

RAILWAY ACCIDENTS

Legislation and Statistics
1825 to 1924

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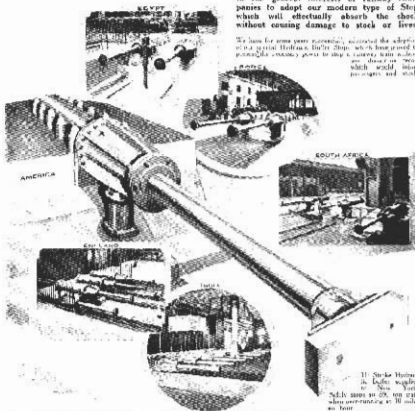
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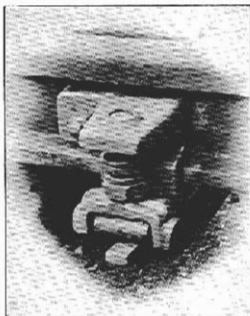
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PREFACE

IT is fitting that in the year that sees the hundredth anniversary of the opening of the first railway over which the public was conveyed by locomotive power a tribute should be borne to those who have made railway travel in this country so remarkably safe. The tale told herein will clearly reveal the debt the travelling public owes to, in part, the splendid service of the men employed on the railways; in part, to the manner in which the Government inspecting officers of railways have performed the duties placed upon them by Parliament and, in part, to the inventors and makers of safety appliances and railway equipment.

It is difficult to convey to the lay mind the immensity of the freedom from accident that British railways enjoy. There is nothing by which it can be judged. Perhaps the chances of meeting with an accident may give some idea of the smallness of the risk run. Therefore, let it be noted that it is estimated that, during the five years 1920-1924, 9,314 million journeys were made and the proportion of passengers killed in train accidents was 1 in 166 millions, and of those injured, 1 in 3½ millions. That, though, is not the true criterion of safety. That is to be found in the number of accidents, great and small, and with and without personal injuries. During those five years the passenger trains ran 1,176 million miles and there was one collision, in which a passenger train was concerned, for every 3½ million miles run, and one passenger train derailment for every 4 million miles. Such was not always the case. Forty years ago, when the passenger mileage was 148 millions a year, as compared with 255 millions a year now, there was a collision for every 1½ million miles and a derailment for every 2½ million miles. How the present greater perfection has been reached is told in the chapter on Legislation and the steady ascent towards the comparative freedom from mishap is seen in the tables which follow.

The chapter on Legislation will, it is hoped, be instructive in many respects. It will come as a surprise to most readers to know that, despite the harsh treatment railways have always received at the hands of the State, Parliament always left their administration severely alone and never interfered with it. The Board of Trade was given certain powers but, proportionate to the importance of the safety of the travelling public, those powers were very feeble and not until 1889, when two thirds of the hundred years of public railways had passed, were powers obtained to compel British railways to install certain safeguards, which hitherto had only been requisite on new railways. It is only right that it should be added that by that time those safeguards were almost universal. Nevertheless, it must be admitted that such a state had only slowly and very reluctantly been reached. The Board of Trade, as already indicated, was almost powerless, but the inspecting officers were given a strong weapon in the publication, under the Act of 1871, of their reports on accidents and by the general annual reports of the chief inspecting officer. Those frequently made very disagreeable reading and public opinion was thereby influenced. Obdurate general managers, chairmen and boards of directors were thus compelled to listen to the advice of their operating officers and to adopt the block system and the concentration and interlocking of points and signals. Later, came continuous brakes for passenger trains. With the use of all these safeguards, together with the efforts of engineers to take advantage of every mechanical improvement used in the upkeep of the track and rolling-stock, those unnecessarily bad records have been bettered to a degree that, considering the liability of all to err, can hardly, in the author's considered opinion, further be improved.

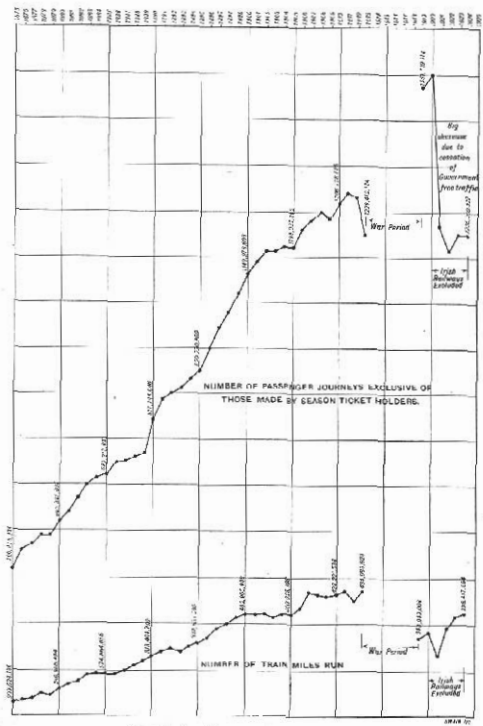


CHART I.—TWO FACTORS TO BE REMEMBERED.

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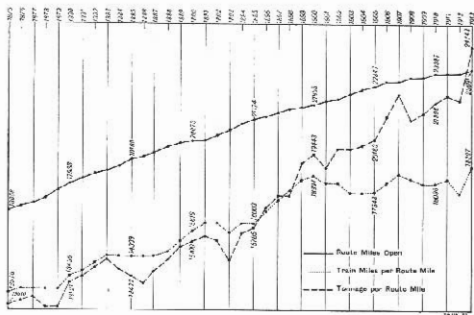


CHART II. TRAFFIC DENSITY.

The above chart is instructive in many ways. Its main purpose is to show the traffic density. As the greater is the traffic density so, in a sense, the greater is the danger. That is a condition to be borne in mind when the tables that appear herein are considered. The chart is instructive also in showing that the tonnage carried increased in a greater proportion than did the length of the railway. Thereby it is seen that the additional mileage opened was more than justified. The train mileage results must be read with the number of passenger journeys shown in Chart I. Taking the number of passengers and tonnage combined they are gratifying as proving that more powerful locomotives, together with wagons of a higher capacity, led to the train mileage increasing less proportionately than did the extensions of the railway and than the amount of business to be carried.

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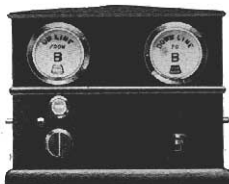
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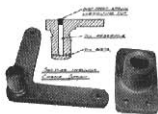
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SYNOPSIS AND INDEX OF CHAPTERS I, II, AND III.

(a) Signifies the left-hand column.

(b) Signifies the right-hand column.

Acts of Parliament.—Regulation of Railways, 3 & 4 Vic. c. 97 (1840), 3 (b). Regulation of Railways, 5 & 6 Vic. c. 55 (1842), 8 (a). Regulation of Railways (Gladstone's Act), 7 & 8 Vic. c. 85 (1844) 7 (b). Offences against the Person, 24 & 25 Vic. c. 100 (1861) 4 (a). Regulation of Railways, 31 & 32 Vic. c. 119 (1868) 9 (b). Regulation of Railways, 34 & 35 Vic. c. 78 (1871) 12 (b). Railway Regulation (Return of Signal Arrangements, Working, etc.), 36 & 37 Vic. c. 76 (1873), 16 (a). Railway Returns (Continuous Brakes), 41 & 42 Vic. c. 20 (1878), 17 (a). Regulation of Railways, 52 & 53 Vic. c. 57 (1889), 18 (a). Railway Regulation, 56 & 57 Vic. c. 29 (1893), 18 (b). Railway Employment (Prevention of Accidents), 63 & 64 Vic. c. 27 (1900), 13 (a), 18 (b).

Administration of Railways.—Not to be interfered with by the Board of Trade, 3 (a), 5 (a), 9 (a). Royal Commission of 1885 said that Parliament had proceeded on the principle of leaving the companies alone; mentioned some of the difficulties in the way of Government interference, 10 (a); instanced the confusion as to the respective responsibility of the railways, the Government and the passenger over the provision and use of passenger communication, 11 (a). Captain Tyler told the Select Committee of 1870 that if the Board of Trade were to interfere with the details of the movement of the railways it should take them upon its own hands and manage them, 12 (b). Laing, as chairman of the London, Brighton and South Coast, replied to the Board of Trade circular of November 18th, 1873—see Board of Trade—and pointed out the difficulties that would face the Government if it departed from its then policy of supervision, 15 (b). Royal Commission of 1874 confirmed the opinions, quoted above, of that of 1865, and was opposed to Government interference with railway administration, 17 (a). Minute of July 18th, 1880, of the Board of Trade, arising out of the failure of the Tay Bridge, pointed out the undesirability of the Board of Trade interfering with railway administration, 17 (b).

Administrative officers (Directors and).—Because of their neglect to order safety appliances, from their lack of discipline, imperfect regulations, etc., have been responsible for more accidents than the men have, 1 (a), 11 (b), 14 (b), 29 (a).

Armagh disaster of June 12th, 1889.—Led to the Regulation of Railways Act, 52 & 53 Vic. c. 57 (1889), as to the compulsory use on passenger lines of the block system, the concentration and interlocking of points and signals; an automatic continuous brake on passenger trains and allowed the Board of Trade to call for returns as to hours of duty—see HOURS OF DUTY, 18 (a).

Automatic train control.—Could be made the subject of an Order by the Board of Trade under the Railway Employment (Prevention of Accidents) Act, 63 & 64 Vic. c. 27 (1900), 18 (b).

Block system.—Circular from the Board of Trade to the railway companies in 1868 pointed out the grave responsibility resting upon railway directors if, without sufficient reason, they refrained from adopting the block system, 12 (a). Progress in the provision of the block system shown in the Return of Signal Arrangements—see—16 (a). The block system made compulsory on passenger lines by the Regulation of Railways Act, 52 & 53 Vic. c. 57 (1889), 18 (a).

Board of Trade.—Control over the railways recommended by the Select Committee of 1839 on Railway Communications, but there should be no interference with railway administration, 3 (a); should be empowered to inspect any railway and to have a month's notice of the opening of any new railway, 3 (a). Further powers recommended by the officers of the Railway Department (1840), including a supervision over railways to ensure the

brought in (1841) for such further powers, and referred to a Select Committee, who found that the existing power of supervision worked well, and recommended that discretionary power be not given, 7 (a). James Booth gave evidence before the Select Committee of 1852 as to the powers of the Board of Trade, 8 (b). Captain Douglas Galton was very emphatic before the Select Committee of 1857 as to the Board of Trade interfering with the administration, 9 (a). Select Committee of 1857 considered that the Board of Trade should have the fullest powers to investigate and report upon any accident, 9 (b). Action taken by the Board of Trade as to the cord system of passenger communication, 10 (a). Royal Commission of 1865 pointed out some of the difficulties in the way of Government interference with the railways, 10 (b). Circular sent in 1868 to the railway companies as to the grave responsibility that would rest upon railway directors if, without sufficient reason, they refrained from adopting the block system, 12 (a). Colonel Yolland told the Select Committee of 1870 that the Board of Trade should have power to enforce its recommendations, as the companies declined to act or procrastinated, 12 (b). Captain Tyler, on the other hand, told the same committee that if the Board of Trade interfered in the details of management it should take the railways altogether upon its own hands and manage them, 12 (b). Powers as to inspection of new railways were extended to new works by the Regulation of Railways Act, 34 & 35 Vic. c. 78 (1871), 12 (b); class of accident to be reported extended, 13 (a); Order of the Board of Trade of November 1st, 1871, as to what had to be reported, 13 (b). Order extended on November 14th, 1874, 13 (b); on October 31st, 1895, 14 (a); on December 21st, 1906, 14 (a), and on December 18th, 1913, 14 (b). Board of Trade sent out a circular on November 18th, 1873, with a copy of Captain Tyler's report for 1872, in which was pointed out the grave responsibility resting on railway companies of finding appropriate remedies for the then great evil of the insecurity of railway travelling; referred also to the want of punctuality and to the lamentable number of casualties, often fatal, among railway servants, 14 (b). Laing, now (1873) chairman of the London, Brighton and South Coast, replied to the circular just referred to and pointed out the difficulties that would face the Government if it departed from its policy of supervision, 15 (b). Royal Commission of 1874 was opposed to any change which would relieve the companies from the responsibilities then resting on them, 17 (a). Great power given to the Board of Trade by the Railway Employment (Prevention of Accidents) Act, 63 & 64 Vic. c. 27 (1900); automatic train control could be made the subject of an Order thereunder, 18 (b). Further Order as to reporting failures of equipment, December 18th, 1913, 14 (b).

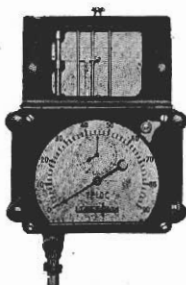
Board of Trade inspecting officers.—A tribute to their good work, 1 (b). The good effect of their reports, 2 (a). The Select Committee of 1839 recommended powers to inspect any railway, 3 (b). The Railway Department (1840) asked for powers to enforce recommendations, 4 (a); commented upon the responsibility of inspecting officers as to the character of the works of the new railways they inspected, 5 (a). Sir Frederick Smith said (1841) that their recommendations had, sooner or later, been adopted, 6 (a). James Booth reported (1852) a disposition to adopt the recommendations, but thought the Board of Trade should have power to enforce the same, 8 (b). Board of Trade inspectors were opposed to the cord system of passenger communication sanctioned by the Board of Trade (1869), 10 (a). Colonel Yolland and Captain Tyler told the Select Committee of 1870 that accident inquiries should be legalised—see INQUIRIES—whilst the latter

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should at once be published, as public opinion would then influence the companies, 12 (b). The Act of 1871 and the inspecting officers' right of entry on to the railway, 13 (a). The late Mr. Frank Potter's opinion on that point, 12 (b). Holding of inquiries legalised by the Act of 1871, 13 (a). Assessors may be appointed, 13 (b). Assessors now only sit on boiler explosion inquiries, 13 (b). Procedure as to accident reports laid down, 13 (b). Responsibility of inspecting officers for design and construction arose out of the failure of the Tay Bridge on December 28th, 1879; minute of July 15th, 1880, of the Board of Trade on that point, 17 (b). Procedure adopted at accident inquiries, 18 (b). The inspecting officer is the sole authority as to the procedure at accident inquiries, 18 (b). *See also Inquiries, Railways (New) and Reports (Accident).*

Brakes (Continuous). The Newark brake trials of June, 1875, were conducted by the Royal Commission of 1874, 16 (b). Returns, as to the number of engines and vehicles fitted each half-year, the mileage run, and the number of failures, ordered by the Railway Returns (Continuous Brakes) Act, 41 & 42 Vic. c. 20 (1878), 17 (a). The Armagh disaster of June 12th, 1889, showed the necessity for continuous brakes to be automatic in their action, 18 (a). Automatic continuous brakes for passenger trains made compulsory by the Regulation of Railways Act, 52 & 53 Vic. c. 57 (1889), 18 (b). The introduction of continuous brakes led to an increase in buffer stop collisions, 20 (a).

Brunel (Isambard Kingdom) was opposed to Government dictation, 6 (b). The present author questions Brunel's fitness to offer impartial judgment, 6 (b). Brunel's irregular action on the Bristol and Gloucester Railway, 6 (b). Was opposed to printed rules and regarded it as no qualification that a man could read, 6 (b).

Commission (Royal) of 1865.—Urged passenger communication, 9 (b). Said that Parliament had proceeded on the principle of not directing the active operations of the railways, 10 (a). Observed that the only interference was to see that the opening of new railways would not be attended with danger to the public, 10 (a). Mentioned some of the difficulties in the way of Government interference, 10 (b). Quoted the conclusions of the 1852 Select Committee—*see*—and said that with the greater comparative safety there was no need to do anything, 12 (a).

Commission (Royal) of 1874.—Conducted the Newark brake trials, 16 (b). The report was signed by only four of its nine members, 16 (b). Was opposed to Government interference with railway administration, 16 (b).

Committee (Departmental) of 1894.—Appointed to secure greater uniformity in reporting accidents, as apparently all non-fatal cases were not being reported, 14 (a). Made some important recommendations as to accidents to railway servants, 14 (a). Standardised the quarterly and annual returns, 14 (a).

Committee (Select) of 1839.—On Railway Communication, recommended a Board of Control, but it was not to interfere with railway administration, 3 (a); that it should have power to inspect any railway, and that a month's notice be given of the opening of any new railway, 3 (a). Stated that comparatively few railway accidents had occurred, 3 (b).

Committee (Select) of 1841.—Considered a Bill for giving effect to the recommendations of the Railway Department (1840)—*see* BOARD OF TRADE— but found that the existing powers of supervision worked well and recommended that discretionary power be not given, 7 (a).

Committee (Select) of 1852.—On amalgamation of railways and canals, 8 (b). James Booth, of the Board of Trade, said they had no powers to hold inquiries; railway companies, however, rendered every assistance, and no inconvenience had been experienced, 8 (b). Every company should have an officer responsible for each department in case of negligence, 8 (b). Thought maintenance of track and equipment was governed by the dividends; con-

siderations of safety should not yield to economy, 9 (a). Officials should be appointed whose reports could not be disregarded by the directors and whose demands the shareholders could not dispute, 9 (a). Commission (Royal) of 1885—*see*—quoted the opinions of the Select Committee of 1852, and said that the greater comparative safety (in 1885) rendered any such action unnecessary, 12 (a).

Committee (Select) of 1857 on Railway Accidents, 9 (a). Captain Douglas Galton's emphatic opinion as to interfering with railway administration, 9 (a). The Committee considered that the cost to the companies of accidents was the best remedy against them, 9 (b). The Board of Trade should have the fullest power to investigate and report to Parliament upon any accident, 9 (b). Urged passenger communication, 9 (b).

Committee (Select) of 1866.—On a Bill for ordering passenger communication, recommended that its consideration be postponed in the hope that the companies would voluntarily provide it, 9 (b).

Committee (Select) of 1870.—As to excessive damages awarded by juries, 12 (a). Colonel Yolland and Captain Tyler gave evidence and, in some respects, opposing views, 12 (b). Yolland wanted more power for the Board of Trade; quoted the supervision over emigrant ships; accused the companies of declining to act or procrastinating, 12 (b). Tyler thought that if the Board of Trade were to interfere with railways it should take them altogether upon its own hands and manage them, 12 (b). Both officers thought that the holding of inquiries—*see*—should be legalised, 12 (b).

Committee (Select) of 1873.—Considered Earl de la Warr's Regulation of Railways (Prevention of Accidents) Bill, 15 (b). Pointed out the disadvantages of making certain safeguards compulsory; if those alone were provided others, equally important but not compulsory, would be neglected, 16 (a). Relying on the great exertions made by the companies, recommended that the Bill be not proceeded with, but that the Board of Trade should call for returns as to progress made—*see* RETURNS OF SIGNALS ARRANGEMENTS—16 (a).

Concentration of points and signals.—Progress shown in the Returns of Signal Arrangements—*see*—ordered by the Railway Regulation (Return of Signal Arrangements, Working, etc.) Act, 36 & 37 Vic. c. 76 (1873), 16 (a); made compulsory by the Regulation of Railways Act, 52 & 53 Vic. c. 57 (1889), 18 (a).

Couplings (Failure of).—The big increase in the number reported was due to the Order of December 21st, 1906, which specifically laid down that all cases of trains—passenger and freight—becoming divided whilst running should be reported, 14 (b). Further Order of December 18th, 1913, led to a still bigger increase—from about 2,000 in 11,000 a year—as divisions of trains, when stopping or starting, had to be reported, 14 (b).

Cost (The) of accidents to the companies was the best remedy against their occurrence, 9 (b), 12 (a).

Criminal proceedings against railway servants for culpable negligence was sanctioned by the Acts of 1840 and 1842 and by the Offences against the Person Act (1861), 3 (b), 4 (a).

Directors and administrative officers.—Because of their neglect to order safety appliances, from their lack of discipline, imperfect regulations, insufficient equipment, etc., have been responsible for more accidents than the men have, 1 (a), 11 (b), 14 (b), 29 (a).

Equipment (Failures of).—Order of November 1st, 1871, specified what had to be reported, 13 (b); enlarged on November 14th, 1874, 13 (b); again on October 31st, 1895, 14 (a); and on December 21st, 1906, and yet further on December 18th, 1913, 14 (b). The apparent increase after 1906 was due to the Order of December 21st, 1906, 20 (b). Gratifying reduction in 1924, 25 (a).

Fatal train accidents (Number of) is the test usually applied by the general public, but it is not the true criterion, 1 (a). Only 76 during the last

25 years or an average of 3 per annum, 1 (a). Table III gives the figures of the passengers and servants killed therein since 1850, 25 (a). The worst five-year period was 1870-74, 25 (b). Other bad five-year periods, 25 (b). The best on record was 1920-24, 25 (b). In the 15 years, 1870-84, nearly 350 servants were killed in train accidents, 25 (b). List of all train accidents since 1825 in which passengers have been killed given in Table IX, 29 (b).

Galton (Captain Douglas) was very emphatic before the Committee (select) of 1857—see—as to the Board of Trade not interfering with the administration of railways, 9 (a).

Gladstone (W. E.) at the Board of Trade, 7 (b). His Act of 1844 was not antagonistic to the railways; it did not, as is generally supposed, sanction State purchase, but only laid down the terms if, and when, Parliament should so determine, 7 (b).

Great Western Railway.—Figures as to the number of failures reported, questioned; the author concludes that the returns are correct, and that the contrast with other companies' figures is due to better upkeep on the Great Western, 25 (a).

Grouping of the railways led, in Colonel Sir John Pringle's opinion, to a more comprehensive system of reporting accidents, and resulted in an increase which was apparent rather than real, 25 (a).

