaling engine	....	1	238
d. Taking water at water cranes	....	1	440
e. The working or action of reverse levers	....	....	542
f. Scalded by water from squirt hose	....	....	219
g. Throwing switches	....	....	838
h. Poling cars	....	....	128
i. Coupling or uncoupling air or steam hose (includes the turning of angle cocks)	....	12	412
j. Using hand brakes	....	1	1,098
k. Loading or unloading freight, baggage, etc	....	1	1,463
l. Cinders in eye	....	....	1,060
m. Stepping on or stumbling over objects, stepping in holes, slipping, etc. on or at side of track	....	18	3.384
n. Unexpected or abnormal movement of trains, cars, or engine	....	23	2.082
o. Struck by objects on or at side of track, not fixed structures	....	1	189
p. Struck while riding in or on trains, cars, or engines, by trains, cars or engines on adjoining track	....	1	409
q. Struck while riding in or on trains, cars, or engines, by projections from trains, cars or engines on adjoin-track	....	2	102
r. Miscellaneous	....	17	2,731
8. Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structure at the side of the track (p. 24)	....	44	1,039
9-10. Falling from, or getting on or off, cars or engines (p. 34)	....	304	10,050
a. Fell from roof of box car by reason of—			
(1) Defect in car	....	1	56
(2) Ice or snow	....	5	81
(3) Parting of train	....	7	69
(4) Derailment, collision, or shock due to abnormal movements of cars other than those under 3 preced-			
(5) While setting brakes	....	30	605
b. Fell from—			
(6)-(7) Freight car other than box car	....	25	345
(8) Engine or tender	....	45	734
(9) Passenger car	....	4	68
(10) Engines, tenders, or cars (all kinds) at rest	....	5	538
(11) Miscellaneous causes	....	33	1,064
(12) Not clearly explained	....	73	144
(13) Slipped getting on moving trains or cars	....	25	1,018
(14) Jumping off moving trains	....	9	2,072
(15) Jumping from engines or cars anticipating collision, derailment, or other accidents	....	1	272
(16) Fell from engines or ing	....	25	630
cars by reason of defective handholds and sill steps	....		416
(17) Getting on or off moving engine	....	16	1,918
(18) Caught in fog, guard rail, or switch	....	....	20
11. Other accidents on or around trains (p. 24) (Only one of twelve subclasses of causes appears to have any possibility of connection with train-lengths, viz: "Unexpected or abnormal movement of trains, cars, or engines" (p. 35.)	....	....	11
12. Being struck or run over engines or cars at stations or yards (p. 24)	....	136	387
13. Being struck or run over by engines or cars at high-grade crossings (p. 24)	....	....	....

Cause.	Number of accidents.	Number of casualties to trainmen. Killed.	Injured.
14. Being struck or run over by engines or cars at other places (p. 24).....	....	42	38
15. Other causes (p. 24).....	....	3	52

To show the number of percentage of casualties from those causes which may, in some instances, have been a result of length of trains, the data in the foregoing table was summarized by the Bureau of Railway Economics as follows:

Summary of causes of casualties.

Year Ended June 30, 1915.

Cause.	Number of accidents.	Number of casualties to trainmen. Killed.	Injured.
Total collisions and derailments	10,387	....	....
Total from causes, of which some might have been due to lengths of trains.....	1,545	....	....
Per cent. such accidents were of all collisions and derailments	14.9	....	....
Total casualties from collisions and derailments.....	....	174	2,373
Total casualties from causes other than collisions and derailments	....	710	31,928
Total casualties from accidents, other than collisions and derailments, of which some might have been due to length of trains.....	....	109	5,070
Per cent. such casualties were of all casualties from causes other than collisions and derailments	....	15.4	15.9

These tables seem to show, considering first the number of collisions and derailments, that from a total of 10,387 of such accidents only 1,545 or 15 per cent. could conceivably have been due in some cases to the length of trains. But even this number (1,545) includes all accidents of those types which occurred on short freight trains in the United States all passenger trains, and all accidents of that type which, although occurring on long trains were occasioned by other causes than the length of the train itself. It is therefore evident that the number of collisions and derailments which could on any reasonable ground be assignable to the length of a train reduces itself to a very small number and to a negligible per cent.

Considering, on the other hand, the casualties to trainmen from causes other than collisions or derailments, it appears that from a total of 710 killed and 31,928 injured, only 109 or 15.4 per cent. and 5,070 or 15.9 per cent. respectively, could conceivably have been due in some cases to the length of the train. Again it must be taken into consideration that this maximum number must be greatly reduced since it included all accidents of that type which occurred on short freight trains in which class there is a great majority of all freight trains, on all passenger trains, and all which occurred on long freight trains but were assignable to causes other than the length of the train itself. The conclusion that the length train has not played a very formidable part in occasioning the casualties to trainmen on freight trains, thus forces itself out.

4—Other Factors Which Should Determine the Size of the Train-Crew

An examination of the "full-crew" laws shows that the only measuring stick indicated with which to estimate the prevalence of casualties is the length of the trains. But a review of the causes of trainmen's casualties makes it clear that the length of the trains has not been ever a noteworthy cause for such casualties. It would not be possible for the most ardent proponent to find that any considerable proportion of casualties were caused by the lengthening of trains. There would seem to be even less ground for the assumption that this is the only cause.

There are a whole host of factors, beside the length of a train, which should enter into the determination of the size of the train-crew. A few of the factors are the curvature of the track, weather conditions, the conditions peculiar to local trains as distinguished from through trains such as the number of stops and number of passengers or kind and amount of freightage, the condition of train equipment and the amount of switching to be done, and the extent to which the train and track have been provided with safety precautions. These and other factors are as important in the determination of the proper number of trainmen that should be carried. from the standpoint of safety, as is the length of the train and yet none have even a slight consideration under the "full-crew" laws. Those laws pass over all of these other equally important criterions and confine themselves to a single term —the length of the train.

5—Summary and Conclusion

The whole "full-crew" movement rests upon its merits as an accident preventive, and all of the "full-crew" legislation proceeds upon the theory that long trains are more hazardous and require more trainmen than short trains. It would seem that the proponents of that law are willing to make the length of a train the sole basis by which to determine the number of trainmen on any train. That is the only real "measuring stick" they have suggested in the many "full-crew" states. It is true that even these laws are not in accord as to how many freight or passenger cars six trainmen can man properly. Some set the number at five cars and some at fifty. But despite their variance in content the laws do undoubtedly proceed upon the same underlying theory, that railroad casualties to trainmen depend upon and vary directly with the length of the train.

A close examination of the reports of the Interstate Commerce Commission shows that the percentum of trainmen casualties, which could even conceivably have had their final cause in and be attributable to the length of the train is almost negligible. A study of the chart tabulating the causes of all trainmen casualties for 1915 will reveal that same conclusion. And aside from the statistics on the subject it would seem that, as a matter of sense, the short local trains which do the most stopping, starting and switching would naturally have more accidents than the long trains which are usually through trains making few stops. The private records of railroad statistics do, as a matter of fact, show this, but have not been included in this report because of their liability to arouse prejudice as coming from a biased source.

The theory of determining the number of trainmen by the number of cars in a train cannot stand upon its own inherent merits. An examination does not show it to be sound. But aside from its intrinsic value, and, even granting that it does have some merit, there is no reasonable basis for making it the only standard by which to determine the number of trainmen on each train. There are other quite as important factors. A local freight train of 25 cars requires more men than a through freight train of 25 cars. An express passenger train of 10 cars does not require as many trainmen as one which is local and of the same number of cars. A through all-pullman train, which has already a porter for each car, a pullman conductor, a train conductor and a brakemen, does not require as many additional brakemen as a commuters' train of the same number of cars. A train running over a perfectly level and safe road does not require as many trainmen as one of the same number of cars running over an unsafe, winding and mountainous road. A train which does no switching does not need as many trainmen as one of the same number of cars which does much switching.

It would seem that the whole theory of gauging the number of trainmen by the length of the train alone is in error. The longer trains are not necessarily, or even usually, more hazardous as such. There are, moreover, other more significant factors to be considered in determining the number of trainmen each particular train should carry.

(*B*) Practical Difficulties of Operation Under the Laws

Aside from the fallacious theory underlying all statutes which attempt to determine the number of trainmen by the number of cars, there are practical difficulties of operation which have arisen under the laws. Chief among these problems are those of making up a train, those which are occasioned by reason of the location of railroad terminals, and those due to conflicts in state requirements.

1—The Problem of Making up a Train

The number of cars. The situation which arises by reason of the law fixing arbitrarily the maximum number of cars that may be hauled before an additional brakeman is required, may be well illustrated by a concrete example. The Pennsylvania Railroad has designated Pittsburg as one of its freight terminals. Since the "full-crew" statute of Pennsylvania requires six trainmen on freight trains of more than thirty cars and five trainmen on those of less, there is always the fight to make trains, which would naturally be of about that length anyway, come within the five trainmen clause. It is very common, therefore, for the Pennsylvania Railroad to have a train of thirty cars made up from Pittsburg and ready for a journey with a crew of five trainmen. But it is contended that a patron will call up at the last minute and demand that an extra car of fruit, let us say, be put in that train. It is apparent that one extra car or two or three could be handled by a crew of five trainmen as easily as otherwise. Yet the rigidity of statutory regulation does, by the very fact that it must set some definite line, require that the train be held up until another trainman is secured. It is not always easy to procure an additional trainman at a moment's notice and that operates to hold up a train until a sixth man can be found.

The number of trainmen. Take, for example, the problem confronting a Central Railroad of New Jersey passenger train connecting the Jersey Coast and New York City. A certain passenger train passing through Asbury Park en route to New York is carrying ordinarily only three or four coaches. That number may by law be carried with five trainmen. But a sudden change in the weather during the summer has the effect of hastening the summer tourists away from Asbury Park. And it becomes evident that an additional car must be put on at Asbury Park to carry the passengers conveniently. An extra car cannot, however there be attached without hunting up and procuring an additional trainman. But it is manifestly difficult, if not impossible, to secure the services of a trainman at a place not a terminal. The usual result is that the extra coach is left standing idle on the Asbury siding and the passengers are crowded into the already full cars.

These hypothetical illustrations are typical of the conditions which are constantly arising in the various states that attempt to set an arbitrary and rigid schedule of the number of trainmen and cars by statute.

A not less significant factor than the practice of fixing a rigid allotment of cars and trainmen in making for the inflexibility of the laws, is that the railroad is prevented from shifting men about to positions most in need.

It is an undisputed fact that some trains are much more in need of additional trainmen than others. There are some trains which require more trainmen than any "full-crew" law would presume to require universally. There are some trains which really do not need as many trainmen as the "full- crew" law in some states demand. The economics of the situation, therefore, from the standpoint of the railroads in those states necessitate that some trains go undermanned and some overmanned. The statutes do not permit of an expeditious adjustment of trainmen at those points where they are most needed.

2—Railroad Terminals Not on State Lines

Not the least of the practical difficulties of operation are those which occur by reason of the fact that railroad terminals do not always fall upon state lines and that interstate runs of interstate commerce trains do not always equal exactly the regular day run.

No more forceful illustration of the point in mind can be made than a picture of the conditions which would obtain had the states surrounding New Jersey no "full-crew" law. The New Jersey law could not in letter require every train which touches rails within the state bounds to carry a so-called "full-crew." But since it is only a two hour run across the state of New Jersey, it is not practical for every railroad to stop its trains on the state line to put on an additional man. Railroads must run their men from terminal to terminal. Consequently the operators of a train must place an additional man on the whole run if the train enters New Jersey or cuts a corner through New Jersey

3—Conflicts of State Requirements

Numerous difficulties in the operation of the various "full-crew" laws are bound to arise so long as there is state, as opposed to federal, regulation. These problems are due not alone to the fact that some states have and some have not "full-crew" regulations, but to the discrepancies which obtain as between the different requirements in the states. The New York law and the New Jersey law are not alike. A train of thirty cars may pull through New Jersey with a train-crew of five men, but no freight of over twenty-five cars can enter New York with less than six trainmen. A Pennsylvania Railroad train starting from Pennsylvania station encounters no less than five different jurisdictions during a run of five hours to Washington, D. C. It is not necessary to enumerate many specific difficulties which have actually arisen in the "full-crew" states due to conflicts of the laws. The evils are different from a simple general statement.

(*C*) The Merits and Demerits of Statutory Regulation

So-called statutory regulation is an attempt to write into a law provisions to take care of all contingencies which might arise under the law. When a legislature is in a position to and knows the specific requirements which it desires to impose, there is always an advantage in passing a detailed law, setting forth all that was meant to be set forth; such a method precludes the possibility of political tampering which might result in case the power to regulate were broadly delegated to an administrative board. But there is always danger that statutory regulation will be unduly arbitrary and will impose restrictions to the hurt of innocent parties. This is the great objection which has been so often raised to the practice of requiring "full-crews" arbitrarily by statute.

STATES WHICH HAVE ADMINISTRATIVE REGULATION

The method most prevalent for regulating the size of train-crews is through statutory provision and eighteen of the "full-crew" laws accordingly attempt to specify arbitrarily in the law the number of trainmen which reilroads must carry on their various trains. In the four remaining laws, of Connecticut, Massachusetts, West Virginia and Wisconsin (in part), however, there has been an attempt to break away from the rigidity of statutory regulation. Those states have instituted the practice of regulating the size of train-crews through the

agency of administrative boards. This is known as administrative regulation. (*a*)

It is to be understood, of course, that so-called statutory regulation and so-called administrative regulation both depend for their authority entirely upon a law of the legislature. The distinction is a difference in the method of application and not in the final source of authority. The real difference is that in the one case the legislature attempts to set down in the law all of the detailed requirements and regulations which are to be included and followed under the law, while in the other the legislature indicates merely the general lines along which it wishes regulation and leaves to an expert administrative board the task of working out the specific requirements to be demanded. The "full-crew" laws, in the eighteen states which have authority regulation, attempt to anticipate and circumscribe every combination of circumstances which may arise in relation to their application. Those laws stipulate in general terms the number of trainmen which must be carried on the various trains, the railroads to which the law is applicable, and the method of enforcement. No requirement may, in fact, be imposed except those actually set down in the law. There is no way to make the law apply to contingencies, but which would clearly have been within the interest of the legislature, but which the laws do not cover. The "full-crew" laws of the four states which have administrative regulation, on the other hand, attempt nothing more than to indicate the will of the legislatures that sufficient crews be required on trains. The entire problem of determining which trains need more trainmen, the size of the crew needed and the enforcement of the regulations is left to a small state administrative board.

(*A*) The Theory of Delegating Train-Crew Regulation to Administrative Officials

It was not until a few years ago that several legislatures indicated that it was inexpedient for a large deliberative assembly to presume to mark out the detailed lines of requirements for train-crew regulation or to impose blanket requirements of any nature on all railroads. That attitude prompted the legislatures of Connecticut, Massachusetts, West Virginia and Wisconsin (in part) to reject all proposals to enact the usual type of "full-crew" laws—containing the familiar arbitrary specifications.

There is no quality in administrative regulation more meritorious than its flexibility. It is not infrequently advisable for the state to regulate certain practices of particular note, and yet not expedient to clasp a general iron law around the whole of such. Our legislators have had such a marked leaning toward statutory, as opposed to administrative regulation, that our laws are honeycombed with general requirements which were intended to have particular relevance only. A statute designed to require railroads to carry sufficient train-crews cannot be made to anticipate and provide for every condition of roadbed, weather, tonnage, grade and curvature which vary incessantly. A flexible regulation may be more nearly approached where the legislature is willing to delegate their power to an administrative body and allow them to exercise their own discretion in the application of the principles involved. Such authority, when exercised fairly and judiciously, cannot make for a more elastic satisfactory regulation along many lines.

