6,743,000; this year the ton-mileage has fallen to 1,799,000,000, while the freight train-mileage has risen to 7,151,000. Last year the average train load was much the largest in the history of the company; this year it is smaller than in any other of the present decade except 1883.

This lessened loading is largely due to a decrease in west-bound freight. East-bound business has increased in volume almost enough to make up for the fall in rates. West-bound business has fallen in volume and in rates both. Last year the tonnage each way was approximately equal; this year the volume of east-bound business is nearly one-fifth greater than the west-bound. The inequality is not nearly so great as it was a few years ago, but our railroads are now working on such a narrow margin of profit that the necessity for full and equal loads is very much greater than it once was.

The increase in east-bound tonnage is quite as surprising as the falling off in west-bound. The crop conditions would have led us to expect the reverse. Grain fell off 90,000 tons; flour and mill products more than 50,000. The movement of these things must have been almost entirely east-bound. Of other commodities whose movement is mainly east-bound, agricultural products and provisions remained substantially unchanged, while animals increased by about 30,000 tons. This leaves an enormous and almost unaccountable increase on miscellaneous shipments east-bound—a difference of over 350,000 tons on a total of little over 2,000,000.

Of distinctively west-bound business we note a reduction of nearly one third (255,000 to 180,000) on pig, bloom, and railroad iron; while other iron also fell from 569,000 tons to 509,000. These facts are easy enough to explain on general business conditions.

To a certain extent the same conditions prevail in the passenger business. The passenger train mileage has grown to an unprecedented figure, so that the aggregate train mileage of all kinds is larger than it ever has been. The average passenger train load has fallen from 61.0 in 1887 to 57.7 in 1888. But inasmuch as passenger rates have been well kept up, this process has not had the evil effects which are seen in the freight business. The passenger earnings have in fact increased $160,000 while freight earnings have fallen over $900,000.

What is true of the Lake Shore applies without very much modification to the Michigan Central, except that, as the latter road publishes few train mileage statistics, we can tell very little about its train loads. The through tonnage east-bound shows a large increase in volume and only a slight reduction in earnings; west-bound business shows an enormous reduction in both these respects. In 1887 the volume of west-bound business, whether measured by tonnage or ton-mileage was greater than that of east-bound; in 1888 the east-bound exceeded the west-bound by more than one-third. The figures are so striking that we give them in full.

	Tons moved.	Tons moved 1 mile.	Rate per ton per mile. Cents.	Earnings.
1888.				
Through:				
Eastward	816,592	367,188,985	0.537	$1,973,107
Westward	571,425	272,321,190	0.462	1,258,179
Total	1,388,017	638,510,175	0.505	$3,226,285
Local	4,843,404	640,902,201	0.883	5,657,161
Total	6,231,421	1,279,412,376	0.694	$8,883,446
1887.				
Through:				
Eastward	745,664	329,874,915	0.633	$2,088,097
Westward	765,094	370,278,085	0.434	1,605,344
Total	1,510,758	700,153,000	0.528	$3,693,441
Local	4,503,475	640,520,175	0.877	5,616,546
Total	6,014,233	1,340,673,176	0.694	$9,309,987

This indicates clearly that though reduced rates may be an important cause of railroad depression they are not the sole cause. On the west-bound through traffic of the Michigan Central, average rates were higher in 1888 than in 1887. Yet it is here that the loss in earnings is most conspicuous. Low rates will explain a great deal of the present trouble; but there are other causes, due to outside conditions of traffic, which deserve much more attention than they have received.

Interlocking.

In looking over the official documents relative to concentrating and interlocking switches and signals on the English railroads, one cannot fail to be struck by the great extent to which these means of safety and of economy of time, space and labor have been adopted. In the year 1887 there were reported in the United Kingdom 38,221 cases in which any passenger line was connected with or crossed by any other line, siding or cross-over. In all of these cases the Board of Trade required the levers to be concentrated and interlocked, and 89 per cent. of all these requirements have been complied with. The number of levers employed and the number of switches and signals interlocked are not given.

The absence of like statistics in the United States makes it impossible to compare the relative amount of interlocking in the two countries, and we would suggest this as a good field for investigation by State Commissioners. Let them familiarize themselves with the requirements of the British Board of Trade, and with the principles which govern in the application of interlocking, and then collect data as to the number of instances in which the conditions are such as to require interlocking and the number of those cases in which it is used. Such a showing would be the basis for legislation extending the field for investigation and recommendation by State Commissioners in a most useful direction. It would be a field in which they would not be likely to go far wrong and might do much good. The art is an old one. Its principles are simple and well settled. The appliances have been slowly perfected by years of use, and the experimental stage has long been passed. In these particulars the art of interlocking is in a position entirely different from that of heating or that of coupling cars when the State Commissioners took hold of them. The Commissioners could, therefore, do good by making public the cases in which railroads do or do not make use of this well-known means of safety, and would be in little danger of forcing them to adopt impracticable or undeveloped devices. The way is so well trodden that no one can get out of it unless he wanders wilfully.

We have seen that in the United Kingdom only 11 per cent. of the switches and crossings on passenger tracks are *not* protected by interlocking. In the United States probably much less than 11 per cent. of such points are protected. Probably the difference is not wholly, or even mostly, due to the demands of the Board of Trade. The greater concentration of traffic in England must have had much to do with it, and that is the element which is most active in bringing interlocking into use this in country, where there is almost a total lack of law and of intelligent public opinion on the subject. We already have many yards where engine movements have become so frequent that it is a physical necessity to concentrate and interlock the switch and signal levers, and such yards are becoming more numerous every year. As traffic increases in speed and volume the economy of protecting junctions, crossings and outlying switches becomes more urgent. There is, therefore, a steady, but singularly slow, increase in the use of interlocking.