Hours of Duty.—Returns as to hours of duty might be called for by the Board of Trade under the Regulation of Railways Act, 52 & 53 Vic. c. 57 (1889), 18 (b). Further powers given by the Railway Regulations Act, 56 & 57 Vic. c. 29 (1893), 18 (b).

Human Element (The) is less the cause for accidents than the neglect of directors and administrative officers to order safety appliances, their lack of discipline, imperfect regulations, insufficient equipment, etc., 1 (a), 11 (b), 14 (b), 29 (b).

Hutchinson (Major-General C. S.)—The minute of July 15th, 1880, after the failure of the Tay Bridge, which had been inspected by him, expressed the confidence of the Board of Trade in that officer, 17 (b).

Inquiries into accidents were held from 1840 onwards, although there was no legislative authority for them until the Act of 1871, 8 (a). The first was into a derailment at Howden on August 7th, 1840, 8 (b). The Committee (select) of 1852—see—was told that the railway companies rendered every assistance, although the inquiries were not legal, and that no difficulty had been experienced, 8 (b). Colonel Yolland and Captain Tyler told the Committee (select) of 1870—see—that the holding of inquiries should be legalised, 12 (b). They were authorised by the Regulation of Railways Act, 34 & 35 Vic. c. 78 (1871), 13 (a). Procedure as to inquiries to-day, 18 (b). Men's representatives attend, 19 (a). Inquiries held in public except where criminal proceedings are possible, 19 (a). Inspecting officer is the sole authority to determine procedure, 19 (a). Number of inquiries held 1871-1908, given in Table IV, 25 (b), and their causes or contributory causes in Table V, 25 (b). Number of inquiries 1909-24, given in Table VI, 28 (b), and the causes of those 1919-24 in Table VII, 29 (a). The primary causes of the 2,707 accidents inquired into, 1875-1924, are given in Table VIII under a method devised by the present author which consists of over 300 sub-headings and divided into five-year periods, 29 (a).

Interlocking of Points and Signals.—Progress shown in the Returns of Signal Arrangements—see—ordered by the Railway Regulation (Return of Signal Arrangements, Working, etc.), Act, 36 & 37 Vic. c. 76 (1873), 16 (a); made compulsory by Regulation of Railways Act, 52 & 53 Vic. c. 57 (1889), 18 (a).

Laing (Samuel).—The first law clerk of the Railway Department (1840), 4 (a). Reported on the Act of 1840, and asked for further powers; recommended a supervision by the Board of Trade over railways to ensure the enforcement of rules and regulations, 4 (a). By 1873 was the chairman of the London, Brighton and South Coast, and replied to the Board of Trade on the 18th of November, 18th of that year—see Board

OF TRADE—and pointed out the difficulties that would face the Government if it departed from its policy of supervision, 15 (b).

Lancashire and Yorkshire Railway had legal proceedings taken against it in 1873 for failing to report accidents to railway servants, 16 (a).

Mileage (Route).—Open 1875-1913, Chart II.

Mileage (Train).—1875-1924, Chart I; per route mile, 1875-1913, Chart II.

Officers (Railway).—A tribute to the railway officers of former days who were more far-seeing than their chiefs, 1 (b).

Officers (Responsible) were, it was recommended by the Committee (select) of 1852—see—to be appointed by each company so that, in case of negligence, it would be known on whom to place the responsibility, 8 (b); responsible officers were also to be appointed whose reports could not be disregarded by directors and whose demands could not be disputed by shareholders, 9 (a).

Orders of the Board of Trade of November 1st, 1871, 13 (b), of November 14th, 1874, 13 (b), of October 31st, 1895, 14 (a), of December 21st, 1906, 14 (a), of December 18th, 1913, 14 (b). The Order of 1871 led to a large increase in the number of accidents reported, 20 (a); that of 1906 to a larger number of failures of equipment, 20 (b), and those of 1906 and 1913 to considerably more failures of couplings, 20 (b).

Passenger communication between passengers and servants in charge of the train. Asked for by the Committee (select) of 1857, 9 (b), and by Commission (Royal) of 1865, 9 (b). Bill considered by Select Committee of 1866, but decision postponed, 9 (b). Ordered by Regulation of Railways Act, 31 & 32 Vic. c. 119 (1868), 9 (b). Cord method approved by the Board of Trade in 1869 on the assurance of the companies but in face of the opposition of the inspecting officers' sanction, though, withdrawn in 1873; continuous brake system sanctioned 1890; approved 1893; investigated by departmental committee 1897; cord system condemned 1898; brake system adopted 1899, 10 (a).

Passenger Journeys (Number of) 1875-1924, Chart 1.

Porter (G. R.), was author of "The Progress of the Nation," and was one of the first officers of the Railway Department (1840), 4 (a). Reported on the Act of 1840, and asked for further powers; recommended a supervision by the Board of Trade over railways to ensure the enforcement of rules and regulations, 4 (a).

Pringle (Colonel Sir John), is the present chief inspecting officer, 19 (b). Compiles annual reports which are concise and complete, 19 (b). Was of opinion that the grouping of the railways led to a more comprehensive system of reporting accidents which resulted in an increase which was apparent more than real, 25 (a).

Rails (Broken).—In any consideration of the number of failures of rails the continuously increasing traffic and axle-load must be remembered, 20 (b).

Railway Department (1840) was the branch of the Board of Trade established in 1840 as a result of the Regulation of Railways Act, 3 & 4 Vic. c. 97, 4 (a). Its first officers were G. R. Porter, Sir Frederick Smith and Samuel Laing, 4 (a)—see BOARD OF TRADE.

Railway Employment (Prevention of Accidents) Act, 63 & 64 Vic. c. 27, 1900, reaffirmed the right of entry—see BOARD OF TRADE INSPECTING OFFICERS—if it had been withdrawn by the Act of 1871, 13 (a). Automatic train control could be made the subject of an Order by the Board of Trade under that Act, 18 (b).

Railways (British) serve their patrons well, especially as to their safety, 1 (a).

Railways (New).—The Select Committee of 1839 recommended that the Board of Trade have power to inspect any railway, and that no new railway be opened until after a month's notice to the Board of Trade, 3 (a). Under the Act of 1840 all new railways

had to be inspected by the Board of Trade before opening, 3 (b). Officers of the Railway Department (1840)—see—recommended that improved notices, as to new railways awaiting inspection, be given, and that the opening should be postponed if not considered safe for public traffic, 4 (a). Power as to inspection enlarged by the Act of 1842, 8 (a). The first inspection was the Bath and Bristol, on August 31st, 1840, 8 (b). The Act of 1871 extended the authority to inspect to "any additional line of railway, deviation line, station, junction or crossing on the level which forms a portion of or is directly connected with a railway on which passengers are conveyed" 13 (a).

Recommendations of the inspecting officers had, said Sir Frederick Smith to the Select Committee of 1841—see—sooner or later been accepted, 6 (a). Lord Ripon said (1842) that the companies had shown themselves most ready to adopt a recommendation, whatever might be their opinion as to its propriety, 8 (a). James Hooth told the Select Committee of 1852—see—that there was a disposition to adopt any recommendations, but he thought the Board of Trade should have power to enforce them, 8 (b).

Records (Accident).—Not always as satisfactory as now; the peak point was reached 50 years ago; comparative safety came with the beginning of the century, 1 (a).

Reports (Accident).—Were not at first made public except annually, 8 (b). Captain Tyler told the Committee (Select) of 1870—see—that they should at once be published, as public opinion would influence the companies, 12 (b). Procedure as to publication laid down in Act of 1871, 13 (b). Evidence first given in the reports in 1877, 19 (b). War time economy in stationery led to evidence not being published, 19 (b). Reports issued quarterly as "command papers"; now as Stationery Office publications, 19 (b).

Reports (Annual Accident).—Commenced by Captain Tyler with that on the figures of 1870, 14 (b). Those of the present day, 19 (b).

Returns (Continuous brake).—Ordered by the Railway Returns (Continuous Brakes) Act, 41 & 42 Vic. c. 20, 1878, 17 (a). Ceased in 1904, 17 (b).

Returns of Accidents.—Officers of the Railway Department (1840)—see—recommended that other accidents than those attended with personal injury—all that was required under the Act of 1840—should be reported, 4 (a). Under the Act of 1842 all serious accidents, whether attended with serious injury or not, to be reported, 8 (a). The class of accident to be reported considerably enlarged by the Act of 1871, 13 (a). Order of November 1st, 1871, of the Board of Trade as to what had to be reported, 13 (b); extended by the Order of November 14th, 1874, 13 (b). Greater uniformity in reporting accidents being desired, a Departmental Committee investigated the matter in 1894, 14 (a); the quarterly and annual returns were revised by that Committee, 14 (a). Further Order issued December 21st, 1906, 14 (a), and another on December 18th, 1913, 14 (b). All reports of accidents go before the chief inspecting officer, who determines which shall be inquired into; some are followed up by correspondence, 18 (b). The total number of accidents, in five-year periods, reported between 1871 and 1924 shown in Table I, 20 (a). The figures for 1921-24 given in greater detail in Table II, 20 (b). The remarkable figures for the 1921-24 period, 25 (b).

Returns of Accidents (Annual) were improved when the grouping of the railways and the exclusion of the Irish railways placed greater space at the disposal of the Ministry of Transport, 20 (b).

Returns of Signal Arrangements.—Recommended by the Committee (Select) of 1873—see—15 (b). Ordered by the Railway Regulations (Returns of Signal Arrangements, Working, etc.) Act, 36 & 37 Vic. c. 76 (1873), and showed the progress in the block system, concentration and interlocking of points and signals, and the provision of safety points, 16 (a). Ceased in 1897, 16 (a).

Rules.—Railway companies, apparently frightened by the desire of the Railway Department (1840)—see—

to secure greater power, called a meeting of chairmen and chief officers in Birmingham on January 19th, 1841, to consider a standard code of rules; resolutions were passed, but after the Committee (Select) of 1841—see—had reported that no change was necessary, no more was heard of a standard code of rules, 7 (b).

Safety appliances.—A tribute to the designers and makers of safety appliances, 2 (a).

Safety (Considerations of) should not yield to economy in order to maintain dividends, 9 (a).

Safety (Measure of) determined by the number of accidents and not of the resultant casualties, 1 (a).

Safety points.—Progress in the provision of safety points in connections leading to passenger lines shown in the Returns of Signal Arrangements—see—16 (a).

Servants (Railway).—A tribute to their good work, 1 (b). How handicapped in the past, 1 (b). Criminal proceedings for negligence, 3 (b). The lamentable number of casualties to railway servants referred to in Board of Trade circular of November 18th, 1873—see BOARD OF TRADE, 15 (a). Lancashire and Yorkshire Railway Company proceeded against in 1873 for not reporting accidents to railway servants, 16 (a). Present work does not cover accidents to railway servants, 18 (b). All non-fatal accidents to railway servants, not apparently being reported, led to the Committee (Departmental) of 1894—see—14 (a). Railway Employment (Prevention of Accidents) Act, 63 & 64 Vic. c. 27 (1900), 18 (b). Representatives of railway servants concerned in accidents attend the inquiry therein by the inspecting officer, 19 (a). Nearly 350 servants killed in train accidents in the 15 year period 1870-84, 25 (b). See also HOURS OF DUTY.

Smith (Colonel Sir Frederick) was the first chief inspecting officer (1840), 4 (a). Reported on the Act of 1840 and asked (1841) for further powers; recommended a supervision by the Board of Trade over railways to ensure the enforcement of rules and regulations, 4 (a). Gave evidence before the Committee (Select) of 1841—see; would vest discretionary power in inspecting officers, who were, however, to be careful what they recommended; the supervising authority would spread knowledge among those companies "where the least intelligence was being displayed"; recommendations of inspecting officers had, sooner or later, been adopted, 6 (a).

Tay Bridge (Failure of the), on December 28th, 1879, raised the question of the responsibility of the inspecting officer for design, construction, etc.; minute made by the Board of Trade on July 15th, 1880, dealt with the undesirability of the Board of Trade interfering with railways, 17 (b).

Tonnage per route mile 1875-1913. Chart II.

Truck (Failures of).—Board of Trade Order of November 1st, 1871, specified what had to be reported, 13 (b); enlarged on November 14th, 1874, 14 (a); on October 31st, 1895, 14 (a), and on December 21st, 1906, 14 (a). Gratifying reduction in 1924, 25 (a).

Tyler (Captain, afterwards Sir, Henry) was the chief inspecting officer in the seventies. Told the Select Committee of 1870—see—that if the Board of Trade were to interfere with the details of the management of the railways it should take them upon its own hands and manage them, 12 (b); thought that the holding of inquiries—see INQUIRIES—should be legalised and that the reports should at once be published, as public opinion would influence the companies, 12 (b). Prepared the first annual report with the figures for 1870, 14 (b). Copy of his report for 1872 sent with the Board of Trade circular of November 18th, 1873, to every railway company—see BOARD OF TRADE, 14 (b).

Yolland (Colonel W.) was one of the inspecting officers. His views, as expressed to the Select Committee of 1870—see—differed from those of Captain Tyler—see; thought that the Board of Trade should have power to enforce its recommendations, as the companies declined to make changes or procrastinated; thought that the holding of inquiries—see INQUIRIES—should be legalised, 12 (b).

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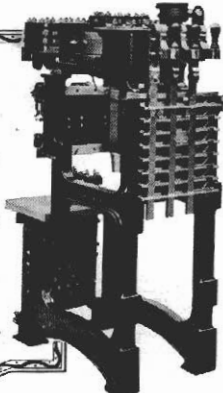
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CHAPTER I.

The Purpose of the Work.

THE present work is intended for the information and encouragement of railwaymen. Though the subject is one that vitally affects nearly every member of the general public, few outside the railway world have any idea how remarkably safe is travel by rail in this country. In many directions British railway companies serve their patrons well. In no way, though, is this excellent service shown more than in the comparative freedom from accident. All who journey by train are so accustomed to do so with safety that they are unconscious of the imminent dangers that would accompany their journeys but for the care and ability with which train movements are conducted and controlled. That has ever characterised British railway operation, but not always with success. As the traffic grew, so—as the present pages show—did the number of accidents increase. It will, however, come as a revelation to most to learn that, as shown herein, the peak point in accidents was reached 50 years ago. Equally surprising will it be to see that the period of comparative safety came in as long ago as the beginning of the present century. In the author's various contributions on this subject he has always maintained that the measure of risk run is the number of accidents and not that of the resultant casualties. In his view a collision, or a derailment, that leads to no injuries is as much to be avoided and safeguarded against as the more serious ones. To the general public it is natural that the record of fatal train accidents should appeal more, and so it may be a source of satisfaction to such to know that during the last 25 years the number of train accidents in which passengers have lost their lives has been only 76, or an average of three a year.

The opinion very widely prevails that most accidents are caused by errors of the men. The pages which follow show that such is not the case—that a large proportion of the mishaps have been due to causes for which the men could not be held responsible. As a matter of fact, to-day, the so-called failures of the human element are fewer than those wherein the managements have themselves been at fault, and it is a question whether the latter has not always been the case. The record of 40 to 50 years ago, which now appears to us so terrible a tale of destruction, was less due to the sins of omission and commission of the men than to the neglect of the companies to provide safeguards that were available and the utility of which could not be denied. One of the most remarkable facts that the present work will reveal is the great reduction in the number of collisions and derailments during

the last five years. The adoption of track circuit, advocated by the author 27 years ago, must have led to a reduction in the number of collisions, but not to the extent shown in Table I. Certain it is that no new departure has been made that would account for the reduction in derailments. It must, therefore, be the splendid efforts of the men that have brought about this remarkably satisfactory result.

So strongly does the author feel on the point just named that were the dedication of books still the fashion he would delight to associate this work with the labours of the millions of British railwaymen, present and past. Day in, day out, in all sorts of weather and often under discouraging conditions, have they, with wonderful success, performed the critical and dangerous duties committed to them. In former days those duties were more arduous than now, as the hours were long, trains had no continuous brakes, there was little block or interlocking and the signalling was primitive. To drivers and signalmen, in particular, are thanks due but, in other ranks are men to whom a debt is owing—the lesser known men like the signal fitter, the telegraph linesman, the carriage and wagon examiner and the handyman of the railway service—the platelayer—whose title, older than the locomotive, is, by the way, likely to be lost in that of "underman."

A word of gratitude must also be said in memory of those officers—mostly men of the rank of inspector but, occasionally, superintendents and, even, engineers—who had a greater vision than their chiefs. Those men saw the possibilities of the block, of signalling and of continuous brakes. They acknowledged that the provision of such would be costly but, more far-seeing than their general managers and directors, recognised that the traffic would be carried more safely and more expeditiously and, thus, that the expense was warranted. To-day, it seems incredible that such apparent ignorance should have prevailed in high places as that voiced by railway chairmen at the half-yearly meetings as recently as 40 years ago. What a contrast to the administrations of to-day!

For much of the present-day safety the travelling public is indebted to the inspecting officers of the Board of Trade. Speaking with a personal knowledge of each one since, in 1881, he met Major—afterwards Sir Francis—Marindin, he can testify to their high worth, strict impartiality, sympathy for men who have made errors and for companies which

could not afford to do as much in the provision of safety appliances as their richer neighbours, and fearless criticisms, even for the most powerful companies. Those who have been concerned in getting railway boards to pass schemes for improvements know what the fear of a possible visit from a Board of Trade inspector has wrought and how many a plan for alterations has been passed because of a hint that, were an accident to happen, existing conditions would be condemned in the subsequent report by the inquiring officer. It was, therefore, by the continual exposure in the inspecting officers' reports that, more than anything else, led to the provision of those safeguards which brought down the peak of 50 years ago and has made British railway travel the safest in the world.

Lastly, and yet most of all, the remarkable story told in these pages is due to those men who, at their own expense, designed, introduced and improved those safeguards to which reference has just been made. In signalling there are the names of Saxby, the Stevens family, Edwards and Hodgson; in railway telegraphy there are found Tyer, Walker, Preece and Sykes; whilst in brakes, the first were two Lancashire and Yorkshire railwaymen—Fay and Newall. In the later and greater work done by Westinghouse their names are almost forgotten, and, in the glory that has deservedly come to the last-named, those who were responsible for the vacuum brake were overshadowed. As far as this country is concerned there must be named in the latter connection James Gresham, Alfred Sacré, T. G. Clayton and Mr.—now Sir John—Aspinall, whose efforts made a crude affair into its present-day success. Those descendants of the above-named pioneers who are

still in business are all dear friends of the present author, and it is in no small way due to the help they are giving him by advertising that the issue of this book has been made possible.

One final, personal, tribute must be paid by the author. The present work would not have been forthcoming but for the opportunities given him, week by week, by two men to make use of his knowledge of railway work—first begun 49 years ago on the Midland Railway at Derby. One of these two is Mr. Loughnan St. L. Pendred, the editor of *The Engineer*, who remarked that a man, with the author's knowledge of railways, ability to write, and with such ample time on his hands, would do well were he to devote his whole attention to railway technical literature and if the author would take up that work *The Engineer* would do its best to help him. Thus, by the kindness of Mr. Pendred, the author has been a regular contributor on every kind of railway subject, except locomotives and electrification, for the last 20 years. In passing, it may be observed that the cause of safety on railways has always found support in the pages of *The Engineer*. Reference to the volumes of that journal for 30 to 40 years ago, when that excellent writer, Vaughan Pendred, was the editor, will reveal many a trenchant, candid, criticism of the inaction of the railways in that direction. The other kind friend is Mr. J. A. Kay, the managing editor of *The Railway Gazette*, to whom, in the matter of railway accidents, the author has been even more indebted; as, since 1912, he has dealt with all accident reports and questions in that paper. Moreover, these gentlemen have added to their kindnesses of the past the further one of allowing the author to continue to contribute to their respective journals.

CHAPTER II.

Legislation.

THE first parliamentary inquiry to investigate railway questions in general was the select committee on Railway Communication which was appointed in April, 1839. All the witnesses that appeared before it were of the opinion that some governmental board of control for railways was necessary. The committee, therefore, in its second report, observed that a supervising authority should be exercised over all the arrangements in which the public was interested. It seemed advisable that such control should be in the hands of the executive government and that it was expedient to vest it in a board attached to the Board of Trade. On the board there should be, in addition to the President and Vice-President of the Board of Trade, one or two engineer officers of rank and experience.

That the committee thought that interference should be of the least possible is indicated by the following:—

"This board must have certain powers, confirmed by the authority of Parliament. It should not interfere with any proposed railway before the act of incorporation is passed, nor should it be authorised to control or regulate the works of any railway during their progress, except in cases where the company might apply for the opinion or sanction of the board. Your Committee are, however, inclined to recommend that no new railroad should be opened for the conveyance of passengers until an inspection had been made under the sanction of the board who, if dissatisfied with the condition and state of the railroad, should have the power of adopting legal proceedings on behalf of the public. It should possess no authority to lay down rules for the government of railway companies but should have conferred upon it a control over those regulations to which the public may be subjected by the exercise of the extensive powers now vested in such companies by their respective acts nor should any bye-laws have the force of law without the previous sanction of this board.

"All complaints on the part of the public, arising from the powers exercised by these companies, should be addressed to this board who might, in the first instance, if they should think fit, represent to the directors any danger or inconvenience arising from the state of the road or from improper arrangements on the part of the company or from misconduct on the part of their servants and, if such representations should be disregarded, might be empowered to take legal proceedings at the public expense."

In its third report the Committee went further in the matter of the inspection of new railways before opening. It said thereon:

"It is the opinion of the committee that this department should have authority to send an engineer or other person to visit and examine the works of any railway and no new railway or portion of railway should be opened for the conveyance of passengers until after a month's notice at the least has been given to this department."

The only mention made to the subject of railway accidents was in the committee's second report, and therein it was observed that "considering the great number of persons who have travelled over railroads it may be confidently stated that very few accidents have occurred and that it did not appear that the velocity of the conveyance was necessarily attended with that degree of risk which many persons, unacquainted with the new method of travelling, had anticipated."