There have been numerous attacks by prominent men on the statutory regulative feature of the "full-crew" laws based upon a belief that it is a subject which might more properly be regulated by administrative boards. Notable among these statements are those of Associated Justices Louis D. Brandeis, Ex-Governor Charles Evans Hughes, Ex-Governor Eugene N. Foss and Governor Cruse.

(*a*) Connecticut gave power, in 1909, to the Railroad Commissioners, and, in 1913, to the Public Utility Commission to regulate the size of freight and passenger crews; Massachusetts gave power, in 1913, to the Public Service Commission to order changes in the crew of any train when necessary for safety; West Virginia, in 1915, empowered the Public Utility Commissioners to regulate the size of train-crews, and Wisconsin, in 1913, empowered the Railroad Commission to require additional men in the switching crews.

Louis D. Brandeis favors administrative regulation theory.

Mr. Associated Justice Louis D. Brandeis, in an interview appearing in *The North American*, of Philadelphia, for February 25, 1915, relative to the fight for the repeal of the "full-crew" law which was then waging, said:

"I do not question the sincerity of the railroads in their new policy for a movement, nor does it surprise me that they have adopted this policy. * * I can only say that the railroads appear to me to have the better end of the "full-crew" argument. The railroads seem to me to have made out a good case. There is no question but that the "full-crew" laws are cumbersome and in an awkward way aim to accomplish something which a commission could do much better. If the railroads want the question of crew left with the railroad commission, I agree with them on that point."

Charles E. Hughes favors administrative regulation.

Ex-Governor Charles E. Hughes, of New York, in his message to the Legislature, dated June 15, 1907, vetoing the statutory regulation "full-crew" bill (Assembly Bill W. 455), said in part:

"This bill, however, upon the facts developed before me upon the hearing and undisputed, is clearly unconstitutional. Such a measure should define the service required with suitable references to circumstances and conditions, so that the law would apply to proper cases and not otherwise. The bill takes no account of the differences between the different roads and parts of roads, in trackage and switching facilities, and of the fact that what may be necessary in the case of some railroads may be wholly unnecessary in others. In the case of the New York Central Railroad, it was shown that the trackage and switching facilities on its main line were of such a character as to make unnecessary the employment of a third brakeman in accordance with the provisions of the bill. This was frankly conceded by the supporters of the bill.

"To require the expenditure of a very large amount of money (estimated at several hundred thousand dollars annually) without necessity for the outlay, is simply arbitrary exaction and a taking of property without due process of law. The bill does not refer its requirements to any proper standard of necessity or provide any criterion by which its proper application under varying conditions is to be determined. It contains an absolute requirement, which, upon the facts conceded before me, cannot be justified."

Eugene N. Foss favors administrative regulation.

Ex-Governor Eugene N. Foss, of Massachusetts, in his message to the Legislature, dated May 2, 1912, in which he vetoed the bill providing for "statutory" as opposed to "administrative" regulation of train-crews, said in full:

"Herewith I return without my approval an Act to Provide for the proper Manning of Railroad Freight Trains by Common Carriers; and creating an arbitrary schedule whereby the number of persons employed to man a freight train is to be fixed.

"The numbers thus determined may, or may not, be equitable in respect to a certain train or class of train service.

"In either event this bill is, in effect, a recognition by the Legislature that at present the Commonwealth does not exercise adequate control over public service corporations. Hence the Legislature faces the necessity of deciding each detail of the public service, like the present one, by special enactments. But the attempt to standardize the public service throughout by such means is quite futile.

"The State ought to possess the general power to regulate all train services, including the whole subject of train-crews. This can be accomplished by creating a Public Service Commission with broad powers over all private corporations furnishing public utilities.

"Such a commission is equally to be desired by the railroads, by their employes and by the public.

"I believe that this necessity will be recognized by the present Legislature, and a Public Service Commission created, thus removing all occasion for arbitrary and special legislative regulation of such railroad details as those compromised in this bill.

"I cannot pass judgment upon the question as to whether or not all freight trains of thirty cars should carry crews of six men, and all freight trains of twenty-nine cars, five men. These matters can, in my judgment, be determined only by a permanent and powerful commission of experts skilled in railroad operation and regulation."

Gov. Cruse favors administrative regulation. Governor Cruse in his message vetoing the Oklahoma "full-crew" bill gave his reason in part as follows:

"Another thing I have learned to believe is that those who have made a life-time study of railroad operations are better judges of the proper method of operating them than I am, and I believe that this is equally true when applied to a majority of the members of any Legislative body. The trouble in Oklahoma is, and has ever been, that in dealing with public service corporations we have assumed to know more about how properly to operate them than those who have given the matter careful study. Public service corporations need to be regulated and need to be controlled. Oklohoma has undertaken to do this by the creation of a corporation commission and has clothed that commission with unusual authority in dealing with such matters. That Commission, after having studied this question, is better able to place suitable regulations upon the railroads than is the Governor or the Legislature."

The theory underlying the principle of administrative regulation, as opposed to statutory regulation, is, in brief, that a small commission of experts is more fit to judge which trains, if any, need additional brakemen or how many men such trains do need, than a large and everchanging legislature.

(*B*) Administrative Regulation in Connecticut, Massachusetts, West Virginia and Wisconsin (in part)

There are often practical problems presented by regulatory measures which over-turn their pleasant underlying theories. The effectiveness of administrative regulation of train-crews cannot be judged by weighing the virtues of the theory alone. It remains to determine the practical operation of that theory as it has been worked out in Connecticut, Massachusetts, West Virginia and Wisconsin (in part).

It is unfortunate, indeed, that the advent of administrative regulation of train-crews has been so recent that there has not been ample time to judge adequately its merits. It has, moreover, been pressed into operation to such a slight extent in the few states which have adopted it, that the data upon which an opinion may be built is very fragmentary. An attempt has been made to procure all information available relative to the operation of these laws and is here included in whole.

Connecticut

The experiences of the State of Connecticut with administrative regulation of train-crews may be grouped under the three statutes which it has enacted in 1902, 1909 and 1913 respectively relative to that subject.

The Act of 1902. The first touch of administrative regulation of train-crews is found as a relief clause attached to the law found in section 3799 of the General Statutes of 1912. (The original law was enacted in 1854). That law was clearly an instance of statutory regulation containing a statement of the specific regulations required and may be considered as the advent of administrative regulation only because the last clause empowered the commission "to reduce the number of brakemen required upon passenger trains, when such company has adopted a system of brakes to be operated by the engineer. (*a*) This provision the early law, as noted, gave to the commission a very limited discretionary power only and was not strictly speaking administrative regulation.

The Act of 1909. It was not until the year 1909 that the legislature gave the railroad commission "power to order after a public hearing, such changes in the number of employes upon freight or passenger trains as in their opinion will conserve the public safety or the safety of such employees." (*b*) A review of the work of the Connecticut Railroad Commission under the law may be had by a reading of a complaint which was filed under the law of the Joint Legislative Committee of the Railroad Brotherhood on February 14, 1911 (*c*) and the answer which was given to that complaint, after a hearing (*d*) by the Connecticut Railroad Commission. (*e*)

(*a*) The full text of this final clause which is found in Sec. 3779 of the General Statutes of Connecticut of 1902, is as follows: "The Commissioners may grant permission to any company to reduce the number of brakemen required upon passenger trains, when such company has adopted a system of brakes to be operated by the engineer, which in the opinion of the Commission will render such number of brakemen unnecessary. The Commissioner may revoke such permission when they consider that public safety requires; and on such revocation the company shall place upon its train the number of brakemen required by law."

(*b*) Acts of 1909, Ch. 219, Sec. 1.

(*c*) The Railroad Brotherhoods Joint Legislative Committee offered on that date the following petition:

RAILROAD BROTHERHOOD'S
JOINT RAILROAD LEGISLATIVE COMMITTEE
OF CONNECTICUT.

February 14, 1911.

"To the Honorable Board of Railroad Commission,
State of Connecticut.

Gentlemen:

The undersigned respectfully petitions you for a hearing to consider the application of Sec. 3799, General Statutes, and Sec. 219, Public Acts relating to the number of brakemen on passenger and freight trains on the New York, New Haven and Hartford Railroad;

(*A*) The application of the permission granted said railroad under date of May 23, 1896, as follows:

"For trains not exceeding five cars, two brakemen, including the baggagemaster;" to the following trains: Nos. 59, 60, 53 and 54 running between East Port Chester, Conn., and Thompsonville, Conn., over the tracks of said railroad; Nos. 256 and 257, between Waterbury and Winsted, Conn.; No. 1223, between Winsted and Ansonia, Conn.; No. 666, between New Haven and New London, Conn., et al.;

(*B*) And a definite order stating the number of brakemen shall be employed on freight trains and switching engines, within the State of Connecticut.

Respectfully submitted,

Ezra C. Terry, Chairman, Order of Railway Telegraphers.
C. D. Moore, Vice-Chairman, Brotherhood of Locomotive Engineers.
Peter O'Hern, Secretary, Brotherhood of Railroad Trainmen
Bernard A. Wynne, Order of Railway Conductors.

(*d*) Upon the receipt of the above petition the following order of notice for hearing was made, to wit:

State of Connecticut,
Office of the Railroad Commissioners,
Hartford, February 15, 1911.

"Upon the foregoing petition it is ordered that the same be heard at the office of the Railroad Commissioners in Hartford, on Thursday, February 23, 1911, at 11 o'clock A. M., and that notice thereof be given to the petitioners and to the railroad companies of this state, by Henry F. Billings, by depositing in the post-office in Hartford, postage paid, true and attested copies of said petition and of this order addressed one to the Railroad Brotherhood's Joint Railroad Legislative Committee of Connecticut, care of Peter O'Hern, Secretary, Stamford, Conn.; one to Arthur E. Clark, Secretary of the New York, New Haven & Hartford Railroad Company and the Central New England Railway Company, New Haven, Conn.; one to Justus A. Southard, Secretary of the New London, Northern Railroad Company, New London, Conn.; and one to G. C. Jones, General Manager the Central Vermont Railway Company (lessee of the New London Northern Railroad Company), St. Albans, Vermont, on or before the 15th day of February, inst."

Richard T. Higgins,
E. J. Doolittle,
Railroad Commissioners.

(*e*) The hearing was finally postponed until March 9, 1911, thereafter the following holding was made by the Commission:

"This petition is brought under the provisions of Sec. 3799 of the Statute regulating the number of brakemen on passenger trains, and Ch. 219 of the Public Acts of 1909 pertaining 'to the number of employes upon freight and passenger trains.' Under the provisions of these Statutes the Railroad Commissioners are empowered to make such order changing the number of employees as in their opinion will conserve the public safety and the safety of the employees. The underlying

This complaint by the Railroad Brotherhood asked for a hearing relative to permission which had been granted on May 23, 1896, to the New York, New Haven and Hartford Railroad to man certain trains not exceeding five cars with two brakemen including baggagemaster and also requested that a definite order be issued stating the number of brakemen which should be employed on freight and switching engines in Connecticut. It response to this first request the Commission had a hearing and after an inquiry of conditions relative to the operation of the particular trains enumerated in the petition held that there was no occasion for a change in the former ruling. The Commission held, relative to the second request in the petition, that since no evidence had been introduced to show that either the public safety or safety of the employees was not being conserved under the present rule or any evidence introduced to show that an additional brakeman would increase that safety the Commission could not rightfully require additional men on freight trains.

The law of 1913. The present law in Connecticut, delegating to the Public Utility Commission the power to regulate train-crews, was enacted in 1913. That law provided in full that "the Public Utility Commission is hereby directed to investigate the operating and manning of passenger and freight trains and to make such orders, regulations or recommendations as upon investigation the Commission may deem necessary for the safety and protection of the public or of the employees of any railroad company operating such trains." (*a*)

The work that has been done in that state relative to the manning of trains is fully recorded in the "full-crew" investigation, which was conducted by the Public Utility Commission pursuant to the Act of 1913. That investigation, which was completed on November 26, 1914, is here printed in full. (*b*)

principle upon which any mandatory order passed by the Commissioners pertaining to the manning of trains under the provisions of said Statutes is necessarily based upon the question of the public safety and the safety of the employees, and incidentally the expense to the companies of maintaining additional men proportionate to the protection afforded.

"The petition is two-fold, first asking for the application of the permission granted by virtue of an order passed by the Board under date of May 23, 1896, as set forth in the petition, to certain designated passenger trains; and second, for 'a definite order stating the number of brakemen that shall be employed on freight trains and switching engines within the state of Connecticut.'

"The first pertains to passenger trains and involves an interpretation of said order passed in 1896. In construing this order, the phraseology seems to be entirely clear, as, for example, where it states, 'two brakemen, including the baggagemaster,' it means one brakeman and the baggagemaster, who should act and do duty as a combination baggagemaster and brakeman. An oral request or suggestion was made by the petitioners, not, however, incorporated or appearing in their written petition, that said order passed by this Board in May, 1896, should be revoked or modified to conform with present conditions.

"There may be certain unexpected emergencies when the travel is heavy and cars for the convenience of the public may have to be added without an opportunity to supply the full quota of trainmen, as designated; but on holidays and previously advertised special events the railroad company should anticipate heavier travel and provide the necessary employees for the increased number of cars.

"Since the installation of air brakes, the duties of brakemen on passenger trains have become very largely those of porter and flagmen, and as applicable to the safety of the public and the employees are those of flagmen to protect the front and rear of the train. The petitioners submitted the following as a satisfactory complement of brakemen on passenger trains:

1.—" 'Trains consisting of two (2) or less cars, one (1) brakeman.'

2.—" 'Trains consisting of three (3) cars and not more than six (6), two (2) brakemen.'

3.—" 'Trains consisting of more than six (6) cars, three (3) brakemen.'

"And further providing that baggagemen shall not be understood as brakemen, and shall not perform the duties of flagman. The order now in force, counting the baggagemaster as a brakeman, requires as large a complement of brakemen for passenger trains as the proposition submitted.

"There was no suggestion or evidence introduced before us but what the baggagemaster had in fact performed the duties ordinarily pertaining to a brakeman. The porter service, or service of trainmen at some of the larger depot platforms on the arrival and departure of passenger trains, might be improved for the convenience of the traveling public, and in some instances, notably passenger trains Nos. 256 and 257 between Winsted and Bridgeport, on and around holidays, the strict terms of the order referred to have not been complied with.

"We have given this matter careful consideration, and, from the facts submitted, we can see no occasion at this time to make any change in the order now in force.

"Second, as to the number of employees on freight trains, there was absolutely no evidence introduced showing that either the public safety or the safety of the employees was not being conserved under the present rule or system adopted by the railroad companies, and no evidence tending to show that an additional man would increase that safety.

"Where a certain specified duty can be performed by one man, or a certain number of men, a more efficient performance of that duty will result with the necessary quota than by adding to the number and dividing the responsibility. The use of air brakes, the block signal system installed on the main lines, the patent couplers and other improved railroad operating devices, have taken the place and removed the necessity of as large train crews as formerly.

"The railroad companies are familiar with the requirements, and are vitally interested in the sufficient manning and successful movement of freight trains, which should entitle them to some discretion as to the number of trainmen employed in different trains and in different localities, unless and until it appears that the public safety or the safety of the employees is endangered and not being conserved under the companies' rule, and that freight commerce was being unnecessarily delayed by reason of the lack of an adequate train crew. To compel the railroad companies to employ unnecessary men would, in our opinion, be an unjustifiable hardship.

"For the reasons herein stated, the petition is denied.