About a dozen years ago, and 20 years after interlocking began in England, it made its start in this country. It may be well to remind our readers that the first interlocking machine built in this country was the invention of J. M. Toucey and William Buchanan and was put in use in 1874 on the Hudson River Railroad. That machine remained in service till 1888. The Pennsylvania imported in the same year a Saxby & Farmer machine, which was put in service in February, 1875. Shortly after this the Saxby & Farmer patents for the United States were acquired by the company which owned the Toucey & Buchanan patents and which was the immediate predecessor of the Union Switch & Signal Co. For 10 years the work of these companies was very largely educational, and notwithstanding the considerable business done by them in those years we doubt if they made any money. The cost of introducing the novel and unknown system has been very great, and so few railroad companies have cared to make use of it that the price of the material has been necessarily kept down in order to get any market. Meanwhile two or three other companies took up the business in a small way, and the *Railroad Gazette* labored to make known the principles and the uses of interlocking. Now the educational stage is pretty well passed. At least there are so many railroad officers who know what interlocking is and what it can do, that we may expect its use to spread rapidly if the railroad companies are not so poor that they can not afford to be economical.

In September, 1884, we published a table, which was pretty complete, of the amount of interlocking then in use. At that time the principal manufacturers of this apparatus had erected machines aggregating 2,129 levers. Up to November, 1885, the same company had put in service 2,700 levers. We have a recent statement from the company showing that up to date it has supplied 6,000 levers and 300 capstan wheels, each of which is equivalent to about three levers. From 1884 to 1885 the number of levers in use increased about 27 per cent. From 1885 to the present time they have increased, including the capstan wheels, and allowing 1,000 levers to other companies, about 200 per cent. It may be said in general terms that in the first ten years of interlocking in the United States 3,000 levers were put in service, and in the first 14 years 8,000 have gone into use.

But recent progress has been not alone in the increase of apparatus. The signaling department of railroads has grown in consideration, and several important roads now have signal engineers; and knowledge of the fundamental principles of the art is no longer confined to a few specialists, but is widely spread among the more intelligent officers of the operating departments. Great improvements have been made in all details of the mechanism, and now our signal engineers and manufacturers are fully up to, if not ahead of, the best practice in England, the birthplace of the art. The Saxby & Farmer machine, which is still the one in most general use, remains practically unchanged, but one or two others of much merit have been introduced. The pneumatic apparatus has been brought to great perfection, and is now not only a serviceable, but a really elegant system. In ease of manipulation and in its adaptability in difficult situations it probably excels every other system. Decided improvements have been made in all the details of ground connections, and great ingenuity has been displayed in movements for switches, signals and locks, and in devices for economizing levers by special locking and the use of "selectors."

Competition of Canadian Railroads.

The investigation now going on with regard to competition of Canadian railroads has not as yet elicited any important facts. We are told that the Grand Trunk railroad tries to comply with the law. This may be true and yet affect the case very little. Even if the Grand Trunk conforms to these requirements of the law on its American traffic, the exemption of its purely local Canadian traffic from these requirements may have the effect of giving it an unfair advantage as compared with the railroads of the United States. Again, Mr. Fink tells us that the legalization of pools appears to be the only remedy for the state of things, while Mr. Depew would have the authority of United States law extended more widely over Canada. Both of these results are unattainable, the former on account of the unwisdom of Congress, the latter on account of political difficulties. But, even if they could be attained, we are not sure that they would fully meet the case in hand. We hope that the committee will cease to occupy themselves with views and will try to get facts. In that way we may hope to make some progress.

What, for instance, has been the actual effect of the law upon the Grand Trunk, and especially upon the Grand Trunk's international business? It is said in a general way that the Grand Trunk has gained by the operation of the law, and we believe such to be the fact. In the calendar year 1887 the Grand Trunk increased not merely its gross earnings but its net earnings also. The New York Central increased its gross earnings in about equal proportion, but its net earnings show actual diminution. This looks as if the New York Central had been handicapped by the operation of the law; but the figures are not sufficiently itemized to make it certain. In 1888 again, the Grand Trunk suffered a loss in gross earnings, but in 1889 it is showing an enormous gain. How far are these losses and gains due to the development of the American traffic or of Canadian? There must be facts and figures somewhere. If the Grand Trunk officials are ready to assist the committee in its investigations, and they profess to be thus ready, they can doubtless produce them. A few facts of this kind will be worth more than any number of opinions. If the Grand Trunk has gained largely in export traffic without unfavorable effect on its operating expenses it will prove that the law hurts the American roads and will indicate that it hurts them in such a way that no relief can be expected except by radical changes in the administration of the law. If on the other hand, the Grand Trunk's gain in international business is comparatively slight, it will show that the effect of the law has been exaggerated and that probably nothing special need be done. Detailed figures of this kind would mean something. Mere expressions of intention of obeying the law amount to very little by themselves. A presentation of facts would prove or disprove them. In either case, we should know what the good intentions were worth.

With the incomplete facts which we have before us, there is, and will remain, a strong suspicion that the Grand Trunk road is gaining at the expense of its American competitors, and that the Northern ports are prospering at the expense of New York, Philadelphia and Baltimore. There is a contest between

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