The present author finds it necessary to make the foregoing references to other subjects than accidents in view of the fact that the legislation subsequently passed, that gave the Board of Trade certain authority over the railways, covered railway accidents and the inspection of new railways—separate parts of the one great question of safety in railway travel. The legislation in question was the Regulation of Railways Act of 1840—3 & 4 Vic., c. 97—and the only portion thereof dealing with accidents was that part of section 3 which authorised the Board of Trade to call for returns of traffic, "as well as of all accidents which shall have occurred thereon attended with personal injury." The Act also sanctioned the appointment of inspectors.

A little-known fact about the above-mentioned Act of 1840 was that section 13 said:—

"That it shall be lawful for any officer or agent of any railway company, or for any special constable duly appointed, and all such persons as they may call to their assistance, to seize and detain any engine driver, guard, porter or other servant in the employ of such company who shall be found drunk while employed upon the railway or commit any offence against any of the bye-laws, rules or regulations of such company or shall wilfully, maliciously or negligently do or omit to do any act whereby the life or limb of any person passing along or being upon the railway belonging to such company, or the works thereof respectively, shall be or might be injured or endangered, or whereby the passage of any of the engines, carriages or trains shall be or might be obstructed or imperilled . . . and every such person so offending . . . shall, when convicted . . . be imprisoned with or without hard labour, for any term not exceeding two calendar months or . . . forfeit . . . any sum not exceeding ten pounds."

By section 17 of the Act of 1842—mentioned later—the powers were extended to any wagon-driver and made to apply to persons employed “in conducting traffic upon the railway belonging to the said Company or in repairing and maintaining the works of the said railway.” There must also be read in connection with this subject section 34 of the Offences against the Person Act, 1861—24 & 25 Vic., c. 100—which said:

“Whosoever, by any unlawful act, or by any wilful omission or neglect, shall endanger or cause to be endangered the safety of any person conveyed or being in or upon a railway, or shall aid or assist therein, shall be guilty of a misdemeanour, and, being convicted thereof, shall be liable, at the discretion of the court, to be imprisoned for any term not exceeding two years, with or without labour.”

It is important to note that none of this legislation has been repealed.

The first three officers of the Railway Department were G. R. Porter the writer of “The Progress of the Nation.”—Sir Frederick Smith, the chief inspecting officer of railways, and S. Laing, who, later, left the Board of Trade to be the chairman of the London, Brighton and South Coast Railway. On January 25th, 1841, those gentlemen, in accordance with instructions, reported to the Board of Trade upon the measures necessary to give efficiency to the supervision of railways vested in the Board of Trade. Some of the remarks made in the report were as follows:—

“The powers given to the Board of Trade by the 3 & 4 Vic., c. 97, are totally inadequate to enable it to carry into effect the measures which from the evidence above stated appear indispensable for the public safety. The only powers given by the Act which have any reference to the protection of the public safety are the following:—

“1st.—A power of requiring returns of all accidents attended with personal injury be made within 30 days from the date of the requisition; 3 and 4 Vic., c. 97, s. 3.

“2nd.—A power of appointing inspectors to enter upon and examine any railway and the station, works, buildings, engines and carriages belonging thereto; s. 5.

“3rd.—A power of directing prosecutions in any case in which it shall appear that any of the provisions of Railway Acts have not been complied with, and that it would be for the public advantage to enforce their performance; s. 11.

“The power of requiring returns is evidently insufficient even for the limited purpose of obtaining information of accidents which have occurred. The period of 30 days given by the Act for making the return is alone sufficient to render it inoperative, and the limitation to accidents ATTENDED WITH PERSONAL INJURY is very objectionable, as accidents unattended with personal

injury may be equally important as throwing light on the causes of danger, and the means of prevention, and may occasion serious inconvenience by interrupting the public traffic. For the still more important purpose of enabling the Board of Trade to obtain the information respecting regulations, signals, time tables, and other details of management upon different railways which is indispensable with a view to any effective supervision for the prevention of accidents, the Act does not attempt to provide, and by expressly defining the returns which the Board is empowered to call for, excludes by implication, all which are not enumerated in the Act.

“Whatever information upon these essential points we have been enabled to obtain, we owe to the courtesy of individual companies and their officers, a resource upon which it would be obviously unsuitable for a Government department to depend, the more especially as the temptation to concealment is strongest in those cases in which it is most essential to obtain information.

“The Select Committee on Railways having in their Report expressly recommended ‘that the Board of Trade should have the power of calling for any returns, financial or statistical, which it should consider necessary for its duty,’ it is surely not too much to ask to be intrusted with the requisite powers of obtaining the information which is indispensable for the discharge of the most arduous and important of our duty, viz., providing for the public safety.

“We accordingly recommend that in any Act which may be introduced in the course of the approaching session, a clause should be inserted, empowering the Board of Trade to call for returns of all accidents attended with personal injury, or occasioning an interruption in the public traffic, and also such returns respecting the arrangements for conducting the public traffic as the Board of Trade may consider necessary, with a view to providing for public safety. The power, with that of inspection, would be sufficient to give us access to the requisite information. The possession of this information would be insufficient, unless our powers of acting upon it are extended. The only positive power given by the 3 & 4 Vic., c. 97, is that above mentioned of directing prosecutions to enforce the provisions of Railway Acts, a power which is useless for the purpose of enforcing the regulations and precautions which experience has pointed out to us as essential for the public safety. As the Act stands at present, the Board of Trade has no power of enforcing any one of the recommendations contained in the reports of its inspectors, however obvious and necessary for the public safety. Although the directors and officers of the different railway companies, whose lines we have had occasion to inspect, have, generally speaking, shown great readiness to attend to the representations of the Board, this has not been uniformly the case, and instances have occurred which are sufficient to show the impossibility of exercising any effective supervision, unless provided with the requisite powers of enforcing our recommendations.

"With regard to the nature and extent of these powers, the proper distinction appears to us to be, that the Government should not attempt to interfere in questions of an experimental nature, which are still subjects of discussion, and admit of a fair difference of opinion among practical men; nor should it attempt to regulate matters of detail, so as to take the management of the railways out of the hands of the parties immediately responsible, viz., the directors and their officers.

"On the other hand, the Government should have the power of enforcing, whenever it is found necessary, the observance of all precautions and regulations which are approved by experience, and are obviously conducive to the public safety. For instance, upon such points as the comparative advantages of six and four-wheeled engines, the best construction and mode of laying down rails, the best form and constructions of wheels, axles, &c., and other points of similar nature, upon which the practice of the best-conducted railways differs, and the opinion of the most eminent engineers is by no means decided, it would be premature for the Government to interfere until experience has solved the questions which may still be fairly considered as doubtful. But with regard to other points, such as the propriety of introducing upon every railway such arrangements respecting time tables and signals as experience has shown to be necessary for preventing collision, of establishing a proper and uniform code of regulations for engine-drivers, guards, and other servants placed in a responsible situation, and for maintaining strict discipline; and generally of introducing upon A.L. railways, whatever has been adopted and proved conducive to safety by the practice of those which are considered to be the best conducted; no difference of opinion can exist, and if the principle of Government supervision be admitted at all, it cannot find a more legitimate field for its exercise.

"The same distinction applies to the case of opening new railways. It would be impossible for the Government inspector, upon a short inspection, to pronounce an opinion upon questions of construction, so as to share the responsibility of the engineer, under whose superintendence the works were conducted. On the other hand, the Government inspector is fully capable of judging whether the works are sufficiently completed, and whether the arrangements for working the line are of such a nature as to present no obvious and unusual danger to the public in the event of its being opened at the time proposed.

"The present Act establishes the principle of a Government inspection of railways previously to their being opened for public traffic; but if this principle is to be maintained, it is indispensable to give the Government power to prevent the opening of the railway in case the conditions considered as essential for the public safety are not complied with. As matters stand at present, the Government has the responsibility, without any of the power which ought to accompany it. The public naturally look to the Government

inspection as a guarantee that the line is in a fit state to be opened, while, in point of fact, the line may be opened in defiance of the representations of the Government and its inspector. The present Act is also defective in not obliging companies to give notice of the day when their railway will be ready for inspection, as well as of the day when it is proposed to open it. Great inconvenience has been experienced from this cause, as from the anxiety of railway companies to open at the earliest possible moment, the inspection has either been fixed so late as to afford no time for considering and acting upon the inspector's report, or if fixed earlier, the works have been found incomplete.

"We recommend, therefore:—

"1st.—That no railway or portion of railway should be opened for the public conveyance of passengers until one month's notice shall have been given to the Board of Trade of the intention of opening, and 10 days' notice that the railway is sufficiently completed for receiving the public traffic in safety.

"2nd.—That in case of an unfavourable report from the inspector appointed by the Board of Trade upon any essential point connected with the public safety, a power should be given to the Board of Trade of postponing the opening from time to time, for periods not exceeding one month.

"With reference to the exercise of this power, it should be a general rule never to sanction the opening of a railway until the works of construction are so far completed as to allow the permanent way to be devoted solely to the purposes of public traffic and of the ordinary repairs requisite for keeping the line in order, nor until the establishment for conducting the public traffic is placed in all essential respects upon an efficient footing.

"With regard to the provisions which should be introduced into the new Act for the purpose of enabling the Board of Trade to exercise an effective supervision over railways after they are opened, with a view to provide for the public safety, it appears to us impossible to define in any Act of Parliament the exact nature of every case which may arise in practice.

"The principle which we think ought to regulate the exercise of this supervision has been already stated, viz., that it should be confined to the enforcement of such rules and regulations as are approved by practice, and obviously conducive to the public safety."

As a result of these recommendations, Mr. Labouchere, the Vice-President of the Board of Trade, obtained in February, 1841, leave to bring in another Bill for the Better Regulation of Railways. He said that that was the result of several accidents and was intended to provide increased security to people travelling. It was, undoubtedly, desirable that the Government should not attempt any minute interference with the

particular province of the directors of railways, who were the natural guardians of the public as well as of their own undertaking. Great exaggeration had prevailed on the subject of accidents and he had no hesitation in saying that, in his opinion, there was no mode of conveyance so little liable to disasters as by railways. One of the subjects to be dealt with was uniformity of signals; on most lines "danger" was indicated by a red light, but some other colour was so used on other lines. It was also proposed that engine drivers should be licensed and, in case of misconduct, they were to lose their licence. On March 9th, 1841, it was ordered that a select committee be appointed to consider whether it was desirable for the public safety to vest a discretionary power of issuing regulations for the prevention of accidents on railways in the Board of Trade and, if so, under what conditions and limitations.

The line taken by the Board of Trade can be best judged by the evidence given by Sir Frederick Smith. He said that the real interests of the railway companies, as well as the safety of the traveller, would, in his opinion, be best preserved by vesting a discretionary power in responsible officers; officers not only responsible to the chief of an important branch of the public service and whose office rendered him the especial protector of the commerce of the country but responsible also to the public and to Parliament. Those officers, be they whom they may, must exercise the power entrusted to them with caution, so that while, on the one hand, they must endeavour to provide for the safety of the public, on the other hand, they must strive to protect the fair interest of the railway companies, without relieving their directors from any part of their responsibility. In no case of doubtful necessity should the Railway Department of the Board of Trade interfere by issuing regulations for the guidance of all or any of the railway companies; the necessity of interference should be obvious and should come home to the conviction of the parties to whom the regulations might apply and, indeed, the officers should be slow to disturb even a system which in itself would appear not altogether free from danger, provided it had stood the test of long experience without the occurrence of accidents. One advantage of the supervising authority would be that it would afford a means of concentrating a knowledge of the dangers, as well as of the security, of railway travelling and admit of suggestions being made for the benefit of those companies where the least intelligence was being displayed, derived from those where experience and talent had led to the adoption of the most perfect systems. In confirmation of this view Sir Frederick said it might be stated that in the generality of cases where accidents of a serious nature had happened, and where the circumstances connected with those accidents had been inquired into by the officers of the Board of Trade, the suggestions

which, in consequence, had been made had, sooner or later, been in a great degree adopted.

The strongest opponent of the proposal was Brunel, who told the committee that if they put such a power as was proposed into the hands of the officers of the Government they must not flatter themselves that there would be that co-operation on the part of the railway companies that there was then. He, himself, would do his best to carry out the views which might become the law. They were, however, but men after all and it would be hopeless to expect that they should really and warmly co-operate in shackling themselves. They would probably, he hoped, answer, in a gentlemanly fashion, questions that might be put and give general information but, as to pointing out the defects in their own railway, they certainly would not do that. They understood very well how to look after the public safety, and putting a person over them who did not know how to look after the public service must shackle them. They had not only more ability to find out what was necessary than any inspecting officer could have, but, he maintained, they had a greater desire to do it. Therefore, when they felt they could carry on the work safely and well it would be shackling them if a third person, with power to interfere, was put over them.

That Brunel was not entitled to present himself as one who "understood very well how to look after the public safety" was, the present author submits, made evident in the action he took a couple of years later when constructing the Bristol and Gloucester Railway. That railway acquired the Bristol and Gloucestershire Coal Railway, a narrow-gauge line, but did not purchase the companion Avon and Gloucestershire Coal Railway, also of narrow gauge. The Act—2 & 3 Vic., c. 56—sanctioning the construction of the Bristol and Gloucester broad-gauge line required that an inner rail be laid between the two rails of the 7-ft. gauge to accommodate the Avon Company's traffic. Instead of doing this, Brunel laid transverse sleepers between the broad-gauge longitudinal rails and put the narrow-gauge rails on them. Moreover, in order to avoid laying in crossings for the siding connections, he made the narrow gauge rails 2 in. higher than the broad gauge, and where sidings were provided the connection had a gap at the intersection with the broad-gauge rail over which the wheels had to jump. Further, at one place there was a siding connected to the broad-gauge line. As the higher rails of the narrow gauge prevented that being used it was arranged to take out four of the narrow-gauge rails when the broad-gauge connection was wanted and to allow for their speedy removal they were laid loosely in their chairs. As another illustration of Brunel's unfitnes to give impartial judgment, it may be said that he told the committee of 1839, now being referred to, that he was opposed to rules and regulations being printed. He said: "I do not believe

the men obtain the slightest knowledge of their instructions by reading. They may read them through and get up with the printed letters before their eyes but, as to obtaining information, they do not . . . I am not one to sneer at education, but I would not give sixpence in hiring an engine-man because of his knowing how to read or write. I believe that, of the two, the non-reading man is the best (*sic*) and for this reason: I defy Sir Frederick Smith, or any other person who has general information and is in the habit of reading, to drive an engine. If you are going five or six miles without anything to attract your attention, depend upon it you will begin thinking of something else. It is impossible that a man that indulges in reading should make a good engine-driver; it requires a species of machine, an intelligent man, an honest man, a sober man, a steady man, but I would much rather not have a thinking man."

The Committee reported:—

"With reference to the expediency of vesting such a power in the Board of Trade widely different opinions have been expressed by witnesses extensively connected with railways,* that they consider it very desirable for the public safety that there should be some power to regulate a great number of things which cannot be regulated in any other way and to enforce a greater degree of uniformity of system than now prevails in matters essential for the public safety and that they view the proposal to vest a discretionary power in the Board of Trade without any apprehension of injury to their interests as railway proprietors. On the other hand, it has been strongly urged that the existence of such a power in a Government department would be injurious to the railway interests† and might tend to diminish rather than increase the safety of railway travelling by interfering with the responsibility of those entrusted with the management."

"It is established by evidence to the satisfaction of your committee that the existing power of supervision vested in the Board of Trade by the Act of last session (1840) has worked well hitherto and promises considerable advantages for the future from the continuance of the amicable spirit and cordial co-operation which seem to have happily prevailed on the part both of the inspector-general and the directors and engineers of railways. This amicable spirit, it has been represented by several witnesses connected with railways, is likely to continue uninterrupted so long as the supervision of the Board of Trade is exercised, as at present, in the way of suggestion, but if an absolute power of enforcing regulations under pain of a penalty were given it might, although exercised with the greatest judgment and forbearance, have the unfortunate effect of engendering on the part of railway companies a desire of concealment and feelings of jealousy which would not otherwise arise."

"Influenced by these considerations your committee recommend that the Board of Trade should not at present have the discretionary power

contemplated . . . and prefer that the supervision of that department should be exercised in the way of suggestion rather than in that of positive regulation."

Before dealing with the sequel to the above report it may be remarked that the companies evidently were alarmed by the attitude taken by the Board of Trade immediately subsequent to the Act of 1840. On January 19th, 1841, the directors and general managers of some of the companies met in Birmingham and passed certain resolutions and adopted a code of rules. Three of the resolutions were as follows, and are quoted here as suggesting that the companies themselves were conscious that there was ground for alarm.

"That in consequence of the public anxiety occasioned by the accidents which have taken place on various railways, the companies here represented, in order to profit by the combined experience of the principal lines, have deemed it expedient that a general conference should be held for the purpose of taking into consideration the causes and circumstances of such accidents and the means that may be available of more effectually guarding against their occurrence in the future."

"That this meeting acknowledges the grave responsibility which attaches to railway directors and the obligation under which they lie to adopt all judicious and practical expedients for ensuring the general accommodation, comfort and safety of the passengers entrusted to their charge. That under a strong impression of their responsibility they have assembled on this occasion and have pursued their deliberations at the present conference."

"That this meeting considers it desirable that there should be a uniform system of regulations and signals recognised as applicable to all railways and they recommend that the following rules and regulations, with this view, be submitted to the consideration of each railway company."

The author has failed to trace that the rules thus approved were universally adopted, and he suggests that having served their purpose in staving off the feared interference by the Board of Trade the matter was allowed to drop. Each company probably had its own rules—the Great Western had in 1841 and the London and North-Western, after its incorporation in 1847. Certain it is that there was no standard rule book until that approved by the general managers' conference of the Railway Clearing House in March, 1876, which, incidentally, was one of the sequels to the Royal Commission of 1874 on Railway Accidents referred to later.

The Bill brought in by Labouchere and, except in respect to clause 11, approved of in Committee, did not pass, as the Melbourne Government was defeated over the Corn Laws in June, 1841. Peel came into power and Gladstone became the vice-president of the Board of Trade. The author wishes, at this point, when mentioning the latter gentleman,

to put upon record the fact that although Gladstone was responsible for the Act of 1844 which established the terms under which the railways could be purchased by the State he, himself, was strongly opposed to any such step. There was a fear at that time that the railways would become wealthy corporations—only railways paying 10 per cent. dividend were, in the main, subject to the Act—and so Gladstone took the step he did in order that the threat of State purchase might make the companies amenable to reason. It is not generally appreciated that the Act in question does not sanction State purchase but only lays down the terms of purchase. Actually, section 4 says: "It is expedient that the policy of revision or purchase should in no manner be prejudiced by the provisions of this Act but should remain for the future consideration of the legislature." Gladstone must always, therefore, be regarded as a sincere friend of the railway companies.

In February, 1842, Gladstone brought in a Bill which subsequently became the Regulation of Railways Act of 1842—5 & 6 Vic., c. 55. He said that it had for its purpose a more effectual inspection of railways previous to their opening and the giving of power to the Board of Trade to postpone the opening of a railway in case the inspecting officers were not satisfied as to its security. In most cases there was little difficulty in that respect, for the directors of most of the companies readily attended to the opinions of the inspecting officers. One of the chief dangers attending the traffic on new railways arose from the unsettled condition of the soil and from a disposition on the part of the railway companies to open their lines before the ground was in a proper state to allow that being done in safety. When the Bill came before the House of Lords, Earl Ripon said that he felt bound to say in justice to the railway companies that in every instance in which the Board of Trade had felt it necessary to point out anything for the convenience or safety of the public they had shown themselves most ready to adopt it whatever might be the opinions of the directors as to its propriety.

The amendments to the Act of 1840 made by Gladstone were, as regards inspections, two in number:—(1) in addition to the month's notice of the intention to open there was to be a second notice 10 days, at least, before the actual opening; (2) power was given to order and direct a company to postpone an opening if the inspecting officer saw reason for such a step and to safeguard against a company opening a railway in defiance of the inspecting officer's order a penalty of £20 a day was enforceable. Sections 7 and 8 applied to accidents and instead of the companies having, as laid down in 1840, to report all accidents attended with personal injury, they had also to make returns of all serious accidents whether attended with personal injury or not.

The author would draw attention to the fact that neither of the two Acts to which reference

has been made sanctioned inquiries by the inspecting officers into the causes of accidents. Such inquiries were, however, held, and the first was into the fatal derailment of August 7th, 1840, at Howden, on the Hull and Selby; the first inspection of new works was the Bath and Bristol section of the Great Western, inspected by Sir Frederick Smith on August, 31st, 1840. The accident reports that followed were not, however, made public until they appeared with the annual reports of the officers of the Railway Department. It is from the latter reports that the author has given the figures for the years prior to 1871 that appear in Tables I, III and IX.

Ten years passed before the question of railway accidents again came seriously before Parliament, and it then arose as a side issue. On December 6th, 1852, a select committee was appointed to consider the principle of amalgamation of railways and of railways and canals. Cardwell was the chairman. Mr. James Booth, the senior secretary of the Board of Trade, gave evidence as to the powers which Parliament had vested in that department. It could order an inspection of a railway but there its powers were left by the Act. Returns of accidents on railways, attended with serious injury to the public, were required to be made to the Board of Trade, but no powers were given to inquire into the cause. It was the practice, in all cases of serious accident, to direct an inspector to hold an investigation and to report. The railway companies had raised no objection to that and rendered every assistance, but if they were unwilling to do so the Board had no power of examining the railway servants compulsorily. He thought it would be desirable that greater powers of inquiring into the circumstances should be given to the Board of Trade, but practically the Board had not experienced inconvenience from the apparent deficiency in the Act as it stood. A copy of the report of the inspector after his inquiry would be sent to the company concerned with the suggestion that what might have been recommended should be adopted. Very generally there was a disposition on the part of the companies to adopt such suggestions. He entertained, however, considerable doubt whether it would be desirable that the Board of Trade should have the power of enforcing the suggestions on the company because in that way the responsibility of the company might be assumed by that body as being diminished and, in some degree, thrown on the Board of Trade.