Richard T. Higgins,
E. J. Doolittle,
T. B. Ford,
Railroad Commissioners.

"The foregoing is a true copy of the original petition, order of notice for hearing and of the finding of the Railroad Commissioners.

Attest:

(Signed) Henry F. Billings,
Clerk of Railroad Commissioners."

(*a*) Acts of 1913, Ch. 210, Sec. 1.

(*b*) REPORT OF THE PUBLIC UTILITY COMMISSION OF CONNECTICUT ON THE SIZE OF TRAIN-CREWS.

November 26, 1914.

"This is an investigation pursuant to the general authority granted by the legislative act establishing this Commission and in accordance with the more specific directions of Chapter 210 of the Public Acts of 1913, which provides that

'The Public Utilities Commission is hereby directed to investigate the operating and manning of passenger and freight trains and to make such orders, regulations or recommendations as upon investigation the Commission may deem necessary for the safety and protection of the public or of the employes of any railroad company operating such trains.'

During the past year the Commission secured a large amount of data bearing on this subject and held a public hearing at its office in the Capitol, on February 10, 1914, of which hearing the several railroad companies operating in the state were given notice, and of which public notice was given by advertising in daily newspapers published in Hartford and New Haven. At this hearing there appeared representatives of the New York, New Haven & Hartford Railroad Company, the Central Vermont Railway Company, the Central New England Railway Company, and representatives of the railroad trainmen, but no one appeared in the interests of the patrons of the railroads or of the general public.

The method followed in this investigation has been to secure a detailed statement of the make-up of all trains regularly operated in freight and passenger service in the State, showing the number and kind of cars and the crews regularly assigned to each. For the New York, New Haven & Hartford system this included a tabulated record of 589 passenger trains operating in this State, exclusive of the electric trains running between Middletown and Berlin. This record indicated over what localities the trains were operated and the number and character of coaches and cars on each train, together with the train-crew employed on each, with particular designation of positions such as conductor, baggageman, trainman, parlor car conductors, porters, etc. Somewhat similar records were secured showing the corresponding data for trains on the Central Vermont Railway and the Central New England Railway. During the past summer the Commission has made a personal investigation, by riding on the trains and by inquiry and observation, of forty-seven of the most important trains, including particularly those whose record crew might indicate the necessity of an additional man, and those concerning which any specified complaint was made or intimated. A complete record of this investigation is on file in this office. In addition, throughout the year, the Commission has by inquiry and inspection considered the manning of many other trains, a formal record of which it has not been considered necessary to file. Members of the train-crews were questioned as to the sufficiency of the quota of men in the crews of which they were a part, and free expression of opinion was encouraged in the attempt to secure all possible relevant information.

In addition to the facts thus assembled and the statements submitted by the parties at the hearing above referred to, the Commission has had available all the data accumulated in the course of its experience in investigating accidents and other matters directly or indirectly related to the manning and operating of trains by which the safety of the public or employes might be affected.

MANNING OF TRAINS—PRESENT REGULATION.

The law pertaining to the manning of trains, Section 3799 of the General Statutes, provision of 1902, provides as follows:

"Upon every train run or intended to be run, upon any railroad in this State, at a greater average speed than thirty miles an hour between stations, and including more than two passenger cars, one brakeman shall be kept at the brake of each car; but when the double-action brake is used on any such train, but one brakeman need be kept upon and for every two cars connected with such train. The Commissioners may grant permission to any company to reduce the number of brakemen required upon passenger trains, when such company has adopted a system of brakes to be operated by the engineer, which in the opinion of the Commissioners will render such number of brakemen unnecessary. The Commissioners may revoke such permission when they consider that public safety requires; and on such revocation the company shall place upon its trains the number of brakemen required by law."

Under this law the Railroad Commissioners, to whose powers this Commission has succeeded, granted permission to the New York, New Haven and Hartford Railroad Company to reduce the number of brakemen on

The significant features of the report are that the Commission, after studying in detail the make-up of all trains regularly operated in freight and passenger service in the state, came to the following conclusions and modified orders:

First—That there should be at least one brakeman (who may be a baggageman) on all passenger trains of not exceeding two cars operated in Connecticut.

Second—That there should be at least two brakemen (one of whom may be the baggageman, assistant conductor or ticket collector) on all passenger trains of three or four cars exclusive of parlor, dining, sleeping, baggage, mail or express cars.

Third—That there should be at least three brakemen (one of whom may be an assistant conductor or ticket collector) on all passenger trains of not less than five or more than eight cars exclusive of parlor, dining, sleeping, baggage, mail or express cars.

Fourth—That there should be at least four brakemen (one

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passenger trains equipped with air brakes. This order or permission, dated May 23, 1896, reads as follows:

"The New York, New Haven and Hartford Railroad Company having adopted a system of brakes operated by the engineer, said system being known as the Westinghouse air brake, said company upon its request, is hereby granted permission to reduce the number of brakemen upon its passenger trains, as follows, viz:

For trains not exceeding five cars, three brakemen including the baggagemaster; and

For trains not exceeding ten cars, three brakemen including the baggagemaster; and

For trains not exceeding fifteen cars, four brakemen including the baggagemaster.

Chapter 219, Public Acts of 1909, provides that "The Railroad Commission shall have power to order, after a public hearing, such changes in the number of employes upon freight or passenger trains as in their opinion will conserve the public safety or the safety of such employes" and provides a penalty for non-compliance by a railroad company with the general statutory requirements, or with orders of the Commissioners, as to the number of brakemen employed. A petition was brought to the Railroad Commissioners under this act in February, 1911, by the Railroad Brotherhood Joint Legislative Committee of Connecticut, requesting the Board to consider the application of the above permission to certain trains specified in the petition, and asking for a definite order stating the number of brakemen to be employed on freight trains and switching engines. The Railroad Commissioners, on investigation, found no grounds for modifying the existing orders relative to the number of brakemen for passenger trains of the New York, New Haven and Hartford Railroad Company and no reasons for issuing any general order affecting the number of brakemen on freight trains and switching engines.

The representatives of the trainmen presented a bill to the General Assembly at the 1913 Session, popularly known as the "Full-Crew Bill," the purpose of which was to prescribe the number of brakemen to be employed on trains in this State. The bill did not become law, however, but there was substituted for it one directing this Commission to investigate the requirements and make whatever orders might be deemed necessary. This bill was enacted as Chapter 210, Public Acts of 1913, hereinbefore quoted.

FINDING.

"The statute prescribing the number of brakemen for passenger trains contemplates a modification in conformity with changed and improved conditions. The principal duties of so-called brakemen on passenger trains to-day, owing to the universal use of the air-brakes operated by the enginemen, are those of porter and flagman, and on trains composed wholly or in parts of Pullman cars, so-called, all such cars are provided with Pullman car porters, who to that extent relieve the duties of the brakemen or trainmen.

The duties of baggagemen are very largely and properly confined to their duties in the baggage car, but in cases of emergency or when the duties of baggagemen are light, there is no good reason why the baggagemen (who as trainmen must be familiar with train operation and the rules of the company governing the same in so far as applicable to trainmen) should not render such additional service as they may be called upon to do at such times.

It is not always practical in any line of business of considerable magnitude to maintain a sufficient force over and above that required for the regular and ordinary business, to meet the possible requirements of unexpected emergencies and conditions. At such times there devolves upon all loyal and faithful employes, as well as upon the employer, a moral duty and obligation to perform in addition whatever service is reasonably possible, to save human life and protect property.

Any added or financial burden imposed upon the railroad under Federal or State control, both as to rates and operation, must ultimately and necessarily be borne by the patrons of such company, and the interest of such patrons, as well as the interest of the railroad and its employes, should be taken into consideration.

Any reasonable regulation or requirement which will increase the safety of operations is in the interest of the railroad company and its employes and patrons and of the public generally. Railroad operation is in its nature hazardous, and all trains, whether freight or passenger, should have a sufficient train-crew for safety of operation and to protect the train while standing on main line tracks. This becomes more imperative with the increasing speed and multiplicity of trains in operation. We feel, however, that to increase the prescribed minimum generally, or to increase the train-crews beyond a reasonably safe requirement, would tend rather to lessen efficiency, and to decrease safety in operation because of a greater division or responsibility and the lessened individual alertness which would follow.

The opinion of the Railroad Commissioners in 1911 as a result of their investigation in February of that year was expressed as follows, relative to the manning of freight trains:

" 'The railroad companies are familiar with the requirements and are vitally interested in the sufficient manning and successful movement of freight trains, which should entitle them to some discretion as to the number of trainmen employed on different trains and in different localities, unless and until it appears that the public safety or the safety of the employes is endangered and not being conserved under the companies' rule, and that freight commerce was being unnecessarily delayed by reason of the lack of an adequate train-crew. To compel the railroad companies to employ unnecessary men would, in our opinion, be an unjustifiable hardship."

This is equally true to-day, in our opinion, as regards both freight and passenger service. The facts brought out in the present investigation disclosed no instance of the jeopardizing of the safety of either the public or employes which increased train-crews could prevent. It is the belief of this Commission that, of all the railroad accidents attended by fatalities which have been reported to and investigated by it, not one has been attributable to an insufficiency in numbers of the train-crew involved.

The tabulations of passenger trains and train-crews hereinbefore referred to, apply to regular or scheduled train equipment and crews. It many times happens on holidays and other special occasions that one coach or more are added to accommodate the increased volume of traffic on such occasions, and as the company and its equipment may be taxed and even overtaxed to meet these conditions successfully and afford the travelling public reasonable facilities, so also are the company's employes, as public servants, called upon and expected at such times to render additional or more constant service. All well managed railroad companies, however, should anticipate with a reasonable degree of accuracy the increased volume of traffic on holidays and other previously advertised special occasions, and reasonably provide for same, both as to equipment and crews, and be prepared to operate their trains without violation of the rule or permission as to the minimum crew prescribed by the Commission.

The law gives the Commission full power in the premises, and the Commission, may at any time, if deemed advisable, annul or modify any general rule or permission granted and may, on complaint or personal observation and investigation, prescribe a greater number of brakemen on certain specified trains than would be permitted under the minimum requirements of the general rule or order.

The conclusion of the Commission as a result of the present investigation is that in general the freight and passenger trains operated over the railroads in this State are now sufficiently manned, and operated with a degree of safety which no order for a general increase of trainmen would augment.

The permission granted by the Railroad Commissioners in May, 1896, under the provisions of Section 3799 of the General Statutes, applied only to the New York, New Haven and Hartford Railroad Company, and made no provisions or distinction as to the type of car or coach, whether passenger, baggage, Pullman, mail, or express, and the second clause of the order or permission hereinbefore quoted appears to be inconsistent with the previous clause.

To make more definite, therefore, and in the interest of uniformity applicable to all steam railroad companies operating revenue passenger trains in this State and having a system of brakes operated by the engineer, the Commission deems it advisable to modify and amend said permission and order, and the same is hereby modified and amended, as follows:

First—On all revenue passenger trains composed of not exceeding two cars and operated by any steam railroad company over its lines in this State, thereshall be at least one brakeman, who may be a baggageman. This provision, however, shall not apply to electric street railway cars operating over steam railroad tracks.

Second—On all revenue passenger trains composed of three or four cars (exclusive of parlor, dining, sleeping, baggage, mail or express cars) operated by any steam railroad company over its lines in this State, there shall be at least two brakemen, which may include as one of such the baggageman, assistant conductor, or ticket collector.

Third—On all revenue passenger trains composed of not less than five or more than eight cars (exclusive of parlor, dining, sleeping, baggage mail or express cars) operated by any steam railroad company over its lines in this State, there shall be at least three brakemen, which may include as one of such an assistant conductor or ticket collector.

Fourth—On all revenue passenger trains composed of nine or more cars (exclusive of parlor, dining, sleeping, baggage, mail or express cars) operated by any steam railroad company over its lines in this State, there shall be at least four brakemen, which may include as one of such an assistant conductor or ticket collector.

Fifth—On all revenue passenger trains composed entirely of parlor, dining, sleeping, baggage, mail or express cars, operated by any steam railroad company over its lines in this State, there shall be at least two brakemen, one of which may be a baggageman.

Sixth—Nothing in this order and permission shall be construed to prevent a conductor, assistant conductor, ticket collector or baggageman from performing trainmen's or brakemen's duties.

A combination baggage and smoking car shall count as one passenger car, and a club, official or private car shall be considered as a parlor car.

It is not the intention of the Commission that the foregoing permission and order shall be construed to apply to cases of emergency from time to time arising in the operation of the railroad, due to circumstances which may not be foreseen.

We hereby determine and direct that notice of the foregoing be given to each steam railroad company operating in the State of Connecticut by Henry F. Billings, Secretary of this Commission, by forwarding by registered mail, a true and attested copy, addressed, one to Arthur E. Clark, Secretary of the New York, New Haven and Hartford Railroad Company and of the Central New England Railway Gompany, New Haven, Connecticut; one to Edward C. Smith, President of the Central Vermont Railway Company (lessee of the New London, Northern Railroad Company) St. Albans, Vermont, and one to C. H. Cheney, Secretary of South Manchester Railroad Company, South Manchester, Connecticut, on or before the 8th day of December, 1914, and due return made hereon.

Dated at Hartford, Connecticut, this 26th day of November, A. D. 1914.

Ritchard T. Higgins.
T. B. Ford
J. H. Hale
Public Utilities Commission

of whom may be an assistant conductor or ticket collector) on all passenger trains of nine or more cars exclusive of parlor, dining, sleeping, baggage, mail or express cars.

Fifth—That there should be at least two brakemen (one of whom may be baggageman) on all passenger trains composed entirely of parlor, dining, sleeping, baggage, mail or express cars.

Sixth—That nothing in that order should be construed to prevent a conductor, assistant conductor, ticket collector or baggageman from performing a trainman's or brakeman's duties.

The Commission further concluded that the existing requirements were entirely adequate to promote safety on freight and passenger service. The Commission went so far in its report as to say that "the facts brought out in the present investigation disclosed no instances of the jeopardizing of the safety of either the public or employes which increased train-crews could prevent. It is the belief of this Commission that, of all the railroad accidents attended by fatalities which have been reported to and investigated by it, not one has been attributable to an insufficiency in the number of the train-crew involved."

Massachusetts

The law empowering the Public Service Commission to regulate the size of train-crews was enacted as a part of the act creating the Commission. The law provides in whole that "whenever the Commission shall be of opinion after a hearing had upon its own motion or complaint, that the number of men forming a train-crew of any train operating in the commonwealth is not sufficient to operate said train for the safety of the public and the employees of the railroad it shall thereupon order such changes as it may deem necessary." (*a*) It is of interest to note, however, that the Public Service Commission has taken no action, as yet, under authority of this act. (*b*)

Although the Massachusetts Public Service Commission has not administered any orders under the authority granted it in the Act of 1913, there was an investigation made on this subject by the Board of Railroad Commissioners in 1912. The Massachusetts Senate, in 1912, a year prior to the creation of the Public Service Commission, asked the then existing Board of Railroad Commissioners "to investigate forthwith the operating and manning of railroad freight trains in this Commonwealth and to make such order, regulation or recommendation as, upon investigation, the Board may think neccessary for the safety and protection of the public or of the employes of the railroad company operating such trains, and particularly as to the number of brakemen to be assigned to such trains. The Board shall report the result of its investigation to the Senate as soon as practicable, and shall accompany its report with a copy of the order, regulation or recommendation made by it." (*c*)

The Board of Railroad Commissioners, in accord with the directions of this resolution, had several hearings and after investigation made the following recommendations:

First—That at least two brakemen be carried on all freight trains.

Second—That at least three brakemen be carried on all freight trains propelled by two locomotives for ten or more miles.

