REPORT OF THE COMMITTEE APPOINTED TO EXAMINE AND REPORT THE CAUSES OF RAILROAD ACCIDENTS, THE MEANS OF PREVENTING THEIR RECURRENCE; NO.13. IN SENATE, JAN. 14, 1853

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STATE OF NEW YORK

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Trieste

Hon. Charles Sumner, U.S.S. of Boston.

State of New-York.

No. 13.

IN SENATE, JAN. 14, 1853.

REPORT

Of the committee appointed to examine and report the causes of railroad accidents, the means of preventing their recurrence, &c.

STATE ENGINEER'S OFFICE,
Albany, Jan. 10, 1853.

The select committee appointed by resolution of the Senate, on the 15th of April last, by which they are required to examine and report to the Legislature, at the commencement of its next session, the causes of railroad accidents in this State, the means of preventing their recurrence, and their opinion whether any, and, if so, what legislation is required on the subject, respectfully

REPORT:

That they have deemed it necessary, in order to comply fully with the requirements of the resolution, to examine, personally, the principal railroads in the State, as the best means of obtaining information from the various agents and officers of the companies, of making themselves acquainted with the characteristics, workings, and management of the roads, and as most likely to lead to suggestions calculated to prevent the recurrence of accidents.

They were aided in their examinations by the professional skill and experience of several gentlemen connected with the management of railroads in this State, and were also accompa-

nied by Senators Smith and Monroe, of the standing committee on railroads in the Senate, who had been invited by the officers of several companies to examine their roads, with the committee.

The committee also addressed a series of interrogatories to the officers of the several railroads, which, together with the replies, will be found in the Appendix. (See A.)

The following companies have failed to reply to the interrogatories:—The Albany and Schenectady, Albany and West Stockbridge, Buffalo and Niagara Falls, Buffalo and Rochester, Hudson River, Long-Island, New-York and Erie, New-York and Harlem, New-York and New Haven. Rensselaer and Saratoga, Saratoga and Washington, Schenectady and Troy, Troy and Greenbush Buffalo and State Line, Chemung, Plattsburgh and Montreal, Rochester, Lockport and Niagara Falls, Saratoga and Schenectady.

The resolution enjoins upon your committee three distinct duties:

1st. To examine into the causes of railroad accidents.

2d. To state the means of preventing them; and

3d. To suggest the necessary legislation, if, in their opinion, any is required.

The general causes of railroad accidents are:

1st. Defective construction.

2d. Improper management.

3d. Impediments in the roadway.

Under the first head, are embraced defects in the construction of roadways; of superstructure, and of rolling stock.

Under the second head are included, the running of engines and trains of too great weight, and at too high a rate of speed for the grades, strength and capacity of the road; the employ ment of incompetent or improper agents and workmen; tl want of proper and vigilant supervision; an insufficient syste

of signals, and want of due attention thereto; the failure of conductors to make their running time; the running of trains too closely following each other; the running of engines and cars too great a distance, without thorough inspection; an insufficiency of brake power, and insufficient examination and inspection of the condition of the superstructure and rolling stock.

Under the third head are included, slides from the cuttings; persons and domestic animals upon the track; cars, hand cars, gravel and wood trains, &c., left standing in improper situations; vehicles crossing the track; obstructions designedly placed upon the track.

I. DEFECTIVE CONSTRUCTION.

Many serious accidents arise from the practice which prevails of opening roads for public travel before the work upon them is completed, and also from the haste in which much of it is performed.

High embankments are built in a short space of time, and frequently during freezing weather, the subsidence of which disturbs the allignment of the track.

The ballasting is frequently omitted, or only partially done, before the trains commence running. The gravel trains are run up close to the time of the passenger trains, and must be switched off in haste by the common hands, who, having other duties to perform, do this one carelessly.

The work is frequently left incomplete after it has been once brought into use, until after some serious accident has occurred.

Culverts and bridges are frequently constructed of insufficient strength, or of an improper quality of materials, or are continued in use after they have become weakened by decay.

The great number of road crossings at the level of the grade of the railroads, are prolific causes of accidents.

The material used for ballast, is often such that the frost disturbs the level of the track, and the ballast in some cases is not filled up sufficiently to retain the ties in their position.

The cross-ties are frequently of a quality of wood which is insufficient to retain the spikes driven to secure the rails; and they are sometimes of insufficient size, and placed at intervals too distant to afford a suitable support to the weight brought upon the rails.

The iron rails are sometimes of an inferior quality of metal, and too light to support the weight and resist the shocks of the engines and cars.

When heavy trains are run over steep grades and sharp curves, at high speed, the superstructure is required to be stronger than when less objectionable grades and curves occur.

The momentum with which the wheels strike the exterior rails in passing curves, must be resisted by the strength of the iron rails; by the tenacity of the spike in the wooden cross-sills; by the adhesion and weight of the ballasting, and by the strength of the chair at the joints.

If these are insufficient to resist the blow, the roadway is disturbed, or the train is thrown off the track.

High speed, on heavy descending grades, places the train out of the control of the engine and brakes, so that if unexpected impediments are discovered on the track, or if the machinery becomes deranged, it is almost impossible to avoid an accident.