The fifth report of the 1852-53 select committee, after dealing with the main question, said that it had considered with care the subject of safety. It then made a remarkable recommendation. It first remarked that "If it be right, as undoubtedly it is, that the culpable negligence of railway managers resulting in death to a traveller should be manslaughter, there seems no good reason why the same negligence, resulting in serious injury or in

risk of life or of limb, should not constitute a crime." It then proposed that each company should have a managing director who was to be responsible for the safe conduct of the traffic; a resident engineer, responsible for the track, and a locomotive engineer, for the efficiency of the rolling stock, "in order that, in case of accident resulting from culpable negligence, the person in whose immediate department the negligence had occurred might be known." Proceeding, the report said:

"A review of the accidents which have recently occurred and of the legal proceedings and official correspondence connected with them, satisfies your committee that the absence of any sufficient code of regulations—in other words, reprehensible negligence on the part of those whose duty it is to lay down such regulations—has been a frequent cause of evil. In some cases the defective state of the lines themselves has caused the accident and in many instances, when accident has not actually occurred, it has appeared in evidence that sufficient assurance is by no means afforded to the public for the proper state of the lines. The very unusual weather of the last winter may be admitted as one of the reasons of this defective condition of the railways, but it is to be feared that a much more operative cause has been the smallness of the dividend paid to the unguaranteed shareholders, their pressure upon the directors and the consequent endeavour of the board to carry retrenchment to the utmost limit. It is obvious that considerations of public safety should not yield to a desire for economy; that true economy is not promoted by the neglect of necessary repairs and that if the pressure of shareholders operates prejudicially some provision should, if possible, be made by law which would ensure to the directors and to the travelling public a remedy against these evils. Your committee anticipates that the necessity for registering a managing director or other responsible officer would tend to ensure the appointment of an individual whose official reports could not safely be disregarded by the board and whose positive requisitions for purposes of repair the shareholders could not readily dispute. It would thus tend to erect a class of professional men of high position under whom the discipline and management of the lines might be expected to acquire consistency and to attain to a greater degree of safety."

On December 4th, 1857, under circumstances that are not recorded in *Hansard*, a select committee was appointed to inquire into the causes of accidents on railways and into the possibility of removing any such cause by further legislation. Mr. G. W. Pierrepont Bentinck was the chairman, and among the witnesses were the three inspecting officers—Colonel Wynne, Captain Tyler and Colonel Yolland—and Captain Douglas Galton, who, after being an inspecting officer, became the secretary to the Railway Department. The last witness was very emphatic in his condemnation of any proposal that the Board of Trade should interfere in special details of railway management. Asked: "Which of the two would be the safer state of things—merely

taking into consideration the safety of the public—that the Board of Trade should or should not have that power?" Captain Galton replied: "I am taking into view the safety of the public. I am looking to the way in which railway accidents can be best diminished, and I do not think it would be by special interference on the part of the Board of Trade."

The committee made the want of punctuality and the consequent excessive speed the chief points of its report. On the general question it observed:—

"That it appears to your committee that the strict personal supervision which alone can check the carelessness of the men employed on the lines and detect the insufficiency of the material used on them can best be obtained by the attention of the companies themselves and that the very serious losses they incur by any accident ought to render it sufficiently their interest to pay minute attention to these points. But cases having occurred when these questions have been neglected by railway companies, your committee is of opinion that the Board of Trade should be invested with the fullest powers to investigate and report to Parliament upon any accident which may occur on railways."

The next occasion on which the safety of railways was dealt with was the Royal Commission of 1865, usually referred to as the Devonshire Commission, which was appointed to "inquire into the charges now and heretofore made for conveyance on the several railways of Great Britain and Ireland and whether it would be practicable to effect any considerable reduction in such charges, with a due regard to safety, punctuality and expedition." Before, however, noticing that some reference must be made to a safeguard which was continually being asked for by the inspecting officers in their reports on accidents, i.e., communication between the passengers and the servants in charge of the train. Its provision was also urged by the select committee of 1857.

The first legislative attempt to deal with passenger communication was by means of a private Bill introduced on March 20th, 1866. That subsequently found its way to a select committee which, on August 2nd, 1866, suggested that the Bill be postponed until the next session. The hope, further, was expressed that railway companies would use their best exertions to carry out the proposed communication between guards and passengers. In 1868 an opportunity presented itself to carry, by the Regulation of Railways Act, 31 & 32 Vic., c. 119, legislation for sundry questions affecting railways. Passenger communication was one and section 22 dealt with that. It ordered that every train which carried passengers and travelled more than 20 miles without stopping was to be provided with such efficient means of communication between the passengers and the servants of the company in charge of the

train as the Board of Trade might approve. As what was subsequently approved was the very unsatisfactory cord communication designed by T. E. Harrison, of the North-Eastern Railway, it should be noted that the sanction was given in direct opposition to the advice of the inspecting officers. John Bright was president of the Board of Trade at the time, and when the companies pledged their word that the scheme was a good one he could not but approve. Provisional sanction was given on February 27th, 1869, and full approval on August 1st, 1869. It is significant though that the sanction was withdrawn on January 1st, 1873. Despite this recantation by the Board of Trade and its disapproval of the cord system and, of more importance, its constant failures "to communicate," it remained the standard passenger communication until 1899. The Manchester, Sheffield and Lincolnshire introduced the present method—whereby the continuous brake is operated—and it was provisionally sanctioned by the Board of Trade in 1890 and fully approved in 1893. Its success there led to a departmental committee being appointed in May, 1897, to inquire into the matter, and in the absolute condemnation, in July, 1898, of the cord system. In 1899 the Board of Trade was informed that the companies had adopted the continuous brake passenger communication.

Reverting now to the Devonshire Royal Commission of 1865, it may be remarked that, like the Cardwell Committee of 1853, it dealt with safety as an incidental subject. It expressed its views thereon at some length, but they call for reproduction in full. They were as follows:—

"In dealing with questions of the safety of the travelling public, Parliament has acted with no less consistency than in its general dealings with the power of levying rates. It has proceeded upon the principle of not attempting to direct the active operations of railway companies, or to give to the Government, either directly or indirectly, any control over the safe or efficient working of the railways.

"We have already explained, but may here recapitulate, that railway companies are free to construct and to work their lines in any manner they choose, provided only that the construction is such at the opening as, in the opinion of an inspecting officer of the Board of Trade, will enable the then anticipated traffic to be worked without danger to the public. When the line has been opened for traffic, Government only possess a power of making regulations at junctions between lines of two companies, and where the lines interfere with landowner's interests, as, for instance, at level crossings. But the control over the manner of working the line is left by Parliament entirely in the hands of the railway company. The company in undertaking the duty of carriers become liable under the common law to compensate persons injured, and under Lord

Campbell's Act to compensate near relations of persons killed by the negligence either of themselves or their servants.

"If an accident occurs attended with fatal consequences a coroner's jury inquires into it in England and Ireland, and if any accident occurs in Scotland the Procurator Fiscal inquires into it, and the directors or officers of the company are held responsible and would be liable to criminal prosecution and punishment in the event of culpable mismanagement being proved.

"It has been urged before Parliamentary Committees that a Government department should periodically inspect the condition of the railways, and have power to require special modes of working or special appliances for safety to be adopted.

"An examination of the summary of accidents to passengers which occurred on railways during the year 1865 shows that 36 persons were killed and 1,039 injured during the year. Of these, 13 were killed and 5 injured, owing to their own misconduct or want of caution, and 23 were killed and 1,034 injured from accidents to trains or causes beyond the control of the passengers. An examination of the reports of the inspecting officers of the Board of Trade shows that all accidents to trains are due to one or other of the following causes, viz., to defects or, at any rate, absence of precaution in the construction of the permanent way, in the signals, or in the rolling stock; or else to want of adequate regulations, non-enforcement of regulations by the company, or to neglect of regulations by the subordinates of the company.

"If to the Government were committed the duty of seeing that the permanent way of the railways was properly maintained, it would be necessary that a large staff of officers should be employed to inspect all the lines with the utmost care and minuteness at very frequent intervals; in short, such inspectors would have to perform duties now performed by the companies' engineers, foremen and platelayers; such an inspection would require a large establishment unless it were to be a mere superficial and occasional inspection; and just in proportion as the work was efficiently done by Government would the railway companies be relieved from the trouble, expense and responsibility which they now incur.

"Again, witnesses have urged that the Government should receive the power of directing what signals should be adopted on railways, and that they should enforce uniformly of signals on all lines, and, further, that to the Board of Trade should be committed the duty of deciding upon the long-mooted questions as to the form of communication between the guards, engine driver, and passengers.

"But it is impossible to form any reliable opinion upon questions as to the relative merits of appliances for safety on railways without a long course of trial on a railway, and a full knowledge of all the circumstances attending their

use. A Government department can only acquire such knowledge through the evidence of the railway managers, and thus practically the responsibility of adoption or non-adoption must finally rest upon the managers.

"Any attempt to regulate such matters by authority would necessarily tend to check all efforts on the part of railway companies themselves to improve these details of working. We may illustrate these remarks by considering the proposal made last session to enforce by law a means of communication between the passengers, guard, and driver of a railway train.

"Such a law would seem to involve these questions:—

- "1. What is to be the medium of communication ?
- "2. What is to be the responsibility of the passenger using it ?
- "3. What is to be the effect of the communication ?
- "4. What is to be the duty of the guard on receiving it ?
- "5. What is to be the responsibility of the company ?

"There are various means of communication which could be adopted, but all are more or less liable to derangement, and the officers of the company allege that they are not satisfied that an adequate medium has been discovered.

"The passengers' liability was defined in the Bill of last session as follows:—

"Any person or persons, being passengers in a railway carriage provided with such means of communication with the guards and drivers of locomotive engines aforesaid who should wantonly or mischievously use or set in motion the means of communication with the said guards so to be provided as aforesaid, shall for each offence be liable, on summary conviction as aforesaid, to a penalty not exceeding five pounds and in default of such penalty being paid, to seven days imprisonment."

"This definition leaves the passenger a latitude which would render it difficult to convict him of abusing his right to use the medium of communication.

"The Bill was silent upon the important point as to what was to be the effect of the communication, i.e., whether the signal from the passenger was to be an imperative order to stop the train, or whether the signal was only to call the attention of the guard to the fact that something was wrong. But upon lines worked on the system generally in use on railways, viz., by interposing a limit of time between trains following each other, greater danger might arise from the stoppage of a train between stations regardless of the position of other trains, than from the passenger not possessing the power to stop the train; and in the case of an accident so occurring a question might arise as to how far the company would be liable for the consequences of an act of a passenger interfering

with the business of the company under the authority of an Act of Parliament. But it could scarcely be contended that the passenger was to be held responsible. It would thus follow that probably Parliament would have to supplement the interference on this matter by a further interference as to the regulations to be observed between trains following each other, and that each degree of interference in detail would have to be followed by further detailed regulations.

"A majority of the accidents are found to be due to combined causes, and much more to a lax enforcement of good regulations, or to a neglect in using appliances for safety which are in existence, than to the absence of regulations or appliances for safety. When accidents occur from an absence of regulations or a want of the necessary appliances for safety, it frequently appears that such absence is due to the circumstances of the traffic having been altered, and to elements of danger having been gradually developed without anything having occurred to bring the altered circumstances to the notice of the manager. Government interference would not necessarily meet this case. It is, moreover, the tendency of Government inspection to seek to multiply accessories to safety; these accessories are more or less valuable, according to the condition of the traffic on a line, and the manner in which it is worked. So long, therefore, as those who control the traffic are free to accept or reject the Government recommendations, it is very desirable that they should be made. But the more such appliances are multiplied the greater are the chances of danger from their neglect or their failure to act, though the chances of danger are diminished or increased according to the class and character of the men who use them. The selection of the men must always rest with the manager, and he should therefore remain responsible for the selection of the appliances for safety which he places in their hands.

"Mr. Cardwell's Committee in 1853 examined very closely into the question. The Committee arrived at the conclusion that any interference with the details of management was undesirable, but recommended that there should be placed upon those in whom the management of railways is vested, a greater degree of responsibility than the law then admitted, and proposed that each railway company should have an engineer, a locomotive superintendent, and a traffic manager, who should each be responsible for the proper working of his department. The Committee also proposed to call in the interposition of the Board of Trade to watch over the public safety. They had been appointed at a time when accidents recurred so frequently, and were attended with consequences so serious, that if no change had taken place in that respect severe legislation would have been required. But the marked diminution in the number of accidents which subsequently occurred induced Parliament to postpone any legislation at that time.

"The figures already quoted in this Report show the great improvement which has taken place in the safety of travelling, inasmuch, in the year 1865, out of 252,000,000 travellers, 23 only met

with death by causes beyond their own control. We believe that no other mode of locomotion ever used by man can show a more satisfactory result, and we are therefore not prepared to suggest any alteration of the present law in this respect.

"Parliament has relied for the safe working of railways upon the efficiency of the common law and of Lord Campbell's Act, which give persons injured and near relatives of persons killed a right to compensation. We consider that this course has been more conducive to the protection of the public than if the Board of Trade had been empowered to interfere in the detailed arrangements for working the traffic.

"We recommend that to the power which the Board of Trade at present possesses of appointing officers to inspect railways and rolling-stock, should be added a power for the inspecting officer to require the attendance of the officers and servants of the company as witnesses, and the production of books and documents bearing on inquiries directed by the Board of Trade, and that the reports of the inspecting officers on accidents should be made public."

During the year 1868 there were eight collisions inquired into wherein the inspecting officers subsequently reported that each might have been prevented had the block system been in use. That led to Mr. Shaw Lefevre, the President of the Board of Trade, issuing a circular which drew special attention to that question. One paragraph thereof remarked:

"Although the Board of Trade have, with rare exceptions, refrained from interfering with railway companies, or even advising them, as to the regulation of their traffic and the management of their business, being unwilling to diminish the responsibility which rests upon directors to conduct their traffic in the safest and most efficient manner, yet, having regard to the experience of the last few years, to the great proportion of accidents which occur through collisions and to the repeated expressions of opinion from the inspectors that such accidents, or many of them, might have been avoided by the adoption of the block system, they think it again their duty, in the interests of the public, to call the most serious attention of your directors to this subject. They are of opinion that, in view of the considerations already stated, a grave responsibility will rest upon railway directors if, without sufficient reason, they refrain from adopting this system."

In the session of 1870, Mr. Denison, M.P., chairman of the Great Northern Railway, complained of the excessive damages granted by juries in cases of compensation for injury in railway accidents. As a consequence a select committee was, on April 26th, appointed to inquire into the law and the administration of the law of compensation for accidents as applied to railway companies and to inquire whether any, and what, precautions ought to be adopted by railway companies with a view to prevent accidents.

The inquiry of 1870 was noteworthy because not only did Colonel Yolland and Captain Tyler, inspecting officers, give evidence, but because in some respects they were opposed to each other in the opinions they expressed. One subject dealt with was the locking of carriage doors—a consequence of the Abergele disaster of August, 1868. Colonel Yolland was inclined to agree to the Board of Trade having powers to compel the companies to do certain things, but, throughout, Captain Tyler favoured all the responsibility resting on the railways. The former said:

"The Government interferes in reference to emigrant ships, where the safety and health of large numbers are concerned and similar interference to compel railway companies to alter what hourly endangers the safety of the travelling public is not only, in my humble opinion, justifiable, but its duty to the community at large when it is only too manifest that the railway companies will not of their own accord make the change or only commence to do it 10 or 12 years after the necessity for it is ascertained and the means of effecting it satisfactorily proved."

Captain Tyler, on the other hand, said that if the Board of Trade were to interfere in the details of the management of railways it should take them altogether upon its own hands and manage them; anything short of that would be very mischievous. In reply to a question, Captain Tyler said that he thought that any power given to the Board of Trade to compel railway companies to do any particular thing would have a mischievous tendency. It had been thought right to place the railway companies in the hands of directors and they had each their own system of management and direction and control. Under those circumstances it would be very improper to dictate, in an arbitrary manner, to them what they should do for the convenience or safety of the public. Both the inspecting officers were agreed that the practice of holding inquiries into accidents should be legalised. Captain Tyler also thought that their reports should at once be published, as "public opinion will so act upon the companies that we shall get all that is required." The only recommendation, as regards the causes of accidents, made by the select committee of 1870 was to commend to the careful consideration of the companies the evidence given in favour of the block system, interlocking and continuous brakes.

The Act of 1871 was the most important step taken in the cause of safety on railways, and it is a remarkable fact that the passage of the Bill—which became 34 & 35 Vic., c. 78—through both Houses did not lead to a single word in debate.

The first point to be noted about the Act of 1871 is that it repealed certain sections of the Act of 1840. Section 5—one so repealed—said:

"It shall be lawful for . . . any proper person or persons to inspect any railway and

for every person so authorised . . . to enter upon and examine the said railway and the stations, works and buildings and the engines and carriages belonging thereto.

In place of the above, section 3 of the Act of 1871 allowed inspectors to be appointed "for the purpose of inspecting any railway and of making any inquiry with respect to any railway or into the cause of any railway accident which the Board of Trade are authorised to make or direct." Now, there are some—the late Mr. Frank Potter of the Great Western was one—who maintained that the general right of entry given by the Act of 1840 was, under that of 1871, limited to those required for inspecting new railways and for holding inquiries into accidents. The present author is disinclined to accept that view, as it is hardly to be credited that the Board of Trade would part with so valuable a power as being able to enter upon a railway for any other purpose than those associated with new railways and accidents. The author submits that that power was retained by the words "any inquiry with respect to any railway." On the other hand, that part of the section is written without commas and the words just quoted may be read "any inquiry with respect to any railway . . . which the Board of Trade are authorised to make or direct." The point is, however, now immaterial as under the Railway Employment (Prevention of Accidents) Act, 1900, referred to later, the Board of Trade is given very wide powers of inspection.

Section 5 of the Act of 1871 extended the need for submitting new railways for inspection to "the opening of any additional line of railway, deviation line, station, junction or crossing on the level" on a line that had already been inspected. It also allowed the Board of Trade to dispense with the month's notice required under the Act of 1842. The effect of the latter has been that all that is now done is to submit the plan of the work before it is opened and sanction is provisionally given for opening on condition that the requirements, if any, that the inspecting officer shall make when he visits the work will be carried out.

The procedure as to railway accidents was put on a proper basis and the accidents to be reported were enlarged and more definitely stated. The latter were: (1) any accident attended with loss of life or personal injury to any person whomsoever; (2) any collision where one of the trains is a passenger train; (3) any passenger train or any part of a passenger train accidentally leaving the rails; (4) any accident of a kind not comprised in the foregoing descriptions but which is of such a kind as to have caused or to be likely to cause loss of life or personal injury and which may be specified in that behalf by any order to be made from time to time by the Board of Trade. Section 7 legalised the holding of inquiries and also provided for what became

known as "courts of inquiry," which was what the Act described as "a more formal investigation." The inspecting officer then had an assessor sitting with him who, usually, was someone possessing legal knowledge. Such assessors sat in the inquiries in such serious accidents as Norwich, Shipton-on-Cherwell and Radstock. The only cases now when assessors accompany the inspecting officers are boiler explosions. Sub-section 7 (4) recited:

"The inspector making an inquiry into any accident, and the court holding an investigation of any accident, shall make a report to the Board of Trade stating the causes of the accident and all the circumstances attending the same and any observation thereon or on the evidence or on any matters arising out of the investigation which they think right to make to the Board of Trade and the Board of Trade shall cause every such report to be made public in such manner as they think expedient."

The Act came into operation on November 1st, 1871, and the relative Order of the Board of Trade of that date calling for personal and train accidents to be reported named the following as coming under heading (4):—"Any accident . . . of such a kind as to have caused or to be likely to cause loss of life or personal injury:—1. As regards the locomotive power and rolling-stock: (a) The bursting of a boiler. (b) The failure of a rope used in working an incline. (c) The failure of a wheel or tire. (d) The failure of an axle. (e) The failure of the hornplate of an engine. (f) The failure of the axle guard of any vehicle in a passenger train. (g) The failure of brakes used in passenger trains. 2. As regards the permanent way and works: (h) The fracture of a rail in the permanent way of a passenger railway. (i) The "bursting" of the permanent way under a train. (k) The failure of a bridge, viaduct or large culvert or of any part of any of them. (j) The failure of a tunnel or of any part of it. (m) The failure of the roof or any important part of a station. (n) Important slips in cuttings or embankments. (o) The failure of a revetment wall. (p) The flooding of a portion of permanent way. (3) Miscellaneous, such as (q) A train travelling in the wrong direction through points on the main line of a passenger railway. (r) An engine or train running over any horse, beast or other obstruction or through the gate or gates of a level crossing on a passenger railway.

It will be convenient to review at this stage the changes subsequently made as to the failures to be reported. Thus, on November 14th, 1874, there was added, to locomotive power and rolling-stock, the failure of any other part of locomotive engines, tenders or vehicles not included in the above which leads to an accident to a passenger train. Instructions were also given that any return of the failure of a boiler, a tire or an axle should be accompanied by a diagram with particulars of construction and failure and by a description of the nature of the materials it

was made of and the amount of work it had performed. In the case of a tire the mode employed of fastening it on the wheel and the results of its failure as to the number of pieces into which it broke, and whether it remained on or flew off the wheel when it broke, should be particularly specified. Under "As regards the Permanent Way and works" there was added "The failure of any other portion of the permanent way or works not included in the above which leads to an accident to a passenger train." It was further ordered that in any return of the fracture of a rail it should be stated of what material it was made, with the weight per lineal yard and whether it had or had not been turned at the time it broke. A diagram showing the section should also be forwarded. To the miscellaneous mishaps was added:—Any fire in any part of a train, or at a station, or involving injury to any bridge or viaduct on a passenger railway.