Third—That at least three brakemen be carried on all freight trains while using the opposite main track to allow trains to pass or for the purpose of setting out and taking in cars, where a brakeman is required to protect the opposite track.

Fourth—That a brakeman be carried on all light engines operating a distance of two or more miles.

(*a*) Acts of 1913, Ch. 784, Sec. 24.

(*b*) Letter signed by Andrew H. Highlands, Secretary of the Public Service Commission and under date of August 23, 1916.

(*c*) Massachusetts Senate Resolution of May 13, 1912.

The full report of the Railroad Commissioners, which is here printed (*a*) covers all the available data relative to the operation of administrative regulation of train-crews in Massachusetts.

West Virginia

In 1915 the Legislature of West Virginia attached a clause to one of its safety acts providing that the Public Service Commission "may prescribe the number of men required to constitute safe crews for the handling of trains on any steam railroad in this state or any division of any such railroad. (*b*) It is of interest to note, however, that the Commission has not, as yet, taken any action under authority of this Act. (*c*)

Wisconsin

It is interesting to find that Wisconsin is the only state which has both statutory and administrative regulation of the size of train-crews. Wisconsin regulates freight and passenger crews by statutory regulation, and switching crews by administrative regulation. It is significant, moreover, that Wisconsin should have adopted administrative regulation of switching crews in 1913, after she had been for two years experimenting with statutory regulation of freight and passenger crews. The Wisconsin law of 1913 states that:

> "It shall be the duty of the Railroad Commission, and it shall have power, jurisdiction and authority to investigate, ascertain and determine such reasonable conditions of employment, and such reasonable number of employes in each switching crew in or about each switching yard in the state and to issue such lawful orders as may be necessary to comply with the purpose of this section." (*d*)

It is of interest to note that since the passage of this law delegating administrative regulation of switching crews there have been only two or three cases brought before the Commission and no formal order has been issued. (*e*)

The Railroad Commission of Wisconsin, in reply to an inquiry relative to the respective merits of statutory and ad-

(*a*) The report in whole of the Massachusetts Board of Railroad Commissioners to the Senate as of August 3, 1912, is as follows:

"August 3, 1912.
8819.

"Recommendations of the Board with respect to the manning of freight trains. On May 13, 1912, the Senate adopted the following order:

"ORDERED, That the Board of Railroad Commissioners is hereby directed to investigate forthwith the operating and manning of railroad freight trains in this Commonwealth and to make such order, regulation or recommendation, as, upon investigation, the Board may think necessary for the safety and protection of the public or of the employees of the railroad company operating such trains, and particularly as to the number of brakemen to be assigned to such trains. The Board shall report the result of its investigation to the Senate as soon as practicable, and shall accompany its report with a copy of the order, regulation or recommendation made by it.

"Public hearings have been held on the foregoing order; and after investigation and further consideration, the Board recommends to the management of railroads operating in this Commonwealth:

"(1) That all freight trains operated on main line tracks and all freight trains operated on branch tracks for a distance of five miles or more, shall be provided with at least two brakemen.

"(2) That all freight trains propelled by two locomotives for a distance of ten or more miles, shall be provided with at least three brakemen.

"(3) That all freight trains while using the opposite main track for the purpose of allowing trains to pass, or for the purpose of setting out and taking in cars, where a brakeman is required to protect the opposite track, shall be provided with at least three brakemen.

"(4) That all light engines operated for a distance of ten or more miles shall be provided with a brakeman.

"It is not the intention of the Board that the foregoing recommendations shall be construed to apply to cases of emergency as may from time to time arise in the operation of the railroad.

"September 3, 1912, is hereby fixed as the time when the foregoing recommendations shall become effective, and the Board reserves the right to revise the same should occasion require.

For the Board,
(Signed) ALLAN BROOKS,
Assistant Clerk."

(*b*) Acts of 1915, Ch. 8, Sec. 4.

(*c*) Letter from Public Service Commission, signed by R. B. Bernheim, Secretary, and under date of September 19, 1916.

(*d*) Acts of 1913 (added by Ch. 63), Sec. 2.

(*e*) Letter from Railroad Commission of Wisconsin, signed by Harold L. Geisse, Secretary, dated August 21, 1916.

ministrative regulation of train-crews as determined by their experience, said:

"We believe that administrative regulation for the size of switching crews is very advisable while the statutory regulation for the size of freight and passenger crews is not only advisable but necessary. As far as switch crews are concerned, under some circumstances, it might be very dangerous to operate a crew with only two men in addition to the enginemen, and in cases of this kind the Commission has authority to require a railway company to increase the size of the crew. There are other cases where adequate service might not be rendered to industries due to a switch-crew not being able to do all the work required of it on account of having too few men, and in a case of this kind this Commission could order an extra man on the crew for the purpose of facilitating switching movements and thereby rendering adequate service to the shippers. On the other hand, we believe that the statutory regulation as far as freight and passenger train-crews are concerned, provides for adequate service and at the same time saves operation as far as the crews themselves are concerned." (*a*)

(*C*) The Danger of Administrative Regulation

There are two dangers against which to guard in the delegation of powers to administrative boards. The one is the evil of incompetency, and the other that of corruption.

The sympathizers of statutory regulation have many times raised objections to administrative regulation of train-crews on the ground that there is no state administrative board competent to judge whether an additional trainman is needed or not. They base this objection upon the claim that not infrequently the Public Service or Public Utility Commission of a state does not have in it a single member who has had practical railroad experience. This objection would seem to have merit, and an examination of the personnel of the Administrative boards of the states having such shows that the members are not ordinarily railroad men. The Connecticut Utilities Commission is composed of a lawyer, a fruit grower and a civil engineer (*b*), and the Massachusetts Public Service Commission is composed of two lawyers, a civil engineer (who for some time was Chief Engineer of the Boston & Albany R. R.) and a Public Franchise man. (*c*) Many of the New Jersey trainmen have indicated that they would be in favor of repealing the present statutory regulation in New Jersey and enacting a law providing for administrative regulation of train-crews if an experienced railroad man were appointed on the Public Utility Commission of New Jersey.

The other and perhaps the greatest danger in administrative regulation of any sort is the possibility of corruption in the personnel of the members. There have been so many instances of good and bad administrative boards that there is nothing to avail in making that examination. When a board does become corrupt, there is no remedy other than removal from office. These are matters for the right management of which public opinion must be held largely responsible.

(*D*) The Merits and Demerits of Administrative Regulation

It is unfortunate that the four states (Connecticut, Massachusetts, West Virginia and Wisconsin) which have adopted the administrative method of regulating train-crews have not had a more extensive experience upon which to make some practical conclusions relative to the merits and demerits of that system. The Public Service Commissions in these few states, although possessing the power to regulate the size of train-crews, have had so little occasion to exercise that jurisdiction that no adequate conclusion can be drawn from their short experience.

There are certain general observations, however, relative to the good and evil in administrative regulation of train-crews which are obvious upon statement. The most salient feature is that a suitable expert board is more fit to formulate and apply the technical rules of requirements in the regulation of a train-crew than a large and ever-changing, deliberative legislature. The administrative board is in a better way to know which particular railroads, if any, are needful of regulation and to judge the definite number of trainmen which each train should carry as its minimum crew. The danger of administrative regulation, on the other hand, lies in the abuse of its most commendable attribute. The possibility of flexibility, which is its greatest justification, gives rise to tempting opportunities for abuse. The power of marking out and enforcing the lines of requirement in the hands of a board, affords unusual chances to the injudicious and dishonest administrator. It is this fear, perhaps, that has stood as the greatest block to a more universal adoption of administrative regulation in this country.

THE RESPECTIVE MERITS OF STATUTORY REGULATION AND ADMINISTRATIVE REGULATION OF TRAIN-CREWS

A review of the theory and practice of the administration of the "full-crew" laws in the eighteen states which have statutory regulation of train-crews and the four states which have adminisrative regulation would seem to serve as a basis upon which to compare the respective merits of the two methods.

It is very clear that although statutory regulation affords the better opportunity for the legislature to write into the law its idea of the specific requirements which should be imposed in regulating train-crews, those ideas are frequently founded on inexpert knowledge. The requirements set up by statute in New Jersey, Pennsylvania and New York have given particular annoyance by requiring additional men on trains which are admittedly well manned. Those laws, by their inelasticity, have worked hardships upon some railroads in order to punish others. The chief barrier to statutory regulation is in its arbitrary application of the rules of requirement set down in law.

The injustices, which are a necessary result of statutory regulation, have just begun to initiate an era of administrative regulation of train-crews. Some of the more prominent Governors, notably ex-Governor Hughes of New York, ex-Governor Foss of Massachusetts, ex-Governor Harmon of Ohio and ex-Governor Cruse of Oklahoma, have taken decided stands in veto messages to block any further spread of statutory regulation of crews and have come out emphatically for administrative regulation. A no less prominent statesman than Mr. Justice Louis D. Brandeis declares that the regulation of train-crews is not a fit subject for statutory regulation. Laws providing for administrative regulation have, indeed, already been passed in Connecticut, Massachusetts, West Virgina and Wisconsin (in part).

A thorough and impartial study of the merits and demerits of statutory and administrative regulation of train-crews forces the conclusion that the latter method is preferable from the standpoint of the public. It affords an opportunity for the employees and public to demand additional trainmen on those particular trains which they can show have been undermanned. It does not work an injustice on trains, moreover, which admittedly do not require additional brakemen. The only objection to administrative regulation which has ever been raised, by even its most ardent opponents, is that the state administrative boards are corrupt. But that is an evil which must be corrected by a change of personnel, not by a change in method.

(*a*) Letter signed by Harold L. Geisse, Secretary to Railroad Commission, dated August 21, 1916.

(*b*) Letter signed by Henry F. Billings, Secretary of the Public Utilities Commission of Connecticut, and dated Nov. 1, 1916.

(*c*) Letter signed by Mr. Andrew Highlands, Secretary to the Public Service Commission, dated October 24, 1916.

CHAPTER VIII

The Economic Aspects of "Full-Crew" Legislation

In considering the economic aspect of "full-crew" legislation it will be well temporarily to ignore other considerations and to place the whole question of "full-crew" on a dollar and cent basis. It is a primary supposition that the railroads are in business to make money. They favor or disfavor a proposition because it pays or because it does not pay. With these assumptions in mind, an attempt will be made to determine what the attitude of the railroads seems to indicate and whether this attitude is consistent.

1—The Economy to the Railroads of Preventing Casualities

It is very desirable to the railroads, aside from any moral consideration, that accidents and damage to property or persons be reduced to a minimum. Any mishap resulting in damage to property is a direct loss to the railroads. Almost any casualty occurring in connection with the railroads means a liability incurred by virtue of Workmen's Compensation Acts in various states and Federal liability laws.

Accident Damages.

The cost of accident damages is, of course, a direct cost upon railroad maintenance and repair, not affected by legislation. Accidents to property occur very often without casualties occurring to persons, and casualties occur often without resulting in accident damages to property and equipment. The fact that property damage to the roads will be as safely guarded against as possible is self-evident. The custom of railroads to man certain trains in excess of the legal requirements, while at times a matter simply of expediency, is at other times a measure of insuring the greatest safety to property.

While, as above indicated, it is self-evident that damages to equipment are of vital importance to the railroads, it might be well to state that in the year ending June 30, 1913, the railroads of Class I spent $6,001,273 simply in clearing away wrecks. (*a*) In the year ending June 30, 1914, the railroads of Class I spent $5,720,546 clearing away wrecks. (*b*) These figures may suggest the enormity of accident damages and losses occurring annually which it would be fair to suppose the railroads are endeavoring to minimize.

Compensation Acts, State and Federal.

Thirty-five states have passed some form of Workmen's Compensation Act, making railroads liable for many casualties occurring to employees. Under various statutes in different states and under the common law railroads are liable in a large part for casualties to passengers. Over and above the various state laws there are Federal Statutory Compensation requirements applying to the railroads. These laws all in all hold the railroads liable for a great part of all casualties, and the injured parties or their dependents can recover from the roads. While no satisfactory data on the amounts paid, under the various laws, to various classes of injured people are available, the Interstate Commerce Commission gives some information on this point. (*c*) In the year ending June 30, 1913, the railroads of the United States in Class I paid out to people injured, including all classes, $24,966,766 (*d*) for injuries occurring directly in connection with transportation or train operation. During the same period the railroads of Class II paid out $980,921 (*e*) as a result of casualties occurring in transportation. These two classes included 242,657 miles of railroads and collectively paid out for transportation injuries $25,947,687. These figures do not include some 500 miles of shorter roads.

In the year ending June 30, 1914, the railroads in Class I. and II. spent $27,450,597 (*a*) in settlement of casualties occurring in connection with transportation. It will be observed from these figures that the railroads pay out annually approximately twenty-five or six millions simply because of casualties in transportation.

2—The Cost of "Full-Crew" Legislation

The fact that railroads are objecting so vigorously to the "full-crew" in New Jersey, as well as other states, indicates that the law involves either a considerable cost to railroads or an obnoxious principle, or both. Ignoring the question of principle for the time, it is probable that the railroads oppose the law because of the additional cost.

In considering the question of cost on this particular proposition, the figures of the railroads must be accepted as the only available criterion. It is recognized possible and probable that estimates of this additional cost made by the various railroads are somewhat biased. These facts, are, however, generally acceptable to governmental officials in government reports.

The railways were asked to report to the Special Committee on Relations of Railway Operation to Legislation, careful estimates of the additional expense resulting from operating legislation already enacted. On January 26, 1915, the Committee made public a compilation of replies received by it from 166 railways, operating 204,610 miles of line regarding expense caused them in the fiscal year ending June 30, 1914, by legislation, both Federal and State, affecting operation. The summary of replies of 166 railways shows that the cost of "full-crew" legislation to the railroads then having "full-crew" laws, was $4,051,533 (*a*) in the year ending June 30, 1914. (*b*) Estimates for the remaining 46,417 miles were not published at the time, so no figures are available for them. It is probable that the mileage was made up largely of switching, branch and other minor roads, not largely affected. Mr. R. G. O'Donnel made the statement that approximately 1000 out of 18,000 brakemen on the railroads in Pennsylvania were affected by the law, and that the cost of the law in the State of Pennsylvania alone in 1914 was $1,359,000. (*c*)

(*a*) The following table was given out by the Special Committee on Relations of Railway Operation to Legislation, June 2, 1914, and shows estimates of the total cost per annum. The estimates are high in comparison to other figures given out.

MINIMUM (FULL) CREWS.

States having laws which affect train or switching crews.	No. of roads.	Estimated number of trains per annum affected by state laws.	Estimated cost per annum of compliance with state laws.
Arizona	5	27,778	$ 79,956
Arkansas	10	99,546	288,100
California	6	71,139	143,745
Connecticut	..	.....	.....
Indiana	23	145,348	463,905*
Kansas	..	.....	.....
Maine	1	1	603
Maryland	8	49,925	107,520
Missouri	10	63,035	407,221*
Nebraska	3	7,905	18,606
Nevada	4	2,845	12,599
New Jersey	9	253,157	389,323
New York	17	594,948	1,524,573
North Dakota	1	372	1,500
Ohio	16	76,901	209,327*
Oregon	4	11,103	45,762
Pennsylvania	22	566,101	1,561,052
South Carolina	1	67,688	189,765
Texas	5	116,593	3,381*
Washinton	6	77,933	281,770
Wisconsin	6	27,050	40,466
Total		2,359,368	$5,769,174*

*Details which comprised totals were not reported by some roads.
(*b*) Bulletin Bureau of R. R. Economics No. 73, page 20.
(*c*) Hearing before the Governor of Penna. on "Full-crew Repealer"

(*a*) I. C. C. Report, page 55—1913.
(*b*) I. C. C. Report, page 60—1914.
(*c*) Class I and Class II are groups of roads classified according to mileage. Class I including 222,744.79 miles, and Class II including 19,912.33 miles.
(*d*) Analysis of operating expenses, Class I railroads. I. C. C. Report, page 55.