The Board of Trade about 1893 had some correspondence with the Railway Companies' Association as to greater uniformity in the system of reporting accidents, as it was claimed that all non-fatal accidents to servants were not reported. No satisfactory conclusion was come to and so, in April, 1894, a departmental committee was set up to consider the returns of railway accidents and casualties compiled by the Board of Trade and to report whether any improvement was possible in the shape in which the information was supplied by the railway companies and tabulated by the Board of Trade. That committee, on which Henry Oakley represented the railway companies, made some very important recommendations, almost all of which, though, refer to accidents to railway servants—a subject not now being dealt with. The committee did, however, standardise the annual returns and this accounts for the changes shown in Tables I and III as having been introduced in 1896.

Another result of that committee's labours was that an amended Order as to what accidents were to be reported was issued on October 31st, 1895. The instructions of November 14th, 1874, mentioned above, as to details to be given when boilers, tires or axles failed, had the latter part—as to how the tire broke—with-drawn, and those with respect to the fracture of a rail were amended to read:

"In any return of the fracture of a rail the form of the rail should be stated, the weight per yard, the material it was made of, the length of service it had done, the manner in which it was fixed and, if a double-headed rail, whether it had or had not been turned at the time it broke."

The requirement to report the failure of brakes used in passenger trains was withdrawn.

As from January 1st, 1907, as a consequence of the Notice of Accidents Act, 1906, the class of accident to be reported was again enlarged by an Order of December 21st, 1906. The necessity to report the failures of the horn-

plates of engine, of axle-guards of passenger train vehicles, of "bursting" of the permanent way and of travelling in the wrong direction was withdrawn, and, instead, there was to be reported any failure of an axle, or of a connecting rod, coupling rod or any other part of a locomotive engine, tender or vehicle which caused or was likely to cause an accident to a passenger train. The failures of any other portion of the permanent way or works than those named in the order were "those on running lines which caused or were likely to have caused an accident to a train or engine." Previously the last qualification applied to those which led to an accident to a passenger train. A very important change and one that caused an apparent big increase in the number of accidents to goods trains was that there were to be reported (1) any collision between goods trains, or between a goods train and a light engine, vehicle or buffer stops on running lines; (2) all cases of goods or mineral trains or engines leaving the rails on running lines; (3) all cases of trains—passenger or goods—becoming divided. The requirement to report all fires was extended to all fires on any part of a railway arising from electrical equipment.

One other, and the last, change was made on December 18th, 1913, to become operative from January 1st, 1914. That was to report all breakages or other failures of couplings which occurred when trains were stopping or starting. That had a remarkable result. Prior to the change of 1906 which required the divisions of trains to be reported, the failures of couplings were 20 or so a year. They then rose to 2,000 a year and now, under the Order of 1913, they are 11,000 a year.

Reverting to the events of the early 'seventies it should be noted that one consequence of the Act of 1871 was that Captain Tyler commenced the series of annual reports which continue to this day. The first was for the year 1870.

After the annual report for 1872 appeared, Mr. Fortescue, the then President of the Board of Trade, sent on November 18th, 1873, a copy to each railway company, together with the following circular:—

"Her Majesty's Government desire to call the earnest attention of the railway companies to the enclosed Report made to the Board of Trade upon the accidents which occurred on the railways of the United Kingdom in the year 1872, exhibiting as it does a state of things which, it is believed, has been not only continued, but aggravated during the present year.

"It appears from the Report that a large proportion of these casualties are due to causes which are within the control of railway companies. If it may be contended that the traffic on many lines has very greatly increased, and with it the risks of railway travelling, it is no less true that it is within the power of the companies to take care that the permanent way, the rolling-stock, and the station and siding accommodation

are kept up to the requirements of the traffic; that the officers and servants are sufficient in number and quality for the work to be done, and that proper regulations for their guidance are not only made but enforced; that pains are taken to test every reasonable invention and expedient devised for the purpose of preventing danger; and that such of those expedients as experience proves to be effective are adopted without undue delay.

"In the face of the facts collected and analysed by Captain Tyler, and of the numerous accidents of the present year (many of them the subject of Board of Trade inquiries), it is difficult to suppose that such is the case.

"There can indeed be no doubt that methods of working and mechanical contrivances, the value of which has been thoroughly ascertained, have been too slowly introduced; and there is great reason to believe that sufficient provision has not been made for the safe working of the increased traffic by the enlargement or re-arrangement of stations and sidings and the laying down of additional lines of rail.

"But whatever may be thought of these or other causes as contributing to the result, the present insecurity of railway travelling imposes upon the railway companies the grave responsibility of finding appropriate remedies for so great an evil.

"In these observations I do not attempt to distinguish the various companies, to all of which they do not in an equal degree apply.

"Another subject which urgently requires attention is the frequent unpunctuality of passenger trains.

"The inconveniences, vexation, and loss caused to passengers by this breach of the conditions upon which the companies profess to carry them, constitute in themselves a serious subject of complaint. But the evil arising from unpunctuality does not end here. The service of the line is disarranged; the chances of accident are multiplied; and trains are forced, in order to make up for lost time, to travel at excessive speed through complicated stations, or under other circumstances where such travelling may be equally dangerous.

"The returns made by the companies to the Board of Trade, under a recent Act, of the accidents which happen to railway servants, show a lamentable number of casualties, often fatal, in proportion to the numbers employed.

"It is no doubt true that many of these accidents are due to the negligence and rashness of the men themselves and to the hazardous nature of their duties. But, at the same time, it is to be feared that the danger of their work is not unfrequently increased by the want of proper accommodation and appliances, or of suitable means of precaution or protection; while sufficient pains do not appear to be taken to enforce upon them the observance of the regulations made for their safety.

"The companies will feel the necessity of seriously considering the means of preventing so great a loss of life.

"Her Majesty's Government are fully sensible of the difficulties incidental to railway working in a country where the traffic is so great and so various as well as of the efforts which have been made by the railway companies, in many respects with remarkable success, for the accommodation of the public; but safety for life and limb, which ought to be a paramount object, has, nevertheless, not been sufficiently secured, and great and increasing dissatisfaction is the result.

"Her Majesty's Government therefore, reserving their own liberty to consider at any time the expediency of legislation upon any part of this important subject, have deemed it their duty to call the attention of the railway companies to the whole question, in the hope that they, in whose hands the means of improvement mainly rest, will themselves make every effort to meet the reasonable demands of the public and of Parliament.

"I request that you will bring this letter and the accompanying report before your Board."

It will be remembered that Laing was one of the three officers of the Railway Department when it was established in 1840. He later became the chairman of the London, Brighton and South Coast and thus he had to reply to Mr. Fortescue's circular. So ironical a situation made his reply interesting, so the conclusion of Laing's letter is quoted below:—

"I mention these facts, which are the result of practical experience, not, as I have said, from any hostile feeling to the supervision of a Government authority nor from any necessity of vindicating this company, for Captain Tyler's report shows that, in our case, there is really no charge against us, but, rather, to point out to Her Majesty's Government the sort of question with which they will be immediately confronted if they depart from their present position of 'supervision' and take upon themselves any portion of the responsibility of laying down and enforcing positive regulations as to the working of railway traffic. They will find that there is no department of affairs in which general principles and abstract rules are of so little use as in railway traffic and that everything, down even to the timing of each train, is a matter to be decided on its own merits and very often as the result of a nice balance of conflicting considerations. They will find also that, do what they will, and however satisfied the residents in the district and habitual travellers on the line may be with the management, the general opinion of the uninformed public will always be disposed to ignore the fact, stated with so much force and truth by Captain Tyler, that 'whatever be the amount of care taken, the item of human fallibility will always remain and will always be the cause of a certain number of accidents.'"

The then Earl de la Warr was, in those days, the principal critic in Parliament on railway administration, and in 1873 introduced a Regulation of Railways (Prevention of Accidents) Bill. That was referred to a select committee which, later, reported that the compulsory

adoption of the block system and the concentration and interlocking of the points and signals, advocated by the Bill, could not be completed within the five years allowed. The report then said:

"A clause might be introduced giving the Board of Trade power to prolong the time named in the Act for the completion of those systems. This course would impose on the Board of Trade a grave responsibility during the interval of time conceded to the railway company, and if an accident from collision should occur during the intermediate period the Board of Trade would be blamed for not having used the power with which Parliament had invested the Department.

"The inspectors of the Board of Trade, in their annual reports, have called attention to many other measures for the prevention of accidents besides the two mentioned in this Bill. If these two systems were made compulsory, railway companies might rest content with fulfilling the requirements of the law and be less inclined to expend money on other improvements which, though not enforced by law, may be conducive to public safety.

"Relying on the great exertions recently and very generally made by different railway companies to extend the block and interlocking systems, and the improvements now in progress, the committee recommend that the Bill should not be proceeded with during the present session. They recommend, however, that the Board of Trade should call for such information as may enable the inspectors, in their annual reports, to state specially the progress made in their adoption on all passenger lines. Parliament will then be in a position to decide whether or not it would be right to require the further and more prompt extension of these systems on those lines where they are necessary."

The sequel was the passage of the Railway Regulation Act (Returns of Signal Arrangements, Working, &c.), 1873—36 & 37 Vic., c. 76—which required the companies to supply each year a return as to the number of junction, siding, crossover, &c., connections they had and the number of such that were concentrated, interlocked and provided with safety points, and the mileage protected by the block or other telegraph systems. These safety appliances were made compulsory by the Act of 1889—see further—and the Board of Trade intimated in 1897 that the returns need no longer be presented.

The directors and officers of the Lancashire and Yorkshire Railway were, no doubt, very much surprised to read in *The Times* one day in December, 1873, that after repeated warnings the company was to be prosecuted for failing to report accidents to its servants. The secretary to the company wrote post-haste to the Board of Trade and pleaded ignorance of any warnings. The Board of Trade was, however,

gentleman in March, 1872, and to the reply of the Department that accidents, of the classes which the Secretary deemed to be exempt from being reported, should be returned if they occurred in the course of working the railway. Ultimately the Board of Trade intimated that the prosecution was undertaken in order to bring home to the company the necessity of being more active in the discharge of the duties laid upon them by the Legislature and to warn other companies that negligence in this respect would not be allowed to continue. The proceedings were subsequently dropped.

The rejection of his Bill possibly led to Lord de la Warr seeking the ends he desired by other means, as on April 27th, 1874, he proposed that a Royal Commission be appointed to investigate the subject. The Government accepted the motion and the names of the commissioners were announced on June 8th. The chairman was the Duke of Richmond, the railways were represented by T. E. Harrison, the chief engineer of the North-Eastern Railway and president-elect of the Institution of Civil Engineers, and the Board of Trade by Captain J. L. A. Simmons, whilst one of the independent members was William Galt, the railway reformer. Beyond conducting the continuous brake trials on June 9th, 1875, and subsequent days at Newark and publishing some very interesting appendices, including a valuable memorandum by Captain Tyler—too long to reproduce—in its report, it cannot be said that the Royal Commission served any good object. That such was natural is suggested by the fact that of the nine members only four signed it without reservation. The Chairman had gone to India and could not sign it, whilst Mr. Ayrton neither signed nor submitted a minority report.

On the particular subject of the Board of Trade not shouldering any responsibility for the administration of the railways the Royal Commission, like those who had conducted previous inquiries, was very emphatic. The following remarks relate to that point:—

"Large as are the powers now possessed by the Board of Trade and the Railway Commission, in respect of railways, they are so adjusted and so limited as to leave with the companies the undivided responsibility of working their lines. The first and the most important question, therefore, which we have had to consider, as affecting the entire character of our report, is whether our investigations lead us to advise a departure from this policy which has heretofore characterised railway legislation.

"With this point in view we have given a wide scope to our inquiry. We have not only examined the responsible officers of the Board of Trade and of railway companies, but we have also received the statements of railway servants of every grade. We have, moreover, personally inspected railway premises and works in various places throughout

certain typical cases of railway accidents. And, in conducting these inquiries we have given the fullest consideration to the system of management, especially with respect to the condition and dangers of railway servants. But upon full consideration we are not prepared to recommend any legislation authorising such an interference with railways as would impair in any way the responsibility of the companies for injury or loss of life caused by accident on their lines. To impose upon any public department the duty, and to intrust it with the necessary powers, to exercise a general control over the practical administration of railways would not, in our opinion, be either prudent or desirable. A Government authority placed in such a position would be exposed to the danger either of appearing indirectly to guarantee works, appliances, and arrangements which might practically prove faulty or insufficient, or else of interfering with railway management to an extent which would soon alienate from it public sympathy and confidence, and thus destroy its moral influence, and with it its capacity for usefulness.

"Even the powers now exercised by the Board of Trade in respect of new lines of railway are not wholly free from these objections. Here, however, the practical evils are so slight and the benefits are so considerable and definite that we think the only question is whether these powers might not be still further increased. But once a railway is opened, the State now holds the company responsible to maintain it, and work the traffic in a manner compatible with the public safety. The Government Inspecting Officers have powers of inspection, and their reports are exceedingly valuable; but to go further and clothe a Government Department with unlimited powers to interfere in the interests of public safety with the detailed working of traffic upon railways, must necessarily create a concurrent responsibility, and in whatever measure this responsibility be cast upon a Government Board, the responsibility now resting upon the railway companies will be diminished. Upon this question of Government interference we wish to refer to the evidence of the Officers of the Board of Trade, whose views differ somewhat respecting it.

"We desire then at the outset to express our concurrence with the judgment formed upon this point by the Royal Commissioners of 1865 and to record our decided opinion that any change, which would relieve the railway companies from the responsibility which now rests upon them to provide for the safety of their traffic, would be undesirable."

The only legislation resulting from the 1874 Royal Commission was the Railway Returns (Continuous Brakes) Act—41 & 42 Vic., c. 20 of 1878—which required the companies to report half-yearly the progress made with continuous brakes and all cases of failure to act.

The returns had to answer the question: Has all new passenger stock brought into use during the half-year been fitted with continuous brakes, and if so, of what description?

The number of miles run by trains conveying passengers fitted with each description of brake had to be given. The cases of failure to act were: (1) Failure or partial failure to act when required in case of an accident to a train or a collision between trains being imminent. (2) Failure or partial failure to act under ordinary circumstances to stop a train when required. Under each head the date of failure, description of brake and particulars of failure were to be given. In 1904 the Board of Trade agreed that that information need no longer be sent in.

Taking events in their historical order, mention must here be made, seeing that it arose out of an accident, of an incident concerned with the failure of the Tay Bridge on December 28th, 1879. The officer who inspected the work was the late Major-General Hutchinson—a particularly kind friend to the author who had many dealings with him, as the Lancashire and Yorkshire was one of the lines he took. As some criticism was levelled at General Hutchinson after the failure of the bridge, a minute of the Board of Trade was prepared on July 15th, 1880, and approved by Mr. Chamberlain, the then President. It opened by observing:

"My Lords desire, in the first place, to state that they have always placed entire confidence in Major-General Hutchinson. No more competent, conscientious and intelligent officer could be found to whom to entrust the inspection of the structure in question, and they are of opinion that his conduct of that inspection has not been such as to forfeit their confidence."

The minute proceeded to show that the inspecting officer's powers were limited. If the officer reported that the opening of the work submitted would be attended with danger to the public, the Board of Trade had power within 10 days to postpone the opening. In the absence of a report to that effect the Board had no powers in the matter and the railway company was at liberty, on its own responsibility, to open the line and to convey passengers over it.

In view of what the author has already said as to the legislature objecting to interfering with railway administration, the following should be particularly noted:—

"The Board of Trade are unwilling to conclude this minute without some general remarks on the policy of the legislation to which they have adverted. It may appear to some that the present state of things is one which cannot be logically defended and that the Board of Trade ought to be entrusted with further powers. The experience of a great number of years has, however, shown that the present system does not work unsatisfactorily, and a little consideration will show that the public safety and convenience would not be promoted by such a change.

"In the first place, if the Board of Trade were to be held responsible for the designs of railway structures and for the supervision of their execu-

tion, they must employ a staff as experienced, as numerous, and probably as highly remunerated as the civil engineers, by and under whom these structures are now designed and executed. It is scarcely necessary to observe on the impracticability of such a step.

"But this is not all. If any public department were entrusted with the power and the duty of correcting and guaranteeing the designs of those engineers who are responsible for railway structures, the result would be to check and control the enterprise which has done so much for the country, and to substitute for the real responsibility which rests on the railway engineer the unreal and delusive responsibility of a public office. At the present moment there is no one who is more deserving of pity than the civil engineer who designed and constructed the Tay Bridge, and who, as the law now stands, is held responsible for its defects. With his case in view, it is in the highest degree improbable that any civil engineer entrusted with a similar task in future will commit similar errors. Had the law been such as to make the report of the inspecting officer a guarantee for the design, this responsibility would have been removed from the civil engineer, and the public would instead have had to trust to a public officer whose knowledge and control must be comparatively inadequate, and against whom no similar responsibility can be enforced. In like manner to impose on any public department the duty of exercising a control over the current management of railways would be attended with equal difficulty and danger. To say nothing of the necessary evils of double management, any Government department exercising such control would, if slack in their supervision, appear to guarantee methods of working which might be really faulty and insufficient, and would, if the supervision were more stringent, interfere with railway management to such an extent as to alienate from it the public confidence and destroy with it its moral influence and its capacity for usefulness. Whilst, therefore, it must be fully admitted that the public safety in the first place and public convenience in the second, are the principal, if not the only, considerations which ought to govern such cases, it appears that these objects would not be promoted if a greater responsibility rested with the Board of Trade and its officers, and a lesser responsibility with the Company and their engineer."

The Regulation of Railways Act of 1880—52 & 53 Vic., c. 57—was the sequel to the Armagh disaster of June 12th, 1889. An excursion train, with a Sunday-school party, failed to climb the bank of 1 in 82 and 1 in 75 after leaving Armagh. It was arranged between the trainmen to divide the train, but the rear portion was inadequately secured and when the driver eased back the rear portion broke free and ran away. Absolute block working was not in force and a second passenger train had been allowed to leave Armagh and the two met. There were 80 passengers killed. The excursion train was equipped with the vacuum brake, but it was not automatic in its action or the division

of the train would have applied the brakes and held the rear portion. With such a terrible object lesson of the evils of a non-automatic brake and of the need for the block system, the Government had no difficulty in obtaining this Act to make the block system, concentration and interlocking on passenger lines and the provision of automatic continuous brakes on passenger trains compulsory. It is due to the large majority of railway companies to observe that for only a small percentage was the Act needed. The Board of Trade was also given power to call for returns as to hours of duty, a matter as to which further authority was given in 1893 by 56 & 57 Vic., c. 29.

The Railway Employment (Prevention of Accidents) Act of 1900—63 & 64 Vic., c. 27—although, as its title implies, applying to railway servants—and therefore outside the subject of the present work—gave very great power to the Board of Trade in the matter of railway accidents generally. It may order the use of any plant or appliance which has been shown to the satisfaction of the Board of Trade to be calculated to reduce danger to persons employed on a railway. Thus, automatic train control would prevent collisions and so "reduce danger to persons employed on a railway." The substitution of electric lighting for gas or some anti-telescoping device might, on the other hand, be ruled as outside. Whilst, however, the Board of Trade—now the Ministry of Transport—could order any safety appliance, it cannot be confirmed, should the railway companies object, unless the Railway and Canal Commission, on the Order being referred to them, say it is reasonable.

To make the present record complete it should be noted that all the powers as to railways possessed by the Board of Trade were transferred to the Ministry of Transport on the constitution of the latter in 1919. The procedure as to accident inquiries may also be noted. All accident returns go before the chief inspecting officer of railways who determines which shall be inquired into. Naturally, only the more serious are investigated; some are, however, followed up, with good results, by correspondence. An intimation is then sent by the Secretary of the Ministry of Transport to the secretary of the railway company that such-and-such an officer has been appointed to hold an investigation. That gentleman will communicate direct with the recognised officer of the railway company, stating when and at what hour he will attend. Meanwhile a plan of the site of the accident will be prepared. If it is a collision the signals concerned are shown; if a derailment the positions taken by the derailed vehicles when they came to rest are indicated, also all marks, broken track, &c. The inspecting officer on arrival will inspect the scene and make himself conversant with the locality and with any of its special features. Usually the railway company would have previously held its own official inquiry and a copy of the evidence then taken is given to the

inspecting officer which forms his brief. No other witness is present when a man gives his evidence. The statement of the latter usually leads off by giving his name, occupation, length of service and of the period during which he had filled his present post. The time he came on duty is then given and, after that, the usual procedure of giving evidence is followed, mostly by answers to questions put by the inspecting officer on the statement lying before him. The latter, however, is, in a sense, only the examination-in-chief, as the inspector soon grasps the situation and commences asking questions that have not previously been referred to.

It will be convenient to say here that officials of the men's unions attend all inquiries and watch over their members' interests. When the inspecting officer has completed his examination of a witness the company's officers representing the traffic or operating, the locomotive and, if necessary, the engineering departments ask any question that will, in their opinion, make any point clearer. The union representatives then do the same in order to, if necessary, protect their clients. The last was not always the case. The author's old railway—the Lancashire and Yorkshire—always admitted representatives of the unions, but some of the other companies were strongly opposed to such a step, and, as the inquiries were on their property, their opposition succeeded. Occasionally, the inspecting officers have desired that the men's representatives should be present and, to overcome the objections of the railway company, they have hired and paid for rooms in an hotel. At first the unions' representatives were little in evidence, but now they are almost as much to the fore as the leading officers of the railway company.