It is practically impossible to compute by any statistical method what the aggregate cost should be in the states having "full-crew" law. However, according to Mr. O'Donnel, about one in eighteen of all trainmen behind the engine, excepting conductors, are affected by this law. The Interstate Commerce Commission report for 1914 (*a*) states that the average wage in the United States in the year ending June 30, 1914, for other trainmen or brakemen was $3.09 (*b*) per day or roughly, about $1125 per year. This would mean that in "full-crew" states, for approximately every eighteen brakemen, the railroads are required to spend approximately $1125 per year by virtue of the "full-crew" law.

Cost of the New Jersey Law.

The railroads of New Jersey were asked to prepare statements of their additional cost in operation because of the New Jersey law and also to state the number of additional men employed because of the New Jersey law. The following table has been prepared from their statements:

NUMBER OF ADDITIONAL MEN REQUIRED BY LAW IN NEW JERSEY.

	1913-14	1914-15	1915-16
Delaware, Lackawanna & Western..	34	42	42
Central Railroad of New Jersey....	64	59	64
Lehigh & Hudson.....	13	10	13
Philadelphia & Reading.....	30	31	31
Erie Railroad	59	55	60
Baltimore & New York.....	7	7	7
Lehigh Valley Railroad Company...	34	35	37
Pennsylvania Railroad	177	164	190
Totals 418	403	444	

ANNUAL COST OF ADDITIONAL MEN IN NEW JERSEY.

	1913-1914	1914-1915	1915-1916
Del., L. & W.....	$24,156.23	$28,161.96	$34,749.26
Cent. R. R. of N. J.....	68,935.37	62,007.68	73,644.69
Lehigh & Hudson.....	11,266.00	10,566.00	12,207.00
Philadelphia & Reading..	31,382.28	31,780.22	31,849.50
Erie R. R.....	35,406.91	26,314.11	28,561.12
Baltimore & New York..	8,500.00	8,500.00	8,500.00
Lehigh Valley R. R. Co..	34,191.23	33,581.23	39,334.90
Pennsylvania R. R.....	142,682.40	122,944.47	168,906.75
Total	$356,520.42	$323,855.67	$397,746.22

3—The Significance of the Cost of the Law

The "full-crew" laws in the United States cost the railroads somewhere in the neighborhood of five million dollars annually. The Pennsylvania law cost the railroads of that state $2,831,000 in 1913 and 1914. (*c*) The New York law, according to the report of the Special Committee on Relations of Railway Operation to Legislation, costs annually upward of a million and a half dollars. The New Jersey law costs the railroads of New Jersey $359,373 annually. (*a*) If the spending of these sums promotes safety it is well and wisely spent. If it does not add safety to railroad operation then it can only be regarded as a waste of money, the burden of which either directly or indirectly ultimately falls upon the aggregate wealth of the various states.

These facts are significant for several reasons. About five million dollars is spent by the railroads in the United States for additional men which, if misspent because of legislation, could and would in all probability be used for the installation of automatic safety appliances, in the elimination of grade crossings and in the general improvement of service. This sum could be used as a capital investment. If it were capitalized, however, at 10%, it would insure payment of dividends on an investment of $50,000,000 and might be made to induce that amount into various channels of the railroad business. (*b*)

The law is significant because it falls ultimately upon the commonwealth of the State. This cannot be expressed through additional charges, but can manifestly fall on the public through its effects on the service. Continued legislation, whether needed or not and whether just or not, must ultimately reach the commonwealth through increased rates.

Summary and conclusion. Considering the subject of "full-crew" legislation from the profit and loss standpoint, it is very evident that accidents resulting in damage to property or casualties to persons are undesirable to the railroads. Damage to property results in a direct loss and injuries to persons are liabilities incurred. The disastrous effects of accidents to property is self-evident. The enormity of the loss incurred by accidents to property alone, can be deduced in a rough way from the fact that the railroads of Class I. spend approximately five and a half million dollars each year simply clearing away wrecks.

By virtue of various liability and compensation laws, state and national, the railroads of Class I. and II. pay out approximately twenty-five million dollars annually as a result of casualties to employees and passengers.

Estimates prepared and published by the Bureau of Railway Economics indicate that the existing "full-crew" laws in all states are causing the railroads (*c*) to spend between four and five million dollars annually in excess of what they would normally spend to man their trains. The cost of the New Jersey "full-crew" law per annum to the roads affected is a little over three hundred and fifty-nine thousand dollars.

It is evident that if the "full-crew" on trains were instrumental in preventing a small fraction of the annual accidents and casualties, the saving effected thereby would reimburse the railroads for the additional cost.

It may be assumed that the railroads are interested in financial and not moral gains. But an assumption that the "full-crew" laws are so much as a slight casualty preventative, carries with it an assumption that the railroads are not alive to their best financial interests in opposing those laws. It would seem difficult, altogether, to find a strictly economic justification for "full-crew" legislation.

(*a*) Statistics of railways in U. S., 1914, page 23.
(*b*) This includes all Class I and Class II roads, but not the smaller ones.
(*c*) Memorandum submitted to Governor by Mr. R. G. O'Donnel at hearing of "full-crew repeal" law in 1915.

(*a*) Table printed above.
(*b*) This is an argument which has been used at several of the "full-crew" hearings, and holds good or not good, according as the cost of the law is considered as an operating expense or not.
(*c*) This includes 166 roads operating 204,610 miles of line.

CHAPTER IX

A Poll of Opinions on the "Full-Crew" Law in New Jersey

The question of regulation of common carriers is one of vital concern to all members of the commonwealth. It is important to the labor element because considerable of the necessary regulation of railroads deals directly with questions which have their rise in the employment of labor. Regulation is of course of the utmost concern to the railroads themselves because of its possible effect, not only upon earnings, but upon investment of capital and general policy. Aside from the directly interested parties, this question of regulation has a considerable interest to all elements in a state because of labor sympathies, or capital connections, or civic and political pride, or other reasons. Of all phases of regulation which arouse public interest the questions of financial regulation and labor regulation are the most prominent. All interests realize the sensitive relation between these two phases of railroad regulation and their own material welfare. Adequate and just regulation will manifest itself in either lower rates or better service, or both, while vicious or unfair regulation of finances or labor will manifest itself through inferior service or higher charges. Consequently, it is only natural that all interests, partial and impartial, should have a thoughtful opinion on this one phase of labor regulation.

A POLL OF OPINIONS EXPRESSED IN NEW JERSEY.

It is significant that there is a variety of social groups in New Jersey having decided opinions on the question of train-crew legislation. A poll of opinions of groups of people, representing several elements of the New Jersey population, has been attempted. The labor element as a whole has been sounded as well as the special labor group (e. g., engineers, conductors and trainmen brotherhoods). The other elements are the railroads, commercial and civic organizations and farmers.

1—Engineers

An impartial letter (*a*) was sent to each of the 1719 engineers operating in New Jersey, asking his confidential opinion on an enclosed question blank. (*b*) Replies were received from 69 engineers. These replies are tabulated, showing the attitude of the men upon the law as it stands and supplementary pertinent remarks are given in addition.

(*a*) "The Bureau of State Research of the New Jersey State Chamber of Commerce is making a thorough and impartial investigation of the operation of the 'full-crew' law in New Jersey. It is interested at this time to secure the unqualified co-operation of every engineer in the State. The Bureau is desirous of ascertaining all the merits and demerits of the present law in an unbiased manner, and it believes that data from the engineers would be free from prejudice either for the railroads or the trainmen.

There is some indication that the movement for the repeal of modification of the present 'full-crew' law will be launched in the coming legislature. For this reason it has been decided to put an end to conjecture and get at the actual facts which are at the bottom of this question.

The engineers of New Jersey are, therefore, asked to give, confidentially if they wish, any information that will help to decide impartially the good and bad features of the present law.

Will you please answer the enclosed questions and return them at your earliest moment?

P. S. The so-called 'full-crew' law of New Jersey provides that freight trains of less than 30 cars shall carry a crew of five persons and trains of more than 30 cars a crew of six persons; passenger trains of 3 passenger coaches and 1 baggage car or less, a crew of 5 persons, and trains of 4 passenger coaches and 1 baggage car or more, a crew of 6 persons. A violation penalty of $100 is attached together with a clause delegating the enforcement to the Public Utility Commissioners."

(*b*) "1. Does the present New Jersey 'full-crew' law meet with your complete approval?

2. If you object to the present statutory regulation do you feel that the regulation of train crews should be delegated to a state administrative board such as Public Utility Commission or Labor Department? Would you apply this to freight or passenger trains or both?

3. Do you need the additional brakeman on the trains under your supervision?

4. What is the work of the additional brakeman?"

POLL OF THE NEW JERSEY ENGINEERS ON "FULL-CREW."

Code to Engineers' Names	Favorable to Existing Law as it Now Stands		Remarks
E 104	....	No	"I think that a train of 50 cars or more should have a "full-crew"; 50 cars or less, 5 men."
E 140	....	No	"On local long freight trains we need him to receive and give signals; on through freight trains he is useless."
E 63	....	No	"I consider that while we are working on the safety first basis, and since the safety appliances have been installed, Commission should have the say both in passenger and freight."
E 34	....	No	"This should be left to the judgment of the company."
E 28	....	No	"The "full-crew" has not in my judgment served any good purpose."
E 359	....	No	"The law as I view it only burdens the R. R. Cos. with needless expense."
E 279	....	No	
E 576	Yes	....	
E 385	....	No	"The state should regulate, in my judgment, by P. U. C."
E 205	Yes	....	
E 196	....	No	"Both to be referred to the Public Utility Commission."
ER 71	....	No	"Public Utility Commission for both freight and passenger trains."
E 223	....	No	
E 291	....	No	"I do not exactly see the justice of a law that requires 5 men on a train of 30 cars and only one additional man on a train of 120 to 140 cars, as I think it puts all the strain and responsibility on the engineer."
E 543	....	No	
E 230	....	No	"I do not feel that the regulation of train crews should be delegated to a state administrative board."
ER 154	....	No	
ER 103	....	No	"Some commission which would work in conjunction with railway companies not to enforce an arbitrary ruling to be applied in all cases."

Code to Engineers' Names	Favorable to Existing Law as it Now Stands		Remarks
ER 198	....	No	"I believe a "full-crew" should be on a train of 60 cars or less; in my opinion 5 men is enough."
E 587	....	No	"The law as it appears to me is radically wrong and economically unjust and should be repealed. They are of no earthly use and only increase the likelihood of personal injury by having that many more men working."
B 62	....	No	
ER 27	Yes	....	"I consider them very essential for the safety, especially with the long freight trains of the present day."
ER 109	....	No	
NYSW 22	Yes	....	"A very present help in time of trouble."
ER 47	....	No	
ER 171	....	No	
ER 32	....	No	"Permit the R. R. company who is held responsible to properly man their trains. This was always done right prior to passage of the law."
B 86	....	No	"I am not in sympathy with the "full-crew" bill. Would prefer to see conditions as they were before this bill became a law."
NYSW 21	....	No	"Each railroad company to use their good judgment in placing men where they are really needed."
ER 97	Yes	....	
ER 72	....	No	"For freight trains—Yes. For passenger trains not in all cases."
E 545	....	No	"Walking back to cabin car to get meals."
E 311	....	No	
P 71	....	No	
E 337	....	No	"It only provides for one additional brakeman with a train of 30 cars or more, where it should provide one additional brakeman for every 25 cars over 30 cars."
ER 92	....	No	"Both freight and passenger should be delegated to a Commission or Labor department."
NYSW 3	Yes	....	
NYSW 2	Yes	....	
NYSW 41	....	No	"I think the R. R. Cos. should be entitled to put as few or as many brakemen on a train as the officials know to be sufficient to do the work with safety to passengers, freight and property."
ER 140	Yes	....	
E 559	....	No	"I think the law could be adjusted and put men where they are needed—in a good many cases they are of no use.
E 264	....	No	"As a factor of safety in stopping trains the brakeman can be eliminated."
E 204	....	No	"The regulation of train-crews should be delegated to a Board of Public Utility Commission."
36 EN	....	No	"We do not need extra brakemen on straight through freight and coal trains required to picking up between terminal and destination of trains."
43 EN	....	No	"I fail to see where he is of any use at all."
ER 112	Yes	....	"I feel that no Utility Commission should be given power to regulate such matters."
ER 20	Yes	....	
ER 130	....	No	"It seems to me it is necessary to have a man on a freight train, but it is unnecessary to have those men on a passenger train."
ER 149	Yes	....	
NYSW 10	Yes	....	
270 EN	....	No	"It should be delegated to the Public Utility Commmission."
321 EN	....	No	"Only in cases of long passenger trains of 8 or 10 coaches or more."
248 EN	....	No	"Why not leave it to the raliroad company; they have to stand the loss, for they foot the bill."
16 EN	....	No	"I approve doing away with "full-crew" and coming to a settlement of hours."
182 EN	....	No	
73 EN	....	No	"In through passenger service it is a huge joke."
E 580	Yes	....	"Except that on long trains there should be more brakemen, especially local passenger trains."
397 EN	Yes	....	"I do not see how we could do with less men especially on freight trains."

Code to Engineers' Names	Favorable to Existing Law as it Now Stands		Remarks
389 EN	....	No	"To Public Utility Commission with practical railroad men as advisors."
303 EN	....	No	"The regulation of train-crews should be left to a body of men that are thoroughly familiar with railroad conditions both in freight and passenger service."
124 EN	....	No	"Regulation of train-crews should be up to the management of each railroad."
370 EN	....	No	"In a number of cases he simply rides from one terminal to the other, his main duty is to cover the law."
267 EN	....	No	"On trains that do way work along the road it is all right. On straight trains don't think he is needed."
133 EN	....	No	"Nothing; just rides along."
427 EN	....	No	"Fry eggs and bacon in the huck."
50 EN	....	No	"I believe the railroad officials are the most competent and the most interested parties to handle this."
68 EN	....	No	"The present law is neither practicable or useful on a great many trains affected thereby."
81 EN	....	No	"The regulation of train-crews should be delegated to a state administrative board."
385 EN	....	No	"Good judgment on part of the company should arrange it all right."

The law as it now stands meets with the approval of 14 of the 69 engineers and the disapproval of the remaining 55. The remarks contain many suggestions worthy of serious consideration in as much as they come from men who actually know the situation.

2—Conductors

A letter (*a*) was sent to each of the 759 conductors operating in New Jersey on October 10, 1916, asking a confidential opinion on the enclosed question blank. (*a*) The 66 replies expressing an opinion (*b*) with pertinent remarks, which were received, are tabulated below. The "yes" or "no" is an expression of favorableness or unfavorableness to the "full-crew" law as it stands.

POLL OF OPINIONS OF CONDUCTORS.