Except where criminal proceedings are possible and the men concerned have therefore to be protected, all inquiries are held in public, but the inspecting officer is the sole authority to determine that; the inquiry is his. Usually, though, none of the public is present, for the simple reason that it is not publicly known that any inquiry is being held. The evidence is not given on oath nor are the statements signed. A reason for that is that the inquiry is not a court of law but held simply to determine the cause in order that steps may, if necessary, be taken to avoid future similar accidents. In due time, usually in a couple of months or so, the inspecting officer's report is published. It opens with a

brief statement as to what happened and its results in personal and material damage. Then follows the "description" which is information that enables the reader to visualise the scene and its surroundings. The conclusions of the officer and his recommendations follow and, usually, in an appendix is given a list of the damage done. A certain number of copies of the report are sent to the company concerned and the press also is supplied. The general public does not, however, see the report until it is published in a quarterly return from the Stationery Office. Where criminal proceedings have been commenced or are likely the report is not published until they have been concluded. Such a step is obviously necessary in order to avoid the man's case being prejudiced by the conclusions—always frankly expressed—of the inspecting officer.

The evidence given by the witnesses used to be embodied in the report. Prior to 1877 this was summarised, but from that year onwards it was given in full. In July, 1917, however, owing to war conditions requiring an economy in stationery and printing the evidence was omitted. It cannot be said that the reports suffer in the least as a consequence, though those interested could often find a useful piece of information in a man's evidence.

The remark was made just now as to the accident reports being published as a Stationery Office publication. It is only of recent years that they have appeared in that way; the quarterly returns were presented to Parliament and came out as Command Papers. As each member of Parliament and others were thus entitled to a copy free it was decided, as a means towards economy during the War, to issue them as Stationery Office publications.

There are, further, two annual publications—the Accident Returns, which is a collection of figures only, and the Annual Accident Report. The latter has been a feature since 1872 and those composed by Captain Tyler up to the time of his retirement were documents full of valuable information. Later reports were presented in a less interesting way until Sir Herbert Jekyll came to deal with them in 1901. They then became particularly strong on the statistical side. The ideal report, however, is that made by the present chief inspecting officer, Sir John Pringle. They are concise, but complete, and, quite correctly, are more devoted to the causes of accidents than to their number.

CHAPTER III.

The Tables Explained.

The following nine tables and the two charts which follow the preface are fairly self-explanatory. The former, except Tables VIII and IX, have been compiled from the annual reports of the Board of Trade, and, since 1919, of those of the Ministry of Transport. The latter body was set up in the year just named and took over the duties, as regards railways, of the Board of Trade.

TABLE I.—*Accidents reported in 1851-1924 inclusive, in five-year periods.*

It will be noticed in this table that the highest number of passenger train collisions and derailments was in the period 1871-1880. That, no doubt, was the case but, when comparing the figures for those years with those for the period 1851-1870 the influence of the Act of 1871, referred to on page 13 of the chapter on Legislation, on the wider character of the accidents to be reported must be remembered.

The sudden increase in passenger train collisions and derailments observable after 1905 was due to the Order of December 21st, 1906, mentioned on page 14. That Order also explains the big jump, at the same time, in the goods train collisions and derailments reported at that period.

Before drawing attention to the figures relating to collisions with buffer stops and with vehicles standing at or near buffer stops, it should be said that, as the second part of that heading implies, buffer stop collisions are not always collisions with the buffer stops themselves. Horse boxes, carriage trucks, empty coaches, loaded and empty wagons, light engines and, even, complete trains often stand in terminal stations and the term "buffer stop collisions" covers collisions with all such, as well as with buffer stops. The noteworthy feature about that class of accident was that its frequency increased as soon as continuous brakes began to be adopted, *i.e.*, about 1885. That fact suggests that drivers, when given power brakes, relied too much upon them and approached terminal stations with less care.

The entry "Trains or engines travelling in the wrong direction through points set improperly" covered those cases, very frequent before point and signal levers were concentrated and interlocked, which were legislated for by the Act of 1889. That Act made concentration and interlocking compulsory and one consequence was that when the annual returns, as noted on page 14 of the previous chapter, were revised in 1895, this particular entry was dropped as no longer required.

The sudden and large increase in the number of fires in trains after 1905 does not imply that fires became more frequent then. Nor was it owing to the Order of December, 1916, as fires had had to be reported since the Act of 1871 came into operation. It was due no doubt to the apparent appreciation, after the Order of 1906, that certain incidents, hitherto ignored, should be reported and, so, the number of fires reported in 1907 was 170, as against 19 in 1906.

The apparent increase in the number of failures of machinery, springs, &c., of engines came about in 1907 when 86 cases were reported, in contrast to 10 in 1906. As the increase was general it may have been a result of the Order of December 21st, 1906, already referred to, or, possibly, of action therein by the Conference of Locomotive Superintendents. It is, however, the fact that it was the above-mentioned Order that led to the greater number of reports of failures of couplings, as the Order specifically laid down that all cases of trains—passenger or goods—becoming divided while running were to be reported. The further big increase in coupling failures in the 1911-15 period was due to instructions being given in December, 1913, that divisions of trains, when starting or stopping, had in future to be reported, along with those occurring whilst running.

In any study of the figures for broken rails it must be remembered that the axle load has, from time to time, been increased and that the tonnage has grown yearly—see Chart II. That the number of rail failures has gradually fallen is, therefore, all the more satisfactory.

TABLE II.—*Accidents reported in 1921-1924 inclusive.*

The grouping of the British railways and the exclusion of the Irish placed some little space at the disposal of the Ministry of Transport in the compilation of the annual accident returns. That allowed for a large number of sub-headings to be inserted and for the figures for each company in respect to each heading and sub-heading to be given. That was first done in the 1923 returns and the figures for 1921 and 1922, *i.e.*, before grouping, were adjusted and added. The Table also gives the figures for 1924.

The author has, further, adjusted the figures for 1921 so that the Irish railways are excluded therefrom and all four years are thus comparable.

The table now given was prepared in anticipation of the 1924 figures appearing, and thus it has not been practicable to show two further

TABLE I.—Accidents reported 1851 to 1924 inclusive.

	1851-1855	1856-1860	1861-1865	1866-1870	1871-1875	1876-1880	1881-1885	1886-1890	1891-1895	1896-1900	1901-1905	1906-1910	1911-1915	1916-1920	1921-1924
collisions between passenger trains or parts of passenger trains	36	31	44	61	241	235	182	186	147	185	184	233	217	172	59
" " " " " and goods trains, light engines, etc.	181	146	163	256	781	507	285	258	229	288	217	290	316	258	187
" " " " " goods trains and parts of goods trains, light engines, etc.	34	19	27	21	267	151	108	100	91	215	167	715	662	739	454
" " " " " trains and vehicles standing foul of the line	—	11	2	19	Commenced in 1886	88	119	88	107	97	9	47	58	39	47
" " " " " stations between trains and buffer stops, or vehicles against buffer stops—	—	—	—	—	Commenced in 1886	—	—	—	—	—	—	—	—	—	22
" " " " " From too high speed	—	—	—	—	Commenced in 1886	—	—	—	—	—	—	—	—	—	—
" " " " " other causes	—	—	—	—	Commenced in 1886	—	—	—	—	—	—	—	—	—	—
" " " " " coming into contact with projections from other trains	—	—	—	—	Commenced in 1886	—	—	—	—	—	—	—	—	—	—
" " " " " passenger trains or parts of passenger trains leaving the rails	64	36	57	82	387	426	249	16	4	67	71	95	135	154	149
" " " " " goods	10	4	18	8	209	115	59	50	46	84	80	1,344	1,256	962	292
" " " " " engines or engines travelling in the wrong direction through points set improperly	27	42	24	37	217	102	85	34	31	—	—	—	—	—	1,689
" " " " " trains running through gates at level crossings or into other obstructions	Co	mmen	ced in	1871	928	1,169	941	863	953	1,110	1,098	1,637	1,765	1,106	1,072
" " " " " simultaneous accidents in trains	Co	mmen	ced in	1871	97	43	28	43	15	69	59	614	945	565	373
" " " " " stalling of boilers of engines	1	—	—	2	Omitted 1871-1900	—	—	—	—	—	—	—	—	—	—
" " " " " or tubes of engines	12	16	17	17	41	38	16	19	13	17	25	49	17	7*	15
" " " " " failure of machinery, springs, etc., of engines	Co	mmen	ced in	1871	81	47	21	44	37	31	26	305	286	68*	191
" " " " " tires	Co	mmen	ced in	1871	826	5,297	5,478	3,546	2,389	1,687	894	662	403	122*	280
" " " " " wheels or axles	37	33	35	29	145	157	10	6	15	11	9	135	6	8*	Ceased
" " " " " axles	Co	mmen	ced in	1871	1,048	2,498	2,169	1,391	1,053	884	782	683	470	230*	325
" " " " " brake apparatus	Co	mmen	ced in	1871	21	9	4	4	5	5	105	9,497	See next two entries	See next two entries	—
" " " " " couplings	8	2	6	5	77	81	52	47	50	70	105	9,497	1903	1893	—
" " " " " from breakage	—	—	—	—	Commenced in 1911	Commenced in 1911	Commenced in 1911	Commenced in 1911	Commenced in 1911	Commenced in 1911	Commenced in 1911	Commenced in 1911	Commenced in 1911	Commenced in 1911	Commenced in 1911
" " " " " other causes than breakage	—	—	—	—	14	6	10	8	4	2	—	5	4	4*	Ceased
" " " " " ropes used in working inclines	Co	mmen	ced in	1871	12	45	20	11	11	11	—	—	—	—	—
" " " " " tunnels, bridges, viaducts, culverts, etc.	Co	mmen	ced in	1871	1,442	2,936	1,946	1,254	1,360	1,470	1,588	1,437	1,247	548*	811
" " " " " seen rails	Co	mmen	ced in	1871	108	184	158	86	98	133	150	138	206	50*	125
" " " " " siding of the permanent way	Co	mmen	ced in	1871	70	103	67	57	72	62	121	134	174	47*	152
" " " " " at stations, bridges, viaducts, etc.	Co	mmen	ced in	1871	28	18	21	42	43	52	37	86	150	51	182
" " " " " other accidents	Co	mmen	ced in	1871	64	50	14	14	22	29	4	4	3	7*	8

* Not reported during the war years 1916, 1917 and 1918.

† Commenced in 1885.

N.B.—The railways of Ireland are included in the years 1851-1919, but excluded from those for 1920-1924.

TABLE II.—Accidents reported 1921 to 1924 inclusive.

	1921.					1922.					1923.					1924.						
	L.M.S.	L.N.E.	G.W.	Southern.	Other Cos.	P.O. wagons.	Total.	L.M.S.	L.N.E.	G.W.	Southern.	Other Cos.	P.O. wagons.	Total.	L.M.S.	L.N.E.	G.W.	Southern.	Other Cos.	P.O. wagons.	Total.	
collisions between—																						
passenger trains or parts of	4	3	1	4	2	14	13	7	4	1	1	—	19	7	3	1	2	—	—	—	13	
passenger trains and goods	12	18	6	8	3	47	38	16	12	1	5	4	48	18	22	4	7	3	—	—	54	
tractors or light engines	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
goods trains or parts of	36	32	6	7	1	82	87	20	41	13	9	4	130	54	70	9	13	6	—	—	155	
goods trains, light en- gines, etc.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
trains and vehicles stand- ing on the line	1	—	—	1	1	3	1	1	—	—	—	—	—	7	10	—	—	1	—	—	18	
trains and buffer stops or vehicles against buffer stops—																						
(a) From trains at too high speeds	3	2	2	—	1	8	6	2	1	—	—	2	3	2	—	—	—	—	—	—	4	
(b) From other causes ..	22	11	4	6	2	35	33	13	6	5	6	3	40	15	9	5	12	—	—	—	41	
(c) From contact with projections from other trains in transit of—	1	3	1	—	—	5	3	2	1	—	—	—	6	5	—	—	—	—	—	—	5	
passenger trains or parts of	17	8	3	3	2	33	36	14	13	3	3	5	69	12	26	10	9	5	—	—	62	
goods trains or parts of	88	133	49	34	11	315	263	41	111	73	29	9	349	66	296	27	8	10	—	—	346	
goods trains or parts of trains running through gates at level crossings, or into other obstructions	46	108	41	29	10	235	243	42	117	54	23	7	263	55	156	57	51	12	—	—	331	
goods in trains	24	22	9	2	3	60	117	13	58	3	1	2	98	22	38	5	28	5	—	—	98	
collisions, accidents to trains	2	—	—	—	—	2	6	—	3	1	2	—	4	5	8	2	5	4	—	—	24	
bursting of tubes or boilers of engines	2	—	—	1	—	3	3	—	1	2	—	—	6	—	—	—	3	—	—	—	3	
failure of machinery, springs, etc., of engines ..	30	14	4	2	—	50	62	24	24	6	8	—	39	16	14	1	7	2	—	—	40	
failure of tires of—																						
Engines	—	—	—	—	—	—	14	—	—	—	—	—	18	8	4	—	—	—	—	—	16	
Tenders	—	—	—	—	—	—	2	—	—	—	—	—	2	—	—	—	—	—	—	—	3	
Coaches	—	—	—	—	—	—	2	—	—	—	—	—	5	—	—	—	—	—	—	—	3	
Vans	—	—	—	—	—	—	1	—	—	—	—	—	3	—	—	—	—	—	—	—	1	
Railway-owned wagons ..	—	—	—	—	—	—	13	—	—	—	—	—	34	—	—	—	—	—	—	—	19	
Privately-owned wagons ..	—	—	—	—	—	—	23	—	—	—	—	—	12	—	—	—	—	—	—	—	19	
Total failures of tires ..	29	13	4	6	2	28	34	18	9	3	4	1	23	85	34	12	4	2	—	—	38	

TABLE II.—Accidents reported 1921 to 1924 inclusive—continued.

	1921.							1922.							1923.							1924.							
	L.M.S.	L.N.E.	G.W.	Southern.	Other Cos.	P.O. wagons.	Total.	L.M.S.	L.N.E.	G.W.	Southern.	Other Cos.	P.O. wagons.	Total.	L.M.S.	L.N.E.	G.W.	Southern.	Other Cos.	P.O. wagons.	Total.	L.M.S.	L.N.E.	G.W.	Southern.	Other Cos.	P.O. wagons.	Total.	
failure by unfastening of couplings of—																													
engines or tenders ..						2																							
locomotives ..						94																							
coaches ..						517																							
railway-owned wagons ..						490																							
privately-owned wagons ..						490																							
Total ..						490																							
Total failures by unfastenings of couplings ..	169	315	46	56	27	490	1,103	168	310	55	39	15	692	1,279	297	416	79	64	11	729	1,516	201	359	63	80	19	654	1,376	
coupled whilst running or starting ..																													
engines, etc. ..																													
locomotives ..																													
coaches ..																													
wagons ..																													
Total ..																													
failure of tunnels, bridges, viaducts, culverts, etc. ..																													
locomotives ..																													
coaches ..																													
wagons ..																													
Total ..																													
failure of wheels, axles, rods, and other parts of rolling stock ..																													
locomotives ..																													
coaches ..																													
wagons ..																													
Total ..																													
failure of telegraph, telephone, and other apparatus ..																													
locomotives ..																													
coaches ..																													
wagons ..																													
Total ..																													
miscellaneous ..																													
Total ..																													

NOTE.—The figures for 1921 and 1922 are given in the groups operating from January 1st, 1923.

sub-headings added in the 1924 figures. These are (1) under "Trains running through gates at level crossings or into other obstructions"; and (2) "Fires in trains." The former is classified under—Running into Gates, of which there were 145 cases in 1924; Running over Animals, of which there were 140 reports and Running into other Obstacles, of which there were 46 cases. Fires in trains are given in respect of passenger and freight trains. There were 20 of the former and 78 of the latter in 1924.

The author has always been impressed by the fact that the Great Western reports fewer failures comparatively than the other large companies, especially as regards couplings. That fact is made evident in Table II. It suggests either that the company does not report as strictly as other companies, or that its equipment is better maintained. The author is satisfied that the explanation lies in the latter fact and his view finds some corroboration in the Midland Company's figures before that company was grouped. It is well known that the latter company had a fine upkeep.

It will be noticed that under most of the headings there was an increase in 1923 as compared with 1922. It was suggested by Sir John Pringle, in his annual report for the former year, that the increase in collisions was apparent rather than real and was the result of a more comprehensive system of reporting accidents due to amalgamation of the railway companies. The present author suggests that the same explanation applies to the increase in some of the headings other than collisions.

It is difficult to account for the increase in 1924 in the number of goods train collisions. Particularly is that so when Sir John Pringle's suggestion, just named, is remembered and, more so, when it is seen that goods train derailments were about the same. Yet more remarkable and difficult to understand is the sudden number of collisions with trains or vehicles foul of the line.

A very gratifying feature of the figures for 1924 is the fewer number of cases of failure of equipment or track.

TABLE III.—*Passengers and Servants killed in Train Accidents, 1850-1924.*

It is the author's contention that the true test as to safety is the number of accidents, and not that of the casualties resulting therefrom—important and of personal interest to all that travel though the latter may be. However small the results of an accident it is something to be avoided. The number killed, however, is a feature that naturally appeals to all of us, and so, in Table III is given the total of those—passengers and servants—killed in train accidents between 1850 and 1924, inclusive, divided under the same headings, as to causes, as

The worst five-year period, as regards passengers, was 1870-74, as it included the Newark, Stairfoot, Kirtlebridge, Wigan, Bo'ness, Norwich and Shipton accidents, in which 16, 15, 10, 13, 16, 21 and 34 passengers, respectively, were killed. The 1875-1879 period included the 73 passengers drowned in the Tay Bridge disaster, whilst in 1885-1889 came the Armagh disaster, when 80, mostly young children, were killed. The serious disasters at Hall Road, Witham, Salisbury, Grantham, Elliot Junction and Shrewbury, giving a total of 100 passengers killed, are reflected in the 1905-1909 figures and that at Quintinshill—estimated at 224—in those for 1915-1919.

It is very gratifying to notice that the five-year period ended on December 31st, 1924, was the best on record as regards servants killed in train accidents and, for passengers, has only once been bettered. As an example of how unwise it is to boast about railway accidents or to be sanguine as to the likely results, it may be remarked that until eight weeks of the end of the 1920-1924 period the number of passengers killed stood at the record total of 41. The Lytham derailment occurred on November 3rd, and 14 passengers lost their lives then.

A significant fact and one not without pathos is the large number of servants killed in train accidents prior to 1885. Fancy! nearly 350 lives were lost in the 15 years 1870-1884, and most of them, being trainmen, would necessarily be experienced men. What seems more pathetic still is that, despite there being hundreds of passengers travelling to each servant, there were nearly as many servants as passengers killed in train accidents in those 15 years.

TABLE IV. (p. 28).—*Number of accidents of the various classes inquired into, 1871-1908.*

There were 2,473 accidents inquired into during the years 1871-1890 inclusive, and 807 in those from 1891 to 1908—the one a period of 20 years and the other one of 18 years. The annual reports divided these accidents under 11 heads and the totals for each class in the two periods are shown in Table IV. The reason the author has separated the two totals is to show the beneficial effect of the Act of 1889, whilst the reason the list does not go beyond 1908 is that when Mr.—later Sir William—Marwood became responsible for the annual report he reduced the number of heads to seven as shown in Table VI. Comment on Table IV appears unnecessary.

TABLE V. (p. 28).—*Causes, or contributory causes, assigned to the accidents of 1871-1908.*

Table V is a companion to Table IV, and is compiled from the annual reports. The causes number more than the total of 3,280 in Table IV because, often, more than one cause led to an accident. These figures show that in other directions than those influenced by the Act of

TABLE III.—No. of passengers and servants killed in train accidents 1850 to 1924 inclusive.

	Killed in Train Accidents.																												
	Passengers.							Servants.																					
1850-54	17	30	60	12	30	50	31	106	13	20	17	82	38	242	36	2	1	3	4	9	3	9	3	8	3	3	5	3	1920-24
1855-59	3	18	29	56	95	21	20	17	44	7	3	2	29	34	3	26	6	16	16	25	6	14	6	9	8	6	14	5	1915-19
1860-64	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	17	15	13	47	22	12	11	6	16	12	7	11	19	1910-14
1865-69	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(c)	(c)	(c)	(c)	(c)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(c)	(c)	(c)	1905-09
1870-74	(b)	—	—	—	—	—	1	1	1	(c)	(c)	(c)	(c)	(c)	(b)	(a)	(a)	—	3	1	2	—	—	—	(c)	(c)	(c)	(c)	1900-04
1875-79	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1895-99
1880-84	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1885-89
1885-89	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1880-84
1890-94	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1875-79
1895-99	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1870-74
1900-04	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1865-69
1905-09	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1860-64
1910-14	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1855-59
1915-19	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1850-54
1920-24	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	1920-24

Collisions between passenger trains or parts of passenger trains
 Collisions between passenger trains and goods trains, light engines, etc.
 Collisions between goods trains and parts of goods trains, light engines, etc.
 Collisions between trains and vehicles standing foul of the line
 Trains entering stations at too high a speed
 Collisions between trains and buffer stops or vehicles against buffer stops
 (1) From too high speed
 (2) From other causes
 Trains coming in contact with projections from other trains
 Passenger trains or parts of passenger trains leaving the rails
 Goods trains or parts of goods trains leaving the rails
 Trains engines travelling in the wrong direction through points set improperly
 Trains running through gates or into other obstructions

TABLE III.—No. of passengers and servants killed in train accidents 1850 to 1924 inclusive—Continued.

	Killed in Train Accidents.															
	Passengers.							Servants.								
1850-54	1															
1855-59	1															
1860-64	3															
1865-69	3															
1870-74		(g)	(a)													
1875-79	1	(g)	(g)			1										
1880-84	1	(g)	(g)													
1885-89		(g)	(b)													
1890-94		(g)	(a)													
1895-99		(g)	(a)													
1900-04		(a)	(a)													
1905-09		(a)	(a)													
1910-14		(a)	(a)													
1915-19		(a)	(a)													
1920-24	1	(a)	(a)													
1850-54	78	68	126	111	213	167	114	138	78	66	53	116	96	265	55	97
Total killed																

(a) Commenced in 1886.

(b) Commenced in 1855.

(c) See entries 6 (i), 6 (h).

(d) Commenced in 1878.

(e) Omitted after 1896.

(f) Commenced in 1871.

(g) Omitted 1871-1900.

(h) See entry 15.

(i) See entry 22.

(j) See entries 19, 20.

(k) See entry 18.

(l) See entry 26.

1889 has there been an improvement, e.g., in the maintenance and construction of engines, rolling-stock, roads and works. Negligence, want of care and excessive speed do not, however, indicate as comparatively great a change for the better.

TABLE VI.—*Number of accidents inquired into, 1909–1924 inclusive.*

The above speaks for itself, the only necessary comment is that the classes of accidents were reduced by Mr. Marwood to seven.

TABLE IV.—*Class of the 3,280 accidents inquired into—1871–1908.*

	1871–1890.	1891–1908.
In consequence of obstructions of, or defects in, the permanent way or works	304	86
From boiler explosions or failures of axles, wheels or tires, or from other defects in rolling-stock	214	43
From trains entering stations at too great a speed	116	92
Collisions between engines and trains following one another on the same line of rails, except at junctions, stations or sidings	126	48
Collisions at junctions	247	97
Collisions within fixed signals at stations or sidings	921	322
Collisions between engines or trains meeting in opposite directions	58	9
Collisions at level crossings of two railways	7	1
In consequence of engines or trains being wrongly turned into sidings, or otherwise, through facing points	276	24
Accidents on inclines	99	22
Miscellaneous accidents	105	63
Total No. of Inquiries	2,473	807

TABLE V.—*Causes or contributory causes of the 3,280 accidents inquired into—1871–1908.*

	1871–1890.	1891–1908.
Fracture or unloosening of couplings	58	20
Defective maintenance of machinery of trains	108	14
Defective maintenance of roads or works	220	35
Defective construction of machinery of trains	89	17
Defective construction of road or works	120	17
Insufficient or deficient accommodation for the requirements of the traffic	170	16
Insufficient establishment, inexperienced servants, or too long hours of duty	76	29
Insufficient brake power	343	23
Defective arrangement of signals or points, or want of or defective locking apparatus, or want of safety points or locking bars or bolts	498	50
Insufficient or inadequately enforced regulations	242	98
Defective systems for securing intervals between trains, or want of telegraphic communication or of block telegraph systems	353	41
Negligence or want of care or mistakes of officers or servants	1,666	634
Excessive speed, having regard to engine or road or other circumstances	265	114
Foggy weather	190	90

TABLE VI.—*No. of accidents, under their various classes, inquired into—1909 to 1924 inclusive.*

	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	1924.
Collisions in which passenger trains were concerned	13	14	16	12	21	12	15	7	4	5	23	20	14	12	15	13
Other collisions	1	1	4	4	4	3	—	2	1	5	5	2	—	4	5	2
Deraillments of passenger trains	6	4	3	7	4	3	5	3	1	2	2	1	3	5	2	4
Other deraillments	—	1	—	—	1	—	—	—	—	—	—	—	—	1	—	—
Accidents due to failure or defective construction of engines or rolling-stock	1	—	—	1	—	—	—	—	—	—	—	—	1	5	3	1
Fires in trains	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—
Other accidents	—	—	—	—	—	1	—	—	—	—	—	—	—	1	1	—
Total No. of Inquiries	21	20	23	24	30	19	20	12	6	12	30	25	18	28	28	20

N.B.—The railways of Ireland are included in the years 1908–1919, inclusive, but excluded from those for 1920–1924.

TABLE VII.—Primary causes of accidents,
1919-1924.

Table V was abandoned by Sir William but was resumed, as to primary—but not primary

and contributory—causes by Sir John Pringle when he became responsible for the annual report on the formation of the Ministry of Transport. Table VII is the result.

TABLE VII.—Primary causes of the accidents inquired into—1919 to 1924 inclusive.

	1919.	1920.	1921.	1922.	1923.	1924.
Failure or insufficiency of equipment	4	7	3	See next two entries	6	3
(a) Engine and rolling-stock	See first entry	6	3	1	5	2
(b) Signalling and permanent way	See first entry	5	2	4	3	4
Failure of enginemen to obey danger signals	10	6	5	6	4	3
Failure of enginemen to give effect to regulations or misjudgment	7	4	1	3	7	3
Failure of signalmen to observe or give effect to regulations	8	7	3	3	5	3
Failure of permanent way staff to give effect to regulations	1	—	—	—	—	1
Failure of employees other than above to give effect to regulations	—	—	3	4	2	—
Failure of traffic staff to carry out correctly coupling duties	—	1	—	—	—	—
Faulty methods of signalling and of yard working	—	—	2	—	—	—
Faulty methods of marshalling for high speed	—	—	—	1	—	—
Irregularities in single-line working	—	—	1	—	—	—
Divided responsibility	—	—	—	—	3	5

TABLE VIII.—Primary causes of accidents
inquired into, 1875-1924.

This Table may be designated as the causes of 50 years' railway accidents. It is divided into five-year periods and a total is given for the first and for the second 25 years. It has been compiled solely by the author, who has had every accident report, for the period named, before him. He first divided the accidents into the four classes of (1) collisions; (2) derailments; (3) failures of track or equipment that did not lead to either a collision or a derailment; (4) miscellaneous. The collisions were then divided into 27 headings which were then sub-divided in order to indicate in whom or where the primary responsibility rested. The 602 derailments were then divided as shown and, finally, the failures and the miscellaneous accidents.

It is most important, though, to remember that, whilst the majority of the collisions, particularly the earlier 25 years of the 1875-1924 period, are shown as being due to the fault of a servant—usually a driver or a signalman—there may have been mitigating circumstances, such as the omission of the railway company to provide some safeguard. Many of the cases where collisions are shown as due to the fault of enginemen could have been avoided by the provision of continuous brakes, whilst in innumerable instances blame was cast on signalmen that should have lain at the door of officers and directors of the company who failed to appreciate the benefits that concentration, the block and uniform signalling would have provided. What those safeguards secured is seen in the later great decrease in the number of passenger train collisions and derail-

ments. For reasons explained on page 14 changes in the character of accidents to be reported led to a big rise in the number of goods train accidents after 1905. In any consideration of these figures it must be remembered, too, that all the while the traffic, as shown in Chart II, had been increasing.

The outstanding feature of this Table and of Table I is the record for the last five years—1920-1924. The period 1915-1919 must be ignored as during the war only serious accidents were inquired into. Let the growing traffic be remembered and that, except in casual installations of track circuit, operating conditions are the same as 30 years ago, and all must be forced to the conclusion that the results are marvellous. It is sometimes said that discontent prevails among railwaymen. If that be so it is not reflected in their work!

TABLE IX (p. 36).—List of all Train Accidents
Fatal to Passengers 1825-1924.

This is an entirely new list which has been compiled by the author and may be termed "One Hundred Years' Railway Accidents." The three entries prior to 1840 have been obtained by reference to Palmer's *Index to the Times*, in which paper, it is safe to say, all railway accidents, fatal to passengers, would, at that time, be recorded. The remainder have been obtained from the annual reports of railway accidents, but considerable research has often been necessary as frequently the total for the year only was given and no further detail; moreover, there was no discrimination between passengers and servants, and often the local newspapers of the period had to be consulted by the author.

	1875-79.	1880-84.	1885-89.	1890-94.	1895-99.	1900-04.	1905-09.	1910-14.	1915-19.	1920-24.	1875-99.	1900-24.
Collisions with standing passenger or goods vehicles—												
Through fault of—												
Signalman	15	5	3	2	5	3	—	3	1	1	30	8
Engineman	9	3	1	1	2	3	—	—	—	—	16	3
Signalman and engineman	—	—	—	—	—	—	—	—	—	—	2	1
Guard	—	—	1	—	1	—	—	—	—	—	—	1
Guard and engineman	—	—	—	—	—	—	—	—	—	—	—	—
Shunter	5	2	—	4	3	2	2	—	1	1	14	6
Signal fitter	1	—	—	—	—	—	—	—	—	—	1	—
Platelay	1	—	—	—	—	—	—	1	—	—	1	—
Through absence of or defect in signalling	1	—	1	—	—	1	—	—	—	—	2	1
Through failure of—												
Engine equipment	1	—	—	—	—	—	—	—	—	—	1	—
Privately-owned wagon equipment	—	—	—	—	—	—	—	—	—	—	—	1
Westinghouse brake equipment	—	1	—	—	—	—	—	—	—	—	1	—
Fay's brake equipment	1	—	—	—	—	—	—	—	—	—	2	—
Through signal needing adjustment	—	2	—	—	—	—	—	—	—	—	2	—
Through misadventure	—	—	—	—	—	—	—	—	—	1	—	1
Collisions with standing passenger or goods vehicles, in fog or falling snow—												
Through fault of—												
Shunter	—	—	—	1	—	—	—	—	—	—	1	—
Fogsignalman	—	1	—	—	—	—	—	—	—	—	1	—
Through absence of or defect in signalling	1	—	—	—	—	—	—	—	—	—	1	—
Collisions with light engine—												
Through fault of—												
Signalman	16	14	6	5	10	9	1	8	3	5	51	26
Engineman	9	12	2	6	8	2	2	2	—	1	37	7
Signalman or engineman	—	—	—	—	—	—	—	—	—	—	—	1
Signalman and engineman	—	—	1	—	—	—	1	—	—	—	2	—
Guard	2	—	—	—	—	—	—	—	—	—	4	—
Shunter	1	—	2	—	1	2	—	—	—	—	1	2
Man in charge of single line working	—	1	—	—	—	—	—	—	—	—	2	1
Station master or inspector	1	—	—	1	—	—	—	—	—	1	2	1
Through absence of or defect in signalling	1	—	1	—	—	1	—	—	—	—	2	—
Through failure of vacuum brake equipment	—	—	1	—	—	—	—	—	—	—	1	—
Collisions with light engine, in fog or falling snow—												
Through fault of—												
Signalman	3	3	1	2	1	—	3	1	—	3	10	7
Engineman	1	—	—	2	—	1	—	—	—	—	3	1
Signalman and engineman	1	—	—	—	—	—	—	—	1	—	1	1
Collisions with vehicles foul—												
By being—												
Derailed in running	3	2	1	—	—	—	1	—	—	—	6	1
Derailed in shunting	11	6	2	2	5	3	2	—	1	—	26	6
Derailed through signal passed at "danger"	—	—	—	1	1	—	—	—	—	—	2	—
Left foul	—	3	—	1	—	—	—	—	—	—	4	—
Blown foul	—	—	—	—	1	—	—	—	—	—	1	—
Collisions with buffer stops or vehicles near buffer stops—												
Through fault of—												
Signalman	—	1	1	—	—	1	1	—	—	3	2	5
Engineman	—	—	—	—	—	—	—	—	—	—	—	—
Unsuitable speed	4	3	5	7	2	5	1	2	—	2	21	10
Want of care	6	13	11	8	5	6	1	1	1	1	43	8
Mishandling brake	—	6	1	4	5	1	3	1	1	1	16	3
Not coupling continuous brake	—	2	1	—	—	—	1	2	—	—	3	4
Passing signal at "danger"	—	—	1	—	4	3	—	1	2	1	5	7
Error of judgment	—	9	10	14	14	5	1	4	1	3	47	14
Misadventure	1	—	—	1	1	—	2	1	—	2	3	5
Passing signal at "danger" in fog	—	—	—	—	—	1	—	—	—	—	—	1
Misadventure in fog	—	—	—	1	—	1	—	—	—	—	—	1
Signalman and engineman	—	—	—	—	—	1	—	—	—	—	7	—
Guard	3	3	—	—	1	—	—	—	—	—	2	—
Guard and driver	—	—	—	1	1	—	—	—	—	—	—	—
Shunter	2	4	2	1	1	—	—	—	—	—	10	—
Station master or inspector	—	—	—	1	—	—	—	—	—	—	1	—
Platelay	—	—	—	—	—	1	—	—	—	—	—	1
Man in other grade than above	—	—	—	—	1	—	—	—	—	—	—	—
Through failure of—												
Equipment on engine	—	—	—	—	—	—	—	—	—	—	1	1
Equipment on carriage	—	—	1	—	—	—	—	—	—	—	1	—
Equipment on railway-owned wagon	—	—	—	—	1	—	—	—	—	—	—	—
Equipment of Westinghouse brake	—	—	—	—	—	—	—	—	—	1	—	2
Equipment of vacuum brake	1	2	—	1	—	2	—	—	—	—	4	1
Through want of sufficient brake power	—	2	1	—	—	1	—	—	—	—	3	1

	1875-79.	1880-84.	1885-89.	1890-94.	1895-99.	1900-04.	1905-09.	1910-14.	1915-19.	1920-24.	1875-99.	1900-24.
Collisions due to trains being turned into the wrong road—												
Through fault of—												
Signalman—points connected to box ..	10	9	5	3	2	1	2	3	—	—	29	6
Pointsman—points not connected to box ..	6	8	6	1	—	—	—	—	—	—	21	—
Shunter	—	2	—	—	—	—	—	—	—	—	2	—
Flagman	—	1	—	—	—	—	—	—	—	—	1	—
Watchman at disused junction	1	—	—	—	—	—	—	—	—	—	1	—
Through signal being passed at "danger" ..	1	6	—	—	—	—	—	—	—	—	7	—
Through defective point connections ..	1	7	1	1	—	—	—	—	—	—	10	—
Through interlocking complete or out of order ..	1	4	2	—	—	—	—	—	—	—	7	—
Through facing points being laid in the wrong road ..	1	—	—	—	—	—	—	—	—	—	1	—
Through fault of signalman in fog or falling snow	—	1	—	—	—	3	—	—	—	—	1	3
Collisions due to train being out of control—												
Through load apparently exceeding capacity of engine	4	—	—	—	—	—	—	—	—	—	4	—
Through insufficient brake power	2	1	—	—	1	1	—	—	—	—	4	1
Through fault of—												
Engineman	2	1	1	—	3	1	—	1	2	1	7	5
Guard	2	—	—	2	1	—	—	—	—	—	3	—
Engineman and guard	—	—	—	1	—	—	—	—	—	—	2	—
Engineman and pilotman	—	—	—	—	—	—	—	—	—	—	1	—
Signalman	—	—	—	—	—	—	1	—	—	—	—	1
Through driver not being advised as to load ..	—	—	—	—	—	—	1	—	—	1	—	2
Through misadventure	1	—	—	—	—	—	—	—	—	—	1	—
Collisions from loose vehicles running forward ..	1	1	—	—	1	—	2	—	—	1	3	3
Collisions from loose vehicles running back—												
Through shunt being made before points were set	4	1	—	—	—	—	—	—	—	—	5	—
Through vehicles not being secured	6	1	—	—	1	1	—	—	—	—	8	1
Through being forced out of siding	1	—	—	—	—	—	—	—	—	—	1	—
Through not being coupled to engine	—	1	1	—	—	—	—	—	—	—	2	—
Through failure of—												
Equipment on engine	1	—	—	—	—	—	—	—	—	—	1	—
Equipment on carriage	1	1	—	—	—	—	—	—	—	—	2	—
Equipment on railway-owned wagon	2	—	—	—	—	—	1	—	—	—	2	1
Equipment on privately-owned wagon	1	1	—	—	—	—	1	—	—	—	2	1
Through engine not being able to hold its train	1	—	—	—	—	—	—	—	—	—	1	—
Through brake not being able to hold rear of divided train	—	—	1	—	—	—	—	—	—	—	1	—
Through continuous brake not being used ..	—	—	—	—	—	—	—	1	—	—	—	1
Through misadventure	1	—	1	—	—	—	—	—	—	—	2	—
Collisions with two parts, or with rear part, of divided train—												
Where division caused by failure of—												
Coupling of engine	—	—	1	—	—	—	—	—	—	—	1	—
Coupling of tender	—	—	1	—	—	—	—	—	—	—	1	—
Coupling of carriage	3	4	1	—	—	1	—	—	—	—	8	1
Coupling of railway-owned wagon	6	1	—	2	6	3	1	2	1	—	15	7
Coupling of privately-owned wagon	—	1	—	—	—	—	1	1	—	—	1	2
Drawbar of carriage	2	3	—	—	—	—	—	—	—	—	5	—
Drawbar of railway-owned wagon	3	1	1	—	—	1	—	—	2	—	5	3
Drawbar of privately-owned wagon	—	—	—	—	—	2	—	1	—	—	—	3
Tire of railway-owned wagon	—	—	—	—	—	—	—	—	1	—	—	1
Collisions with loads on passing trains	3	5	1	2	—	—	—	—	—	—	11	—
Collision with level crossing gates	—	—	—	—	1	—	—	—	—	—	1	—
Total Collisions	468	394	220	198	237	169	90	92	65	86	1,517	502

	1875-79.	1880-84.	1885-89.	1890-94.	1895-99.	1900-04.	1905-09.	1910-14.	1915-19.	1920-24.	1875-99.	1900-24.
Deraillments—contd.												
Through wheels of—												
Engine out of gauge			1								1	
Carriage not of standard dimensions	1										1	
Carriage out of gauge				1							1	
Carriage shifted on axle		1			2			1			3	1
Through defective tender								1				1
Through engine not suitable						2						2
Through locking frame defective or interlocking out of order	2										2	
Through facing point equipment disconnected or out of order	3	2				1				1	5	2
Through points needing adjustment	10	1									11	
Through point connections defective	3	1	1								5	
Through want of or incomplete facing point equipment	18	5	2		1						26	
Through facing point locking bar too short	2	1									3	
Through points previously run through and damaged		3	1	3						2	7	2
Through absence of signalling		1									1	
Through signal sticking "off"			1			1	1			1	1	3
Through snow in points			2								2	
Through improper interference with point and signal equipment						1			1	1		3
Through broken rail	4	1	3	1	3		1	1	1	1	12	4
Through fallen rock		3				1					3	1
Through landslip	1	1		2	1				1		5	1
Through permanent way operations not properly protected	11	10	6	5	3	3	1		2	2	35	8
Through lay-out imperfect	7	2	1			2					10	2
Through permanent way defective	26	16	4	3	8	1	2	1			57	4
Through heat distortion	1	3	3				1	2		1	7	4
Through superelevation excessive or insufficient	2	4	2	3							11	
Through gauge too wide or too tight		2	2		1						5	
Through absence of check rail	3	3	2	1							9	
Through permanent way connections defective	3			1							4	
Through adjacent rails of uneven height			1			1					1	1
Through permanent way too weak for locomotives	1	6	1		2	5	1		1	5	10	12
Through effects of thaw after frost					1						1	
Through failure of culvert	1										1	
At diamond crossing	1		1	1	1		3				4	3
From undetermined cause	1	1	3	1	1		1				7	1
Total Deraillments	167	135	87	43	52	31	33	21	14	19	484	118
Failure of track or equipment that did not lead to collision or derailment—												
Of bridge	3	6		1	1			1			11	1
Of staging for repairing viaduct					1						1	
Of tunnel					1					1	1	1
Of boiler	12	7	1	2	2	2	3	1		1	24	7
Of step of tender										1	1	1
Of connecting rod of engine	2	4	1		2					5	9	5
Of coupling of carriage	3	2									5	
Of drawbar of carriage	1										1	
Total Failures	21	19	2	3	7	2	3	2		8	52	15
Miscellaneous accidents												
	4	3	2	1	2	3	1			3	12	7
Total Collisions	488	394	220	198	237	169	90	92	65	88	1,517	502
Deraillments	167	135	87	43	52	31	33	21	14	19	484	118
Failures	21	19	2	3	7	2	3	2		8	52	15
Miscellaneous	4	3	2	1	2	3	1			3	12	7
Grand Total	660	551	311	245	298	205	127	115	79	116	2,065	642

TABLE IX. List of all train accidents in which passengers were killed 1825-1924 (see p. 25).