Code to Conductors' Names	Favorable to Existing Law as it Now Stands		Remarks
C 4	Yes	....	
C 9	Yes	....	
C 20	Yes	....	"I believe it (regulation of train-crews) should be delegated to the Public Utility Commission."
C 25	....	No	"I suggest on 50 cars or more the additional man, also more protection on passenger trains for the safety of the company and public."
C 27	....	No	"Not as applied to passenger trains."
C 30	....	No	"It is too arbitrary. Should be delegated to the Public Utility Commission. Apply to both passenger and freight."
C 33	Yes	....	
C 61	....	No	"Public Utility Commission. Both" (Passenger and freight trains).
C 62	Yes	....	"This law is very good as it is I don't know why at the present time there should be any change."
C 71	....	No	"No freight train should be sent out on the road with less than conductor and three brakemen. There is use on a train of ten cars for this, as there is on train of over 30 cars. * * On a train of one combined car and four coaches two men can handle it and there should be one additional man to every two additional cars. * * As the law now reads if no baggage is carried, 10 or 12 cars carrying passengers only have two brakemen and conductor. That is not enough for safe handling of passengers at stations. Word the law right and it is all right."

(*a*) "The Bureau of State Research of the State Chamber is making a thorough and impartial investigation of the operation of the 'full-crew' law in New Jersey. It is interested particularly at this time to secure the unqualified co-operation of every conductor in the State. The Bureau is desirous of ascertaining all of the merits and demerits of the present law in an unbiased manner, and it believes that that data from conductors would be free from prejudice either for the railroads or the trainmen.

There is some indication that the movement for and against a repeal of the present "full-crew" law will be as vigilant in the coming legislature as it was in 1915 in New Jersey. It has been decided therefore to put an end to conjecture and get at the actual facts which are at the bottom of this question.

The conductors of New Jersey are, therefore, asked to give, confidentially if they prefer, any information that will help to decide the partially the good and bad features of the present law."

(*a*) "1. Does the present New Jersey 'full-crew' law meet with your complete approval?

2. If you object to the present statutory regulation do you feel that the regulation of train crews should be delegated to a state administrative board such as Public Utility Commission or Labor Department? Would you apply this to freight or passenger trains or both?

3. Do you need the additional brakeman on the trains under your supervision?

4. What is the work of the additional brakeman?"

(*b*) Eight letters were received in which the conductor did not register an opinion.

Code to Conductors' Names	Favorable to Existing Law as it Now Stands		Remarks
C 79	....	No	"On train over 5 cars without baggage car we are only allowed 2 trainmen. Should have a man for every 2 cars over 5 cars." (Passenger service.)
C 86	Yes	....	"Present regulation meets with my approval and I feel that it should apply to passenger and freight service. I need the "full-crew" man and no trains are provided with a "full-crew" man except when there is a real necessity for him."
C 94	....	No	"Modified I would say, but by no means abolished. On local trains a man should be placed between platforms. On through or express trains a man for every two cars providing such cars are all connected. * * To regulate this it should be placed in the hands of men who have railroad experience."
C 96	....	No	"In my judgment the present law is a good one, but could be improved by amending it to provide an extra man for every additional 30 cars."
C 99	Yes	....	"The present statutory regulation now in vogue gives all the protection to company's property and the traveling public that it is possible to give; the question should not be left to Public Utility Commission or Labor Department, as they have no experience in handling trains over the road or in yards."
C 113	Yes	....	
C 115	Yes	....	
C 132	....	No	"It would be allright if they would put railroad men on this Board * * Through trains do not need as many men as a way train, one brakeman is enough on 10 and 12 cars on a passenger."
C 154	Yes	....	
C 197	Yes	....	"In running express train, not necessary. (Additional brakeman.) In running local trains, yes."
C 207	....	No	"In reference to freight trains, yes. Passenger, no."
C 224	Yes	....	"It should stay where it is now, if any changes there should be more men on all trains. * * Without this man there would be more wrecks."
C 227	Yes	....	
C 229	Yes	....	"Labor Dept. (Regulation of train-crew.) The additional brakeman is very much needed."
C 235	....	No	"I think for every train of 75 cars or over there should be one more additional brakeman than the "full-crew" calls for."
C 236	....	No	"It does in regard to freight trains up to the limit of fifty (50) cars which is as long as any train should be for the safety of all in general."
C 237	Yes	....	
C 264	Yes	....	
C 274	....	No	"The loopholes in the "full-crew" law by not carrying baggage, how is it railroads can run as 8 cars with five men, including engineer and fireman."
C 284	Yes	....	"A 'full-crew' for trains meets with my full approval. Yes, he (additional brakeman) is needed at all times at and about the train."
C 285	Yes	....	"Yes, except it could be made more binding * * In case of accident his (additional brakeman) services are invaluable."
C 291	Yes	....	
C 314	Yes	....	"In my opinion regulation of train-crews should be in the hands of competent Trainmaster or Superintendent on any division. Men that have a thorough knowledge of practical and theoretical railroading. In my 27 years of railroad experience, I am convinced that the extra man is not only needed on long trains but absolutely necessary."
C 318	Yes	....	
C 331	Yes	....	"It does; it is certainly necessary."
C 346	Yes	....	
C 380	....	No	"Labor Department." (Train regulation.)
C 389	Yes	....	

Code to Conductors' Names	Favorable to Existing Law as it Now Stands		Remarks
C 390	....	No	"It should be revised to greater number of cars. Public Utility Commis-mission both passenger and freight."
C 392	....	No	"Public Utility." (Regulation of trains).
C 396	....	No	"In many of the trains they are not worth the room they take up as there is nothing for them to do."
C 401	....	No	"Labor Department." (Train regulation).
C 404	....	No	"No only in the way." (Additional brakeman.)
C 427	....	No	"There are a few changes I believe could be made that would be of interest to the railroads and the safety to public not sacrificed. In freight service the extra man is needed by all means."
C 428	....	No	" * * Do not need a "full-crew" man on express train that makes no stops or has Pullman cars. * * but need "full-crew" men on all local trains that have more than three (3) cars for passenger service."
C 470	....	No	"Personally I can see no objections to delegating the administration of any statute on this subject to a board, commission or department appointed for that purpose, applying to both passenger and freight service."
C 495	....	No	"But the law does not go far enough. If a train of four passenger coaches and one baggage car requires six persons, a train of ten or twelve should have seven persons for the benefit of the passengers. A freight train of more than 30 cars should have six persons, this is not enough for 90 cars, as many trains are made up."
C 500	....	No	
C 517	....	No	
C 527	....	No	"The company should have the power to regulate these matters. Do not believe in legislation on this matter."
C 535	Yes	....	"For the safety of our own lives the law applies to freight, and for the safety of the public the law applies to passenger trains."
C 537	Yes	....	"It is the best law for the public safety."
C 545	Yes	....	"The present "full-crew" law of New Jersey has my approval. I have often said that it was not a "perfect law" but it is better than no law at all. I have always found work for the additional brakeman and I can honestly say I needed him."
C 551	Yes	....	"Do not object to present statutory regulation."
C 561	Yes	....	"Leave it where it is." (Train regulation).
C 564	....	No	
C 271	Yes	....	"By all means Public Utility (Train regulation). This will have to be done eventually to overcome abuses, neglects of R. R. Co."
C 589	Yes	....	
C 601	Yes	....	
C 607	Yes	....	"The present statute to remain as it is and to apply to freight and passenger crews."
C 608	Yes	....	"I would suggest that this bill be left as it is."
C 616	Yes	....	
C 645	....	No	"Not in regards to passenger trains. There should not be any set rule governing this. Circumstances alter cases. "There is times an additional brakeman is needed and other times unnecessary. "I do not think brakemen are as efficient under the "full-crew" law."
C 659	....	No	"Having been a passenger conductor for several years I am satisfied the present law is not just right and that the regulation of passenger crews would be safe in the hands of our Division Supt. "On some trains I run I have the extra man and no use for him whatever."

Code to Conductors' Names	Favorable to Existing Law as it Now Stands		Remarks
C 661	....	No	"I think the regulations of crews should be left to a state administrative board such as Public Utility Commission or Labor Department in both freight and passenger crews."
C 690	....	No	"There are trains which are compelled to carry the 'second man' that have no use for him whatever." "There is no set rule to apply to all trains, regardless of the number of cars, as each train has its peculiarities."
C	Yes	....	"I firmly believe that the regulation of train-crews should be delegated to a State Administrative Board."
Total	36	31	

Eight other letters were received from conductors, but they did not express an opinion either way in regard to the "full-crew" law.

Thirty-five of these favor the law as it now stands, while thirty-one do not favor the law as it now stands. Of the thirty-one unfavorable replies, twenty-seven consider the law as arbitrary or unfair to the railroads while four would like more stringent requirements. It is significant that such an expression of opinion has been gleaned from men who are directly concerned in case of any change.

3—Trainmen

The trainmen have given their clear and concise opinion through their spokesman, Mr. G. H. Sines, Vice-President of the American Brotherhood of Railroad Trainmen. The following is a letter from Mr. Sines:

"Referring to the subject matter of our conversation of the 25th ult., pertaining to the so-called "full-crew" law:

"I think that first of all, you will agree with me that the toll of human life and injuries, to say nothing of the loss of property, exacted by the railroads every year from the public and from their employees, is greatly in excess of what it should be and of what is preventable, hence it should be the constant study of the public, of the employees and of the railroad managements to minimize the toll in so far as is humanly possible.

"True, there has been a marked decrease during the past two or three years in percentage of deaths, injuries and loss of property. Unquestionably this has been caused to a large extent by the 'Safety First' movement; and still, with all justice to the railroads, it must be admitted, because it is a fact, that this 'Safety First' movement was not started until legislation began to make it expensive to kill and injure. In other words, while life and limb was cheaper than the necessary safeguards therefor, but little attention was paid to the protection thereof. And to the credit of the Brotherhoods it must be said that they were the pioneers of 'Safety First' on the railroads for the public and the railroad employees because of the fact that they insisted upon preventative measures, opposed always by the Railroads.

"The Brotherhoods believe that no small part of the appalling loss of life and limb and property is due directly to the fact that trains were or are insufficiently manned and still are insufficiently manned in the States where as yet 'full-crew' laws have not been enacted. And if this form of legislation will serve as a means of safeguarding to any appreciable extent the public and the employees, then we submit it is well worth the financial consideration. We of the Brotherhoods think, yes, know, that the major portion of the saving of life and limb and property is directly attributed to this humane law, all arguments by the railroads to the contrary, notwithstanding. As to the financial cost, we think that the railroads have greatly overdrawn the picture; in fact we believe that the 'full-crew' laws have actually resulted in economies for them.

"Precisely the same line of argument was used by the railroads when we asked for the enactment of the liability laws, laws compelling the railroads to block switches, frogs, etc., of the power brake and the automatic coupler statutes and of the standard equipment rulings issued by the Interstate Commerce Commission by authority of Congress, etc., as is now used against the 'full-crew' law. The public was told that one of those measures would lessen the hazards of the business. Why it was preposterous to think for even one instant that they would not make use of every agency to protect the public and their employees. The public was told every time of the great financial cost which would absolutely be of no benefit to any one.

"However, regardless of their emphatic protestations supported always by a mass of figures and wonderful arguments, the said laws were enacted and time has proven beyond the shadow of a doubt that every one of them has gone a long ways, if indeed, some of them have not exceeded, in doing just what the representatives of the organizations said they would do. In view of this past history all of which is a matter of record, we feel that we are entitled justly to the benefit of the doubt on the part of the public as to whether the arguments of the railroads or our claims are correct as to the 'full-crew' law.

"As yet the law in the States of Pennsylvania, New Jersey and New York has not been in effect long enough to establish our claims, to the same extent as the Federal laws hereinbefore referred to have proven our case. However, some very interesting comparisons can be shown wherever we have gathered the data. The statement which I handed to you was copied from the 9th Annual Report of the Public Service Commission, 2nd District, N. Y., and shows the percentage of decrease in the toll of lives, injuries and loss of property as between the year before the enactment of the 'full-crew' law and the year since it has been in effect—a remarkable record, irrespective of the cause or the causes. The Railroads, of course, pursuing their usual course of sidestepping, will undoubtedly ascribe it to anything and everything else, rather than to admit that a proper manning of trains (the 'full-crew' law) has been a factor, but we of the Brotherhoods say most emphatically that it has been the controlling factor in safety. To one who does not understand thoroughly the thousand and one things confronting the trainmen, and therefore is "all at sea" as to which argument he should credit, the copied statistics should convert such a one to the organizations' viewpoint.

"In addition to the statement referred to in the preceding paragraph, the excerpts from the Interstate Commerce Commission's reports, as well as the matter showing the usefulness of the so-called 'extra-man', prepared by our Legislative Committee in Pennsylvania, which I also handed to you, but serve to accentuate the soundness of our claims."

Letters were sent to each of the twenty orders of trainmen in New Jersey. These letters explained the purpose of this investigation, and asked for an honest opinion. Only three organizations replied and these replies with pertinent remarks are tabulated below:

POLL OF THE TRAINMEN ON THE "FULL-CREW" LAW.

Organization	Favorable to Law as it Now Stands	Remarks
Hope Lodge, No. 202., C. C. Lewis, Sec'y.	Yes	"For the safety of the traveling public and the men in service on account of the heavy

Organization	Favorable to Law as it Now Stands	Remarks
		trains that are required to be handled."
Hohokus Lodge, No. 299. G. W. Eisenberger, Legislative Representative.	Yes	"Not only because it furnishes a few more positions for our men but it places more men on passenger trains whereby the lives of the travelling public can and will be more carefully protected from personal injury."
Lehigh Valley Lodge, No. 333, D. J. Roerty, Sec'y.	Yes	"It is the most beneficial law for the protectection of life and limb, of both the travelling public and the employees ever passed by the legislature of this or any other state."

The whole expression of opinion of the trainmen is unanimous in support of the law as it stands.

4—Labor Unions of New Jersey

Letters (*a*) with questionaires (*b*) were sent to each of the labor unions in New Jersey.

Replies were received from seventy-three labor unions expressing their sentiments on the present "full-crew" law. The replies are tabulated below with pertinent remarks taken from their replies.

POLL OF OPINION OF LABOR UNIONS.

Organization	Favorable to Law as it Now Stands	Remarks
Bakers' Union, No. 289, Robert Maus, Sec'y.	Yes	
Barbers' Union, No. 296, Bert M. Horn, Sec'y.	Yes	
Boiler Makers' & Iron Ship Builders' Lodge, 176 John J. McGrath, Sec'y.	Yes	"—highly in favor of the present "full-crew" law in New Jersey."
Bridge Structural Iron Workers, No. 45, Dan Unix, Sec'y.	Yes	"The "full-crew" law improves the working conditions of the employes of the railroad. It safeguards the lives of passengers, employes and also safeguards the property of the railroads and stockholders."
Cigarmakers' Union, No. 8, William Jerome, Sec'y.	Yes	"Cigarmakers' Local No. 8, of Hoboken, N. J., favors the 'full-crew' law of the State of New Jersey as it stands and is opposed to any repeal of same."
Cigarmakers' Union, No. 146, B. Friedman, Sec'y.	Yes	"For safety of the public at large."
Cigarmakers' Union, No. 230, Frank Wathier.	Yes	"We believe the trainmen know what is best for them, better than we."
Glass Bottle Blowers' Ass'n, No. 63, W. Marsh.	Yes	"We believe it a proper safeguard for the traveling public."
Glass Bottle Blowers' Ass'n, No. 110, Sam'l Lenallen, Jacob R. Gerges, Winfield S. Baldwin, Judiciary Committee.	Yes	"The present "full-crew" law is good, but is inadequate."
United Brotherhood of Carpenters & Joiners, No. 265, Jacob H. DeBaun, Sec'y.	Yes	
Carpenters' Union, No. 519, W. V. Jochem, Sec'y.	Yes	
United Brotherhood of Carpenters, No. 1179, Thos. C. Cadien.	Yes	
United Brotherhood of Carpenters & Joiners, No. 1122, E. H. Yarwood, Sec'y.	Yes	"We think it is both to the interest of crew and passenger, also the public in general."
United Brotherhood of Carpenters & Joiners, No. 752, Rec. Sec'y.	Yes	
United Brotherhood of Carpenters & Joiners, Hudson County District Council, Chas. L. Cook, Sec'y.	Yes	"A means of protection to the traveling public."
United Brotherhood of Carpenters, No. 139, Andrew Baumel, Sec'y.	Yes	"Best of policy for the public who patronize the roads."
United Brotherhood of Carpenters, No. 282, W. J. Brown, Sec'y.	Yes	"Our reasons are it insures safety for all hands concerned, train travelers and foot travelers."
United Brotherhood of Carpenters, No. 482, John W. Baker, Sec'y.	Yes	"It appears to give adequate protection to passengers on trains and since its adoption has worked satisfactorily to both public and trainmen."
United Brotherhood of Carpenters, No. 612, Wm. Allen, Sec'y.	Yes	"A 'full-crew' makes railroad travel safer for passengers and crew and eliminates unemployment to a certain extent."

(*a*) "Through its Bureau of State Research the State Chamber is making a thorough and impartial study of the operation of the present 'full-crew' law in New Jersey, with an idea to determine its merits and demerits.

The 'full-crew' law which was passed in 1913 to compel the railroads to place a certain number of brakemen on their freight and passenger trains and as a result of the different views which have been expressed regarding the law, it has been decided to canvass the honest opinion of the labor organizations. The railroads contend that it imposes an unnecessary expenditure upon them and the trainmen contend that it is essential to prevent the under-manning of trains.

There has been and still is a movement under way in this state to repeal the 'full-crew' law altogether, there is another movement to revise the present method of statutory regulation and empower some administrative state board to regulate the size of train crews, and then there is the determined opposition to both of these changes by those who favor the present law.

Will you kindly register the opinion of your organization and answer the enclosed question at your earliest opportunity?"

(*b*) "Does your organization favor the present 'full-crew' law in New Jersey? If so, state why, and if not, what objections do you have?"

Organization	Favorable to Law as it Now Stands	Remarks
United Brotherhood of Carpenters, No. 2515, D. McDonald, Sec'y.	Yes	
United Brotherhood of Carpenters, No. 151, B. F. Lane, Sec'y.	Yes	"From reports from trainmen consider it just and necessary in the operation of trains."
United Brotherhood of Carpenters, No. 349, Geo. Winnett, Sec'y.	Yes	"A just and proper law for the railroad workers."
United Brotherhood of Carpenters, No. 429, Thos. J. O'Connell, Sec'y.	Yes	"For the safety of the public generally, that was not assured before the enactment of the "full-crew" law."
United Brotherhood of Carpenters, No. 941, Geo. Applin, Sec'y.	Yes	"Better service, less accidents."
United Brotherhood of Carpenters, No. 1067, O. E. Bedford, Pres.	Yes	
Millmen, No. 1209, John Walsack, Sec'y.	Yes	
United Brotherhood of Carpenters, No. 1297, Jos. Schlosser.	Yes	
United Brotherhood of Carpenters, No. 325, Abram Wright, Sec'y.	Yes	"Safety to the public at large and a betterment for the crews of the trainmen."
United Brotherhood of Carpenters, No. 65, Robt. Brizell, Sec'y.	Yes	"We believe it provides a safer operation of trains and a consequent reduction in the number of railroad accidents."
United Brotherhood of Carpenters, No. 155, H. S. Derflinger, Sec'y.	Yes	
United Brotherhood of Carpenters, No. 1113, Frank E. Meisel, Sec'y.	Yes	"The present number of men are necessary to properly care for the comfort and safety of the passengers, and the unusual length of freight trains at the present time would seem to demand an increase in the crew instead of a reduction."
Bartenders' Local, No. 4, Fred A. Stimmel, Sec'y.	Yes	"It considers same ("full-crew" law) to be in the interest of the traveling public and beneficial to fellow members of organized labor organizations."
Bartenders' Union, No. 762, Michael Herzog.	Yes	
International Longshoremen's Ass'n, No. 306, John Gunloch, Sec'y.	Yes	"The law is considered not far reaching enough as the safety of human life is involved."
International Association of Machinists, No. 315, Theodore Miller, Sec'y.	Yes	"We believe the measure is necessary for the safety and welfare of public in general."
International Association of Machinists, No. 329, Philip Grosswater, Sec'y.	Yes	"Because trains that would carry crews smaller than what the law provides as it is, would be insufficient to man a train properly."
Amalgamated Sheet Metal Workers' International Alliance, No. 126 Frank Warholick, Sec'y.	Yes	"Better public safety."
Polishers' & Platers', No. 194, Chas. Coleman, Sec'y.	Yes	
Wharton Miners' Union, No. 268, A. F. Lindemann, Sec'y.	Yes	
Oxford Miners' Union, No. 270, Emil Dux.	Yes	"For the safety of the public and the employment of more men."
Iron Molders, Union, No. 7, Henry Kuhn, Sec'y.	Yes	"We believe that the lives of the traveling public, and of the railroad employes should be protected regardless of the cost."
International Molders' Union, No. 40, James S. Kelly, Sec'y.	Yes	"The present law should stand as it protects both trainmen and the passengers."
International Molders' Union, No. 208, Dan'l. P. Beebe, Sec'y.	Yes	"We believe that it adds greatly to the safety of the traveling public and our motto is always safety first."
American Federation of Musicians, No. 151, Frank L. Schneider, Sec'y.	Yes	"More of a protection to the passengers as well as the train-crew."
American Federation of Musicians, No. 204.	Yes	
Plainfield Musicians' Union, No. 693, Chas. A. Nichols, Sec'y.	Yes	
Brotherhood of Painters, Decorators & Paperhangers, No. 1015, Fred Powell, Sec'y.	Yes	
Brotherhood of Painters, Decorators & Paperhangers, No. 653, George Morlock, Sec'y.	Yes	"Our views being the same as the trainmen whose contention seems to be perfectly fair and right to all concerned."
Brotherhood of Painters, Decorators & Paperhangers, No. 78, John Cottam, Sec'y.	Yes	
Brotherhood of Painters, Decorators & Paperhangers, No. 400, William C. Nye, Sec'y.	Yes	

Organization	Favorable to Law as it Now Stands	Remarks
Brotherhood of Painters, Decorators & Paperhangers, No. 819, George D. Blazier, Sec'y.	Yes	"Necessary for the protection of life and limb."
Brotherhood of Painters, Decorators & Paperhangers, No. 705, Harry Tompkins, Sec'y.	Yes	"Not only for protection but for the uplifting of labor's cause."
Brotherhood of Painters, Decorators & Paperhangers, No. 242, Wm. H. Mears, Sec'y.	Yes	
Brotherhood of Painters, Decorators & Paperhangers, No. 174, W. T. Gardner, Sec'y.	Yes	
United Association of Plumbers & Steam Fitters, No. 274, F. T. Kramer, Sec'y.	Yes	"As it means safety to passengers, better handling of freight trains and gives employment to more men."
United Association of Plumbers & Steam Fitters, No. 263, Fred Van Deveer, Jr., Sec'y.	Yes	"Because it is a protection against accidents, because it gives more men work and not only a few."
United Association of Plumbers & Steam Fitters, No. 24, W. D. Barry, Sec'y.	Yes	
National Brotherhood of Operative Potters, No. 36, William Cope.	Yes	
Central Labor Union, No. 50, Wm. Harvey, Sec'y.	Yes	"For the benefit of labor and also for the safety of the human."
Brotherhood of Railroad Trainmen, No. 329, W. A. Young, Sec'y.	Yes	"A matter of safety first and a benefit to the public."
International Brotherhood of Composition Roofers, No. 2, Wm. Bevins, Sec'y.	Yes	"For the protection of life and limbs of human beings."
Brotherhood of Railroad Firemen, No. 349, D. F. Kelliher, Sec'y.	Yes	
Newark Stereotypers' Union, No. 18, H. C. Sander, Sec'y.	Yes	
Journeymen Stone Cutters' Association, Tony Jordan.	Yes	
Truck & Building Material Teamsters' & Chauffeurs' Union, No. 487, Walter Darden, Sec'y.	Yes	"In the name of safety to all parties concerned we vehemently protest against any change in the 'full-crew' law."
Union Hill Typographical Union, No. 110, John L. Hall, Sec'y.		"The safest for the public and greatest benefit to labor and not unreasonable."
Rahway Typographical Union, No. 235, R. D. Uhler, Sec'y.	Yes	"It seems to please the railroad men who are the ones interested."
Trenton Typographical Union, No. 17, Jas. E. Leigh, Sec'y.	Yes	"Firm believers of the nation wide movement of safety first."
Jersey City Typographical Union, No. 94, Percy L. Anderson, Sec'y.	Yes	"Our principal reason is that it is favored by the railroad men and is considered a 'safety' arrangement for passengers and men on the railroad."
Elizabeth Typographical Union, No. 150, M. N. Mooney, Sec'y.	Yes	"The law has proved itself of value in the operation of passenger and freight trains."
United Brotherhood of Carpenters and Joiners, Newark, G. G. Allon, Sec'y.	Yes	"We believe their has been less accidents because of proper manning of trains."
Cigarmakers' Union, No. 3, E. Romary, Sec.	Yes	"We favor the 'full-crew' law, believing it to be of benefit to the railroad workers, also the public."
Coopers' International Union, No. 33, Ferdinand Kadel, Sec'y.	Yes	"We are of the opinion that the traveling public should demand its strict enforcement for their own safety and that of the railroad men."

The labor unions are unanimous in their endorsement of the law as it now stands.

5—Railroads of New Jersey

Letters were sent to all railroad companies operating in the State of New Jersey. A questionaire made up of twenty questions (*a*) was enclosed with each letter. Replies were received from eight railroads, affected by the law. Extracts of these replies expressing the opinions of the various roads are given below.

Among others these questions were asked:

1.—What is the work of the "additional" brakeman which you are required by the law to carry?

2.—Would the repeal of the law mean that these men would be thrown out of employment altogether or would they be transferred to other positions?

3.—Please give arguments in support of your position with full statement of any facts which are not set forth in answer to previous questions.

PHILADELPHIA AND READING RAILWAY COMPANY.

Ans. I. "On the majority of trains, especially passenger and through freight trains, there are no duties for these additional men to perform that were not fully cared for previous to the time the additional man was required by law. On our local freight trains the additional man was provided, wherever necessary by the character or volume of the work, before the law was enacted."

Ans. II. "The repeal of the law would not necessarily mean that all of the additional men would be thrown out of railroad employment. It is possible that a very small percentage would be obliged for a limited period to seek other occupation, but the constantly increasing demand for men in the train service would, in short time, restore all of them to railroad employment."

(*a*) These questions asked relative to the cost of law, effect on operation, number of trains involved, number of extra men needed, duties of additional men, difficulties of operation caused by law, etc.

Ans. III. "Our investigation and observance of the conditions under the 'full-crew' law, compared with results obtained under our practices previous to the enactment of the law, demonstrate that no additional measure of safety has been afforded by the additional men required by the law. Our practice both as to passenger and freight train operation prior to the enactment of the law, was to provide what, in our judgment, based on past experiences, was the number of men necessary to safely operate trains of various number of cars, and additional men were assigned to trains not only to the extent, but in excess, of the number prescribed by the Act, where safety conditions and the proper protection of the public required it."

THE LEHIGH AND HUDSON RIVER RAILWAY COMPANY.

Ans. I. "There is no essential work done by the brakeman which we are required to carry by law. While he is on the train he does whatever the conductor requires him to do."

Ans. II. "The repeal of the law would mean that a majority of these men would be taken out of train service. Under present conditions there would be plenty of other work on the railroad for them if they would care to accept it."

Ans. III. "Our records show no more accidents in New York State without the 'full-crew' than in New Jersey with the 'full-crew.' Therefore, our experience shows it is not dangerous, and, as a matter of safety, useless. Our experience with the extra man on the Federal Express, which we ran over this road at night for three years, is quite remarkable. The writer happened to be in the Superintendent's office when this man was employed in compliance with the law. He asked what his duties would be. We told him that he was to stay awake, if possible, and see that the other men were awake. We told him that in New York State at that time, then Governor Sulzer had gone on record as stating that, in his opinion, the extra man should smell the breath of the engineer. When the writer told this man to do this, he replied that if he did, he would be killed by the engineer, and that he wouldn't take the job under those conditions. This man was put on an all-steel vestibule train, with only two day coaches, all the rest sleepers, making only flag stops in going over this road between the hours of midnight and four A. M. This is the best example of wasted money that we ever knew of. We are not arguing from the standpoint of any other road, only from our own. We feel the above facts are sufficient to condemn this law so far as it applies to this railroad."

CENTRAL RAILROAD COMPANY OF NEW JERSEY.

Ans. I. "He works under the conductor's instructions."

Ans. II. "As a rule, they would not want other positions. They would be thrown out temporarily, until our needs caught up to them, which would not take long."

Ans. III. "The law is fundamentally unjust and confiscatory, in that it compels the railroads to furnish 'full-crew' men, without specifying any duties which such men are to perform, and the railroads themselves do not consider the man a reasonable exaction from standpoint of practical operating requirements—the addition of one or more cars in a train not being a proper measure of necessity for additional men in the train-crew."

THE DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY.

Ans. I "He has no specific assigned duties."

Ans. II. "They would not be dismissed, but assigned to other duties."

Ans. III. "The foregoing covers the situation pretty thoroughly. The reasons for the repeal or modification of the law are so apparent that no further argument is needed."

THE BALTIMORE AND NEW YORK RAILWAY COMPANY.

Ans. I. "Practically the same work as that of any other brakeman on the train."

Ans. II. "To repeal the law would not mean that the brakemen would be thrown out of service, but they would be transferred to other positions."

Ans. III. As far as the Baltimore and New York Railway is concerned, the situation is peculiar and the law as worded, works a great hardship on this road without any adequate benefit being obtained, because of the extra brakeman. The line is a single track railroad of 5.30 miles in length, hauling within the State of New Jersey, running from Arthur Kill to connect with the Jersey Central at Cranford Junction. There is not and has not been for years any passenger service performed on this line, with the possible and very rare exception of an occasional excursion or special train. It is safe to say that such special passenger service has not occurred on an average of once per year within the last five years. The service performed is freight service, and transfer service. The crews run from St. George to Cranford Junction, New Jersey, a distance of 12.2 miles, over the tracks of the Staten Island Rapid Transit and the Baltimore and New York. Because of the New Jersey law, the extra brakeman is carried in New Jersey and, although not needed, in New York, the New York law not calling for the extra brakeman on roads under fifty miles in length. It is felt that in this particular case the law should either be repealed or modified to make non-applicable railroads on which there is no regular passenger service or on railroads under fifty miles in length."

ERIE RAILROAD COMPANY.

Ans. I. "The 'additional' brakeman in freight service and in passenger service has no work to perform."

Ans. II. "He would be assigned to regular train service."

Ans III. "In view of the foregoing facts, an 'argument' would seem to be unnecessary."

LEHIGH VALLEY RAILROAD COMPANY.

Ans. I. "He has no specific work to perform, as there is a sufficient number of men employed on each train, exclusive of the 'full-crew' man, to properly and safely operate the train. His work consists of what he makes for himself, such as relieving other men and transferring signals during the trip, which is unnecessary."

Ans. II. "The 'full-crew' men would be transferred to other positions in train service, according to their seniority rights. If no positions available in train service in their respective seniority districts, they would be given the preference for positions in other districts when men are needed, or in other branches of the service."