1832.					1832.				
Nov. 25	Rainhill	1	Collision.		May 29	Donnington	1	Collision	
1836.					July 12	Burnley	4	Turned into siding.	
Dec. 3	Great Corby	3	Derailment.		Aug. 3	Stockton	1	Collision.	
1837.					Aug. 23	Leamington	2	"	
Sept. 9	Kenyon Junction	1	Collision.		" 23	Dolton	1	"	
1840.					1833.				
Aug. 7	Howden	5	Derailment.		Jan. 3	Oxford	3	"	
" 19	Brentwood	4	"		Feb. 24	Ealing	2	Derailment.	
Sept. 13	Wingfield	2	"		Mar. 4	Manchester	2	"	
" 13	Bow	1	Collision.		" 9	Mangotsfield	2	Collision.	
Oct. 17	Nine Elms	1	"		Aug. 11	Byers Green	2	"	
Nov. 11	Milford Junction	2	"		" 22	Reverley	2	Derailment.	
1841.					Sept. 8	Whitmore	1	Collision.	
Feb. 11	Whitmore	1	"		Oct. 5	Straffan	15	"	
Oct. 2	Cuckfield	4	Derailment.		Dec. 27	Dowlas	1	"	
Dec. 24	Sonning Cutting	9	"		" 29	Newton Heath	1	"	
1842.					1854.				
Dec. 7	Northchurch	1	"		Jan. 5	Thetford	2	"	
1843.					June 5	Dublin	1	Miscellaneous.	
Jan. 12	Barnsley, now Cudworth	1	Collision.		Aug. 21	East Croydon	3	Collision.	
1844.					Sept. 23	Kittybrewster	1	"	
Aug. 28	Katby	1	Derailment.		Nov. 25	Knights	1	"	
Sept. 2	Masborough	1	Collision.		Dec. 7	Caiton Tunnel	1	"	
Oct. 8	Shields	2	"		" 8	Rescot	1	"	
Nov. 21	Nottingham	2	"		" 30	Two Mile Bottom	2	"	
1845.					1855.				
May 19	Linthgow	1	"		Feb. 14	Barton Branch	2	"	
Aug. 30	Defford	1	"		" 22	Glasgow	1	"	
Oct. 20	Barnsley, now Cudworth	2	"		Mar. 19	Lichfield	1	"	
1846.					Sept. 12	Reading	4	"	
July 18	Stratford	1	"		Oct. 20	Mallow	1	Failure of coupling.	
Sept. 21	Farrington	2	"		1856.				
1847.					July 26	Church Fenton	2	Collision.	
Jan. 25	Southall	2	Miscellaneous.		Aug. 4	Stubbins	1	Derailment.	
Feb. 21	Hull	2	Derailment.		" 6	Albion	1	Collision.	
May 24	Chester	3	Failure of bridge.		Nov. 12	Nantyderry	2	Derailment.	
June 5	Wolverton	7	Turned into siding.		Dec. 3	Denton	1	Collision.	
July 10	Luddendenfoot	2	Derailment.		1857.				
" 22	Dundee	1	"		May 21	London Bridge	1	Derailment.	
1848.					June 28	Lewisham	12	Collision.	
May 10	Shrivenham	6	Collision.		July 24	Bridlington Junction	1	"	
Aug. 21	Bay Horse	1	"		Aug. 5	Collingham	1	Derailment.	
Sept. 2	Newton Road	2	Derailment.		Sept. 24	Tuxford	5	"	
1849.					Oct. 14	Stormy	3	Collision.	
Feb. 10	Rockliffe	5	"		1858.				
1850.					May 10	Nuneaton	3	Derailment.	
Aug. 7	Cowlairs	5	Collision.		June 18	Huddersfield	3	Collision.	
" 29	Marsden	1	"		" 20	Bishopstoke	1	Derailment.	
Dec. 14	Tewkesbury	2	"		" 30	Chilham	3	"	
1851.					Aug. 23	Round Oak	4	Collision.	
April 30	Frodsham	6	"		Oct. 20	Heriot	1	"	
May 29	Clay Cross	2	"		1859.				
June 6	Falmer	3	Derailment.		July 16	Bishopton	1	"	
Sept. 9	Bicester	6	Turned into siding.		Aug. 17	Tilbury	1	Derailment.	
Nov. 22	Weedon	1	Collision.		Oct. 11	Sheffield	1	Collision.	
					Dec. 22	Perry Bar	1	Derailment.	
					1860.				
					Feb. 20	Tottenham	5	"	
					April 23	Hatfield	1	"	
					Aug. 27	Craven Arms.	1	Collision.	
					Sept. 4	Helmshore	11	"	
					Nov. 16	Atherstone	9	"	
					Dec. 24	Nottingham	1	"	
					" 26	Weston	1	Derailment.	

1861.	Jan. 4 ..	Primrose Hill ..	1	Derailment	1870.— <i>con.</i>	Sept. 29 ..	Patrick's Well ..	1	Derailment.
	" 4 ..	Dunmore ..	2	"	Oct. 21 ..	Brighouse ..	1	Collision.	
	" 14 ..	Lincoln ..	1	"	Nov. 7 ..	Brough ..	1	"	
	" 28 ..	Epsom ..	1	"	" 26 ..	Harrow ..	7	"	
	May 29 ..	Annan ..	2	"	Dec. 6 ..	Brockley Whins ..	4	"	
	Aug. 25 ..	Clayton Tunnel ..	23	Collision.	" 12 ..	Stairfoot ..	15	"	
	Sept. 2 ..	Kentish Town ..	15	"	" 28 ..	Hatfield ..	6	Derailment.	
	Dec. 4 ..	Sittingbourne ..	1	Derailment.					
1862.	Jan. 2 ..	Portadown ..	1	Collision.	1871.	Jan. 26 ..	Bradford ..	1	Collision.
	April 19 ..	Lydney ..	1	Derailment.	April 11 ..	Newtonstewart ..	1	Derailment.	
	May 3 ..	St. Boswell ..	1	"	May 13 ..	Goraghiwood ..	1	Collision.	
	" 9 ..	Faversham ..	3	"	" 13 ..	Delfast ..	2	"	
	Aug. 28 ..	Market Harborough ..	1	Collision.	July 5 ..	Sandbach ..	2	Derailment.	
	Oct. 13 ..	Winchburg ..	15	"	" 19 ..	Unston ..	1	Collision.	
	Nov. 3 ..	Moulton ..	1	"	Oct. 16 ..	Maryhill ..	2	Miscellaneous.	
	" 15 ..	Deatock ..	1	Derailment.	Dec. 19 ..	Wortley ..	1	Collision.	
1863.	May 29 ..	Streatham ..	3	"	1872.	July 29 ..	Red Hill Junction ..	1	"
	June 6 ..	Knottingley ..	1	Collision.	Aug. 3 ..	Agecroft ..	4	"	
	Aug. 3 ..	Lynn ..	7	Derailment.	Sept. 2 ..	Preston Junction ..	2	Derailment.	
	Oct. 9 ..	Port Glasgow ..	1	Collision.	Oct. 2 ..	Kirtlebridge ..	10	Collision.	
	" 29 ..	Leadburn ..	1	"	" 17 ..	Kelvedon ..	1	Derailment.	
					Dec. 6 ..	Ambergate ..	1	"	
1864.	Feb. 5 ..	Bishopton ..	1	Derailment.	1873.	Jan. 13 ..	Grindford Bar ..	1	Collision.
	" 10 ..	Gothland Incline ..	2	Miscellaneous.	" 24 ..	Houston ..	2	"	
	May 4 ..	Welwyn ..	1	Derailment.	May 8 ..	Condover ..	4	Derailment.	
	June 7 ..	Egham ..	7	Collision.	" 17 ..	Newcastle ..	1	Collision.	
	Aug. 1 ..	Margate ..	1	"	June 21 ..	Wingfield ..	3	Derailment.	
	Oct. 29 ..	Ballmasloo ..	2	Derailment.	Aug. 2 ..	Wigan ..	13	"	
1865.	June 7 ..	Rednal ..	11	"	" 9 ..	Miles Platting ..	1	Collision.	
	" 9 ..	Staplehurst ..	10	"	" 22 ..	Eastbourne ..	3	"	
	Nov. 25 ..	Wigan ..	1	Collision.	" 23 ..	Retford ..	3	"	
1866.	Mar. 27 ..	Aberdare ..	1	"	Sept. 2 ..	Hartlepool ..	2	Derailment.	
	April 30 ..	Caterham ..	2	"	" 9 ..	Peasmarsh ..	3	"	
	Sept. 6 ..	Brynkir ..	6	Derailment.	Oct. 4 ..	Maryhill ..	1	Collision.	
	" 7 ..	Trenholme Bar ..	2	"	Nov. 4 ..	Durham ..	1	"	
	Nov. 12 ..	Sittall ..	1	"	Dec. 2 ..	Guide Bridge ..	1	"	
	Dec. 19 ..	Aldersgate Street ..	3	Miscellaneous.	" 24 ..	Scarborough Road ..	1	Derailment.	
1867.	Mar. 7 ..	Dowling ..	1	Collision.	1874.	Jan. 10 ..	Barlestone Junction ..	1	Collision.
	" 16 ..	Castleblaney ..	1	Derailment.	" 27 ..	Bo'nest Junction ..	16	"	
	June 29 ..	Warrington ..	8	Collision.	Feb. 14 ..	Brithdir ..	1	Derailment.	
	Aug. 9 ..	Bray Head ..	2	Derailment.	June 16 ..	Merthyr ..	1	Broken	
	Sept. 9 ..	Dove Holes ..	5	Collision.	Sept. 10 ..	Norwich ..	21	Collision.	
	Nov. 16 ..	Dudley Port ..	1	"	" 26 ..	Dundalk ..	1	"	
	" 23 ..	Hamilton Junction ..	1	"	Nov. 7 ..	Elstree ..	1	Ran over ob-	
1868.	April 24 ..	Raskelf ..	2	"	" 21 ..	Queensferry Junction ..	1	struction.	
	Aug. 21 ..	Abergele ..	31	"	" 21 ..	Kettering ..	1	Collision.	
	Oct. 1 ..	Draycott ..	2	Derailment.	" 30 ..	Boston ..	1	"	
	" 24 ..	Northenden ..	1	Collision.	Dec. 24 ..	Shipton ..	34	Derailment.	
	Nov. 5 ..	Newnham ..	3	"	" 25 ..	Ince Moss ..	1	Collision.	
1869.	Jan. 18 ..	Acton ..	1	"	1875.	Mar. 1 ..	Bedford ..	1	"
	May 9 ..	Thirsk ..	1	"	June 11 ..	Bathampton ..	2	Derailment.	
	July 17 ..	Winsford ..	1	"	July 3 ..	Scots Gap ..	3	"	
	Aug. 2 ..	Gateshead ..	1	Derailment.	Aug. 9 ..	Sibsey ..	1	Collision.	
	Sept. 1 ..	Strensall ..	1	Collision.	" 16 ..	Hammerton Street ..	1	Derailment.	
	Oct. 9 ..	Long Eaton ..	7	"	" 16 ..	Wilstrop Siding ..	1	"	
	" 9 ..	Greenhill ..	1	"	" 28 ..	Kirkwick ..	7	Collision.	
	" 24 ..	Welwyn ..	3	Derailment.	Sept. 20 ..	Barking ..	1	"	
1870.	Jan. 1 ..	Forgandenny ..	2	Collision.	Oct. 30 ..	Castlebar ..	1	"	
	Feb. 11 ..	Gartsherrie ..	2	"	1876.	Jan. 21 ..	Abbot's Ripton ..	14	"
	June 7 ..	Pleasington ..	2	Derailment.	" 28 ..	Tebay ..	1	Failure of	
	" 21 ..	Newark ..	16	Collision.	" 29 ..	Hammersmith ..	1	machinery of	
	July 10 ..	Carlisle ..	5	"	Aug. 7 ..	Radstock ..	12	engine.	
	Sept. 13 ..	Upholland ..	2	Derailment.	Oct. 30 ..	Brierfield ..	3	"	
	" 14 ..	Tamworth ..	1	Turned into siding.	Dec. 23 ..	Arlesley ..	4	"	
					" 28 ..	Antrium ..	1	"	

1877.	Mar. 25 ..	Morpeth	5	Derailment.	Sept. 16 ..	Hexthorpe	25	Collision.
	April 9 ..	Leysmill	1	Collision.				
	June 11 ..	Woking	1	"	1888.			
	July 3 ..	Betley Road ..	1	Miscellaneous.	July 14 ..	Dewsnap	5	Derailment.
	" 4 ..	Dalkey	1	Derailment.	Aug. 6 ..	Hampton Wick ..	2*	Collision.
	Oct. 18 ..	Billing Road ..	3	Collision.	" 29 ..	Ashburys	1*	Turned into siding.
	Dec. quarter	On G.E.R.	1	"	Sept. 11 ..	Kintore	2*	Collision.
1878.	Feb. 27 ..	Glenageary	1	"	1889.			
	July 8 ..	Chester	2	Derailment.	Mar. 29 ..	Penistone	1	Derailment.
	Aug. 31 ..	Sittingbourne ..	5	Collision.	June 12 ..	Armagh	80	Collision.
	Sept. 8 ..	Ballincollig ..	3	Derailment.	July 25 ..	Brackley	1	Turned into siding.
	Oct. 19 ..	Pontypridd	13	Collision.	Oct. 4 ..	Longsight	6	Collision.
1879.	Dec. 1 ..	Brunswick Junction	1	"	1890.			
	" 6 ..	Stafford	7	"	Jan. 25 ..	Dournemouth ..	1	"
	" 28 ..	Dundee	73	Failure of bridge.	Mar. 4 ..	Carlisle	4	"
1880.	Jan. 15 ..	Burscough Junction	5	Collision.	Nov. 11 ..	Norton Fitzwarren	10	"
	Aug. 12 ..	Wennington	12	Derailment.	Dec. 21 ..	Brindle Heath ..	1	"
	Sept. 8 ..	Penilee	3	Collision.	" 23 ..	Broadstone	1	"
	" 11 ..	Nine Elms	5	"	" 24 ..	Wortley	1	"
	Oct. 9 ..	Scarborough	1	Turned into siding.	1891.			
	Dec. 21 ..	Leeds	3	Collision.	July 6 ..	Salford	1	Collision.
1881.	Feb. 26 ..	Dalston	1	"	Aug. 29 ..	Pacit	3†	"
	May 21 ..	Crystal Palace ..	1	Derailment.	" 31 ..	Ramsgate	1	Buffer stops.
	July 19 ..	Matlock Bath ..	1	Miscellaneous.	Dec. 24 ..	Barnby	1	Collision.
	Aug. 8 ..	Blackburn	7	Collision.	1892.			
	Oct. 12 ..	Canonbury	4	"	May 27 ..	Birmingham ..	1	"
	" 22 ..	Desford	4	Turned into siding.	June 9 ..	Esholt	5	"
	Nov. 25 ..	Tayport	5	Collision.	" 14 ..	Bishopsgate	5	"
1882.	Jan. 25 ..	Hornsey	3	"	July 25 ..	Melton	1	Derailment.
	" 28 ..	Bow	5	"	Nov. 2 ..	Thirsk	9	Collision.
	Feb. 4 ..	Bricklayer's Arms	1	"	1893.			
	July 28 ..	Streham Fen ..	1	Derailment.	May 5 ..	Erith	1	Ran through gates.
	Sept. 1 ..	Dunbar	1	Boiler explosion.	July 1 ..	Poulton	2	Derailment.
	Oct. 29 ..	Leeds	1	Fire in train	Aug. 12 ..	Llantrissant ..	13	"
	Nov. 27 ..	Inverthyan	5	Failure of bridge.	1894.			
	Dec. 7 ..	Mencock Siding ..	1	Collision.	Aug. 2 ..	Newtownmore ..	1	Collision.
	" 11 ..	Dinting	1	"	Dec. 22 ..	Chelford	14	"
1883.	Mar. 19 ..	Eglinton Street ..	4	Collision.	" 26 ..	Low Moor	1	"
	May 14 ..	Lockerbie	5	"	1895.			
	July 28 ..	Perth	1	"	April 26 ..	Tanfield	1	Derailment.
	Aug. 24 ..	Mallow Junction ..	1	"	Aug. 1 ..	Herne Bay	1	Collision.
1884.	June 3 ..	Downton	5	Derailment.	Sept. 26 ..	Howden	1	Obstruction.
	July 5 ..	Balloch	1	Boiler explosion.	Nov. 10 ..	St. Neots	2	Derailment.
	" 11 ..	Strathblaine	1	Landslip.	1896.			
	" 16 ..	Bullhouse	24	Derailment.	May 7 ..	Little Bytham ..	3	"
1885.	Jan. 1 ..	Penistone	4	Collision.	Aug. 3 ..	Preston Junction	1	Collision.
	" 27 ..	Pengam	1	"	Sept. 29 ..	March	1	"
	July 31 ..	Binegar	1	"	1897.			
1886.	Feb. 10 ..	Finsbury Park ..	1	"	Feb. 6 ..	Brinnington ..	1	"
	May 5 ..	Birmingham ..	1	"	" 15 ..	Rothbury	3	Derailment.
	June 30 ..	Portadown	6	Derailment.	June 11 ..	Welshampton ..	10	"
					Aug. 2 ..	Buxton	1	Miscellaneous.
					Oct. 10 ..	Penistone	1	Collision.
					Nov. 11 ..	Manchester	2	"
					1898.			
					Jan. 3 ..	Dunbar	1	"
					Feb. 4 ..	Barassie	4	"
					Mar. 31 ..	St. John's	3	"
					June 2 ..	Leyland	2	"
					Aug. 2 ..	Inniskillen ..	1	Buffer stops.
					Sept. 2 ..	Wellingborough	5	Obstruction.
					Oct. 17 ..	Wrawby	8	"
					Nov. 24 ..	Lispole	1	Derailment.

* The returns for 1888 showed six passengers as having been killed in collisions. Presumably one further passenger died in one of these three accidents after the report was published.

† One died subsequent to publication of annual return.

1899.					1912.			
Sept. 11	Manchester ..	2	Collision.	June 21	Charlestown Curve ..	4	Derailment.	
" 16	Twylch ..	1	Derailment.	Aug. 5	Lombardstown ..	1	"	
Dec. 8	Norton Bridge ..	1	"	" 29	Vauxhall ..	2	Collision.	
" 11	Wortley ..	1	Collision.	Sept. 17	Dilton ..	13	Derailment.	
" 19	Bermondsey ..	2	"					
" 23	Glassford ..	2	"	1913.				
" 23	Wivelsfield ..	5	"	Jan. 3	Bromford Bridge ..	3	Collision.	
1900.				Mar. 28	Marylebone ..	1	"	
Feb. 15	Hroton ..	1	"	Aug. 8	Yeovil ..	3	"	
Mar. 28	Glasgow ..	7	"	Sept. 2	His Gill ..	16	"	
June 16	Slough ..	5	"	" 7	Donemana ..	1	Derailment.	
July 24	Amberswood ..	1	Derailment.	Oct. 15	St. James, Liverpool ..	6	Collision.	
Aug. 25	Andlerston Cross ..	1	Collision.	" 25	Waterloo Junction ..	3	"	
Dec. 15	Grangemouth ..	1	"					
1901.				1914.				
	Nil.	—	—	June 18	Carr Bridge ..	5	Failure of bridge.	
				" 27	Cannon Street ..	1	Collision.	
1902.				1915.				
April 12	Sutton Coldfield ..	1	Collision.	Jan. 1	Ilford ..	10	"	
" 25	Hackney Downs ..	4	Derailment.	" 28	Kinsale ..	2	"	
Aug. 30	Charing Cross, Glasgow	1	Collision.	Mar. 28	Smithy Bridge ..	3	"	
1903.				May 22	Quintinshall ..	224*	"	
April 11	Ballymoe ..	1	"	Aug. 14	Weedon ..	10	Derailment.	
July 15	Waterloo (Liverpool) ..	6	Derailment.	" 16	Pollokshaws ..	1	Collision.	
" 27	Glasgow ..	16	Buffer stops.	Sept. 6	Newark ..	1	Derailment.	
Aug. 1	Preston ..	1	Collision.	Dec. 17	Jarrow ..	18	Collision.	
Oct. 22	Sowerby Bridge ..	1	"					
1904.				1918.				
May 5	Waterloo ..	1	"	Aug. 11	Bletchley ..	1	Collision.	
Oct. 3	Loughor ..	3	Derailment.	Sept. 2	Warminster ..	1	"	
Dec. 23	Aylesbury ..	2	"	Oct. 2	Lincoln ..	1	"	
1905.				1917.				
Jan. 19	Cudworth ..	5	Collision.	Jan. 3	Ratho ..	12	"	
April 21	Huddersfield ..	2	"					
July 27	Hall Road ..	21	Turned into siding.	1918.				
Sept. 1	Witham ..	11	Derailment.	Jan. 19	Little Salkeld ..	7	Derailment.	
				June 15	Aberdeen ..	1	Collision.	
1906.				1919.				
April 6	Kirtlebridge ..	1	Collision.	June 16	Acton Bridge ..	1	Derailment.	
June 22	Tannochside ..	1	Derailment.	Oct. 16	Carstairs ..	1	Collision.	
July 1	Salisbury ..	24	"	Nov. 29	Haverhill ..	1	Turned into siding.	
Sept. 19	Grantham ..	12	"					
Dec. 28	Elliot Junction ..	21	Collision.	1920.				
1907.				Mar. 10	Firsby ..	1	Buffer stops.	
Mar. 26	Felling ..	2	Derailment.	July 17	Lostock Junction ..	5	Collision.	
April 30	Taunton ..	1	Collision.					
Sept. 30	Coatbridge ..	1	"	1921.				
Oct. 15	Shrewsbury ..	11	Derailment.	Jan. 26	Abermule ..	14	"	
" 26	West Hampstead ..	3	Collision.	Mar. 19	Coaldyke ..	1	"	
				Nov. 26	Birmingham ..	3	"	
1908.				1922.				
	Nil.	—	—	Jan. 27	Bhsworth ..	1	Miscellaneous.	
1909.				Aug. 21	Milton Halt ..	3	Collision.	
July 2	Sudbury ..	1	Derailment.	Dec. 6	Birkenhead Park ..	1	"	
1910.				1923.				
Jan. 29	Stoat's Nest ..	5	"	July 6	Diggle ..	2	"	
Nov. 25	Ormskirk ..	1	Collision.	Nov. 22	Palace Gates ..	1	"	
Dec. 5	Wilkesden ..	5	"					
" 24	Hawes Junction ..	12	"	1924.				
1911.				Jan. 26	Euston ..	5	"	
Jan. 23	Coke Ovens ..	11	"	April 26	Haymarket ..	5	"	
April 3	Westbourne Park ..	1	"	July 28	Haymarket ..	5	"	
Nov. 18	Dowlais ..	2	"	Nov. 3	Lytham ..	14	Derailment.	

* Estimated.

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