Ans. III "Trains made up by yard crews are all well equipped with automatic couplers, air and steam hose coupled, engine coupled and the air brakes test is

made by inspectors before road crews are given charge; therefore the road crews do not have terminal duties to perform. The Lehigh Valley Railroad in New Jersey is 76 miles in length; is doubled tracked for 76 miles, 27 miles has three tracks, and 11 miles has four tracks. The operations are controlled by automatic signals, interlocking plants, 14 in number, permitting and protecting all inlets and outlets to the third and fourth tracks, except at Potter and New Market, where day and night switch tenders are employed to give trains every protection possible."

PENNSYLVANIA RAILROAD.

Ans. I. "No specific duties are assigned to additional men required by law. He assists the flagman and head brakeman and such other duties as may be assigned to him by the conductor; all of which work was safely and satisfactorily performed by the crew before the law was enacted. Since the passage of the law no additional duties have been added to the train-crews."

Ans. II. "The repeal of the 'full-crew' law would not mean that these employes would be thrown out of employment. They would be assigned to other positions or placed on extra list, and we would discontinue employing men until those returned to such extra lists have secured regular positions. At the present time, owing to the shortage of labor, we are holding freight on account of our inability to properly man trains."

Ans. III. "About twenty years ago, the railroad began to introduce automatic couplers and the use of air brakes on freight equipment cars, in lieu of link and pin couplers and hand brakes. This movement was fostered by the United States Government and as progress was made in equipping cars with these modern appliances, certain rules were established by the government requiring that not less than a certain percentage of cars in each train should have air brakes in operative condition and in use. This percentage of cars in each train was gradually increased in each train to the present requirement of 85% under the law (except in emergency cases the Pennsylvania R. R. operates with 100% air brakes). To equip and maintain these automatic coupling and air brakes on cars cost the railroad vast sums of money and finally when such a large percentage of cars were operated by air, one of the men in the crew required to control trains controlled by hand brakes was dropped.

"Trains were successfully operated by air in this manner for a number of years without the necessity of the man dropped from the crew, until finally the Trainmen's Organization began agitating the question of the 'full-crews' for the purpose of having the railroads restore to each crew the one man which had been taken off by reason of operating with automatic couplers and air brakes which law they were successful in having passed in 1911. In the meantime the wages of trainmen have been largely increased and the effect of the law was to still further increase the amount paid in wages to trainmen without any compensating advantage to either the railroad or the public.

"The advantages accuring to railroad employes and to the travelling public from adoption of automatic couplers and air brakes on trains cannot be questioned, and the expenditure on these improvements was warranted, but the 'full-crew' law in providing for the employment of additional brakemen after equipping and operating trains with automatic couplers and air brakes, was unwarranted, since they are not in a position to render any additional service that is conducive to the safety of the public or their fellow employes, and the fact of their enforced employment by law increases the element of personal danger by subjecting an additional and unnecessary person to the hazards of the service.

"So far as we can determine, no accident has been prevented by the action of this additional man on the men on the crew before the law requiring the the men on the crew bfore the law requiring the extra man was in force.

"We feel that any money paid out needlessly is an injustice not only to the railroad company and the public but to the railroad employes themselves, outside of the individual who is personally interested, and we believe that the presence on a train of this additional man has resulted in a division of responsibility among the other members of the crew, since a supernumerary in a train-crew is subversive of good discipline and likely to impare the morale of the crew.

"It is our opinion that the question of furnishing proper crews on trains can safely be left to the judgment of the railroad company, and the various Public Service Commissions can readily hold them responsible for seeing that the crews provided are adequate for the safe operation of all trains."

Naturally, the expressions of opinion from the railroads are unanimous in opposition to the law.

6—Commercial and Civic Organizations of New Jersey

Letters (*a*) with questionaires (*b*) were sent to each of the Boards of Trade and Chambers of Commerce in the State. The following organizations have at one time passed resolutions favoring the repeal of the "full-crew" law.

Resolutions passed by various Boards of Trade and Chambers of Commerce in New Jersey to favor repeal of "Full-Crew" Law—1915.

Atlantic City Chamber of Commerce—W. B. Dill, Secretary.
Atlantic City Hotel Men's Assn.—John C. Benson, Secretary.
Atlantic City Rotary Club.
Asbury Park Chamber of Commerce—President Frank Cole.
Bayonne Chamber of Commerce—H. C. Stevens, Secretary.
Bridgeton Commercial League—LeRoy W. Loder, Secretary.
Camden Board of Trade—Chas. Curry, Secretary.
Cape May County Freeholders—C. H. Clouting, President.
Clinton Hill Improvement Assn.—Geo. M. Judd, 3d Vice-President.
Clementon Township Committee—Jacob C. Lippincott, Kirkwood, N. J.
Columbus Grange, Burlington County—Wm. E. Shinn, Master.
Elizabeth Board of Trade.
Hoboken Board of Trade—Mr. Wyatt, Secretary.
Hopewell Business Men's League.
Grand Interest of the County of Hudson.
Long Branch Chamber of Commerce.
Medford Board of Trade—E. H. Haines, Secretary.

(*a*) "The New Jersey State Chamber of Commerce is making a thorough and impartial investigation of the merits and demerits of the so-called 'full crew' law in New Jersey and desires to record the sentiment of commercial organizations throughout the State.

"This 'full-crew' law, enacted in 1913, makes it mandatory that the New Jersey railroads place a certain number of brakemen on freight and passenger trains.

"There has been and still is a movement under way in this state to repeal the 'full crew' law altogether, there is another movement to revise the present method of statutory regulation and empower some administrative State Board to regulate the size of train crews, and then there is the determined opposition to both of these changes by those who favor the present law.

It is respectfully requested that you submit the enclosed questions to your membership at your earliest opportunity."

(*b*) "Does your organization favor the present 'full crew' law in New Jersey? If so, why, and if not, what objections do you have."

Monmouth Junction Board of Trade—N. H. Vreeland, Secretary.
Monmouth Pomona Grange, Monmouth County—Henry W. Herbert, Master.
Monmouth County Chamber of Commerce.
New Jersey State Chamber of Commerce.
Newark Advertising Men's Club—A. S. Koening.
Neward Board of Trade.
Newark Traffic Club.
Newark Foundrymen's Association—J. S. Kinnie, Secretary.
American Grocers' Society of Newark—Lloyd Curtiss, Secretary.
New Brunswick Board of Trade—F. W. Yorston, Secretary.
Ocean City Young Men's Progressive League—John E. Adams, Cor. Sec.
Ocean City Board of Trade—Otis M. Townsend, Secretary.
Passaic Board of Trade.
Paterson Chamber of Commerce—John J. Fitzgerald, Secretary.
Perth Amboy Board of Trade.
Pitman Board of Trade—Wadsworth Cresse, President.
Rahway Board of Trade—Robt. W. Elliott, Secretary.
Sea Isle City Young Men's Business Assn.
Sea Bright Board of Trade—P. Hall Packer, President.
Summit Board of Trade.
Trenton Chamber of Commerce.
Woodbine Board of Trade.

7—The Farmers of New Jersey

The most important expression of opinion, by the agricultural element of the State on the "full-crew" law, is a resolution passed by the New Jersey State Grange, at its annual meeting at Atlantic City on December 5, 6, 7, of 1916. The resolution is as follows:

"Whereas the 'full-crew' law of New Jersey is working hardship upon the public as well as the transportation companies of the State, and causing an unnecessary increase in the cost of transportation, without any noticeable increase in safety to the public

"Be is resolved. That we favor the repeal of this measure in the coming Legislature.

Approved by the Committee.

Adopted by the State Grange."

A poll of opinion of the farmers of New Jersey was taken by sending letters (*a*) and questionaires (*b*) to 146 local granges and five agricultural societies.

(*a*) "The New Jersey State Chamber of Commerce is making a thorough and impartial investigation of the merits and demerits of the so-called 'full-crew' law in New Jersey, with a view to determine whether it is justifiable or not. This law, enacted in 1913, makes it compulsory for the railroads to place additional brakemen on their freight and passenger trains.

"There is a strong movement under way in this state, as in other 'full-crew' states, to secure a repeal of this law. There is also just as determined an opposition to that repeal. The State Chamber, however, is not interested at this time, or yet prepared, to conduct an agitation for or against the repeal. Its only concern is to ascertain the public sentiment in an impartial manner.

"There are certain aspects of the measure which vitally concern the farmers and their vote will be one of the determining factors in deciding the fate of the law in New Jersey. It was the vote of the farmers which wrought the repeal of the 'full-crew' law in Missouri. The tabulations of the rural attitude in this state, therefore, will be of significance.

"The advocates of the law claim that in making an additional brakeman on all trains mandatory it is instrumental in reducing casualties.

"In asking for the repeal of the law the opponents contend that it has not actually reduced casualties and that the railroads have been compelled to use their funds to employ unnecessary brakemen instead of providing for the public the loading facilities and other improvements demanded by the shippers.

"This argument is answered by those in favor of the law maintaining that the economic factor is not to be considered since the railroads may raise additional revenue when needed by increasing their rates.

"Business men insist that the public is strongly opposed to any further increase in rates.

"Upon the basis of these and other considerations pertaining to the rural sections, the State Chamber is particularly anxious that this question be discussed and that the farmers declare whether they are in favor of a repeal of the 'full-crew' law in New Jersey."

(*b*) 1. "Have you any really urgent need for additional local improvements of railroad facilities? If any state specifically.

"Do you feel that the cost of the 'full-crew' law to the railroads has prevented or has been a factor in preventing the railroads from granting those improvements?

3. "Are the farmers of your section, as represented by the members of your Society, in favor of repealing the present 'full-crew' law in New Jersey?"

The questions invited among other things an opinion on the repeal of the law. These statements on repeal are tabulated below.

Replies were received from 71 organizations. Of these, 49 favored repeal, 11 did not favor repeal, and 11 felt insufficiently informed to express an intelligent opinion.

POLL OF OPINIONS OF THE FARMERS OF NEW JERSEY ON REPEAL OF "FULL-CREW" LAW.

A. Granges.

Do you favor the repeal of the "full-crew" law?

Morris, No. 105, A. M. Webb, Master.	Yes	....
Monmouth, No. 92, E. C. Conover, Master.	Yes	....
Moravian, No. 187, Milton C. Gibbs, Master.	Yes	....
Fair Lawn, No. 155, Albert I. Ackerman, Master.	Yes	....
Union, No. 154, L. H. Smith, Sec'y.	Yes	....
Sussex Co., No. 2, Ira Stoll, Master.	Yes	....
Millstone Central, No. 202, Sela Thompson.	....	No
Pioneer, No. 1, Spencer Perrine, Master.	Yes	....
Titusville, No. 163, Elizabeth M. Scudder, Sec'y.	Yes	....
Mt. Bethel, No. 201, F. T. Horton, Master.	Yes	....
Anchor, No. 173, Fred Popee, Master.	Yes	....
Blue Anchor, No. 166, Wright Smith, Legislative Committee.	....	No
Wayne Township, No. 145, C. Fred Day, Sec'y.	Yes	....
Moorestown, No. 8, S. Lucy Satterthwaite, Sec'y.	Yes	....
Stanton, No. 148, Silas Schomp, Master.	Yes	....
Mercer Co., No. 5, Chas. E. Rue, Master.	Yes	....
Allentown, No. 98, Mrs. Anna I. Otterson, Sec'y.	Yes	....
Glendola, No. 168, Chester C. Thompson, Sec'y.	Yes	....
Sergeantsville, No. 101, Wm. E. Rittenhouse, Sec'y.	Yes	....
Elmer, No. 29, John Bishop, Master.	Yes	....
Hopewell, No. 16, Walton E. Davis, Sec'y	Yes	....
Fenwick, No. 20, A. E. Harris, Sec'y.	....	No
N. J. State, John T. Cox, Sec'y.	Yes	....
Liberty, No. 99, S. B. Wells, Sec'y.	Yes	....
Kingwood, No. 106, S. E. Boyer, Master.	Yes	....
Vineland, No. 11, Mrs. M. E. Hendricks, Sec'y.	....	No
Passaic Twp., No. 188, Elber Bebout, Master.	Yes	....
Hunterdon Co., No. 3, Egbert T. Bush, Master.	Yes	....
Medford, No. 36, Chas. C. Cowperthwait, Master.	Yes	....
Milltown, No. 151, L. J. Cosgrove, Master.	No Expression	

Cold Spring, No. 132, A. C. Lyle, Sec'y.	Yes	....
Williamstown, No. 85, Mrs. Grace Ritchie, Sec'y.	Yes	....
Hope, No. 43, Leslie A. Platt, W M.	No Expression	
May's Landing, No. 204, Walter H. K. Donovan, Sec'y.	No Expression	
Ramsey, No. 135, G. L. Cortright, Sec'y.	....	No
Livingston, No. 104, Grace Van Ness, Sec'y.	....	No
Plainsboro Grange, No. 184, H. A. Stults, Master.	Yes	....
Allenwood Grange, No. 193, Leslie J. Allen, Master.	Yes	....

B. Agricultural Societies, etc.

Milk Shippers' Union, R. T. Woodward.	Yes	....
Morris Co. Farm Demonstrator, A. M. Goodman.	Yes	....
Salem Co. Board of Agriculture, Henry M. Loveland, President.	Yes	....
Shippers' Union, J. Monfort, Sec'y.	Yes	....
Holstein Friesian Association, A. A. Courtelyou, Prop.	Yes	....
Cumberland Co. Farm Demonstrator, Warren W. Oley.	....	No
Passaic Co. Farm Demonstrator, E. L. Chase.	Yes	....
Hunterdon Co. Board of Agriculture, Roscoe D. Mott, Sec'y.	Yes	....
Belle Mead Farmers' Club, Peter A. Garretson.	Yes	....
North Jersey Agricultural Society, R. V. Lindabury, President	Yes	....
North Jersey Poultry Association, George A. Day.	Yes	....
Burlington Co. Fair Association, Richard Waly Wells, Sec'y.	Yes	....
Passaic Co. Board of Agriculture, Aaron Laauwe, Sec'y.	Yes	....
Burlington Co. Farm Bureau, John V. Bishop, Sec'y.	Yes	....
Cumberland Co. Board of Argriculture. Albert M. Seabrook, Sec'y.	Yes	....
N. J. Agricultural Experiment Station, Jacob G. Lipman, Director.	Yes	....
Bergen Co. Board of Agriculture, John M. Myers, Sec'y.	Yes	....
Atlantic Co. Farm Demonstrator, Ellwood Douglass.	Yes	....
Mt. Laurel Farmers' Club, A. Engle Haines.	Yes	....
Princeton Agricultural Society, Geo. W. Campbell, Sec'y.	Yes	....
N. J. State Horticultural Society, Wm. H. Reid.	Yes	....
Vineland Co-op. Ass'n, R. C. May, Sec'y.	....	No
Fruit Growers' Union, R. C. May.	....	No
Elm Farmers' Club, J. F. Jenison, Sec'y.	....	No
State Poultry Association, Victor G. Aubry, Sec'y.	No Expression	
Somerset Co. Board of Agriculture, Ellsworth Brokaw, Sec'y.	No Expression.	
Mercer Co. Farm Demonstrator, Wm. Hamilton.	No Expression	
Progressive Farmers' Club, J. A. Stuart, Sec'y.	No Expression	
Bergen Co. Farm Demonstrator, L. F. Merrill.	....	No
Middlesex Co. Farm Demonstrator, I. L. Owen, Sup't.	No Expression	
Essex Co. Board of Agriculture, Geo. P. F. Millar, Sec'y.	No Expression	
E. B. Vorhees Agricultural Society, J. H. Hankinson, President.	No Expression	
Monmouth Co. Board of Agriculture, C. H. Brewer, Sec'y.	No Expression	
	No Expression	

	Yes	No	
Total	49	11	11