When the rails are wet or frosty, this danger is increased. Engines of greater weight are required to ascend such grades, especially where freight has to be transported, in which case, engines of enormous size are sometimes used.

The effect of such engines on the superstructure, was graphically described by one of the engineers of a road where they were used, by saying "that they rooted up the track."

There are still in use many portions of road constructed at a time when the usual weight of locomotives and trains was much less than at present, and when the urgent demand of the traveling community for a high rate of speed did not so much influence the management of Railroad companies.

If the present heavy trains and high rates of speed are to be maintained, it is imperative, for the safety of the public, that the superstructure on many portions of roads now in use, should be increased in strength.

Our passenger cars, as at present constructed, are in many respects eminently calculated to protect passengers from personal injury, in case of serious accident, and to this may be attributed the small loss of life that has, in many instances, attended frightful collisions and derailment of trains on high and precipitous embankments. In case of accidents occurring from the failure of axles, the thin flooring is no protection against the fractured axle forcing its way into the body of the car.

Much discussion has been had on the asserted change which takes place in wrought iron when subjected to repeated blows.

With the common rail, the wheel receives a shock at every joint, caused by the settling and wear of the rail in the chair. Simi ar shocks are received at the curves, and they are communicated with increased force to the axle in consequence of the leverage of the wheel causing constant vibration, which, it is alleged, changes the texture of the iron from fibrous to crystalline, greatly diminishing its tenacity.

In the appendix will be found an extract from the report of the Commissioners appointed to inquire into the application of iron to railway structures in Great Britain, giving the result of various experiments and investigations on this subject. [See appendix No. 1.]

Upon some of the roads we have observed that the size of the axles and journals has been greatly enlarged beyond those in common use, and it is believed that, in this State, they are generally all made of the best material, and forged in the best manner.

To guard more effectually against the accidents arising from the alleged deterioration of the iron from the causes above mentioned, it has been the practice, on some roads, to run the wheels and axles one year only under passenger cars, and then transfer them to freight cars.

The safety beams have been introduced on the cars of many of our roads, by means of which the axle is upheld when broken. This has undoubtedly been the means of safety, by keeping the fractured ends of the axle suspended until the motion of the train could be arrested; but, in many cases, it is not calculated to hold them with sufficient steadiness to prevent the wheels from leaving the rail.

The cast iron wheel is now generally in use.

The manner of constructing chilled cast iron wheels, necessarily involves imperfect work and inherent defects.

During the severe frosts of this climate, when the roadway has become very rigid, large numbers of cast iron wheels fail.

Wrought iron wheels have been frequently tried. An objection is made to their use in consequence of the flanges wearing sharp, and thus rendering them very liable to ride upon the rails.

Wheels, with cast iron tires and wrought iron arms or plates, have been suggested.

It is believed that if wrought iron wheels could be constructed, free from the objections to these heretofore tried, it would be found to result in greater safety to the passengers, and greater economy in their use.

The manner of attaching brakes is sometimes insecure, or they become so by use, and frequently cause serious accidents by falling upon the track while the cars are in motion.

Under the head of the defective construction of the superstructure, the danger of running engines and trains of too great weight, and at too high a rate of speed for the grades and curves, and for the strength of the road, has been already alluded to.

It is undoubtedly true, as alleged, that the public demand a very high rate of speed, but it is also equally true that there are rates of speed at which the locomotives and trains cannot be run over the steep grades and sharp curves of roads of imperfect construction, without a certainty of accident, and it would seem that

if the community requires higher rates of speed, public safety as imperatively demands increased strength of superstructure, and the improvement of grades and curves.

The employment of incompetent or improper agents and workmen is, at this time, one great cause of accidents. The rapidly increased demand for services of this kind is, perhaps, the main reason for this. Companies, in opening their newly constructed roads to comply with the demands of stockholders and the public, are obliged to supply their various departments with agents, for whose competency and fitness they have no guarantee, and who are entirely untrained to those peculiar habits of implicit obedience to the minute rules and regulations, upon the prompt and unconditional observance of which depends the security of persons and property. By existing enactments, the officers of corporations seem to have little or no power of remedying the difficulty. It is a fact worthy of notice, in connection with this subject, that this class of persons, entrusted with the personal safety of almost the entire travelling community, are not held by any of those legal restraints and penalties which are applied to those having in their charge the most trifling pecuniary trust.

If a system of signals is not perfectly arranged, and carried out with the most minute accuracy, and strictly observed, it leads to accidents which would sometimes have been avoided by the entire absence of such signals, because, relying upon and giving their whole attention to them, the conductors of the train do not observe any irregularity *in the road.*

The usefulness of signals as a means of preventing accidents, depends upon their timely exhibition, and their being so placed that they can, under all circumstances, be seen at a sufficient distance to enable the engineman to arrest the motion of his train, before reaching the point of danger. For instance, if a train cannot be stopped by a prompt application of all the means at hand, until it has passed over a space of 600 yards, a signal which could be seen only 400 yards from the point of danger would be of little use. The committee believe that many accidents have occurred, either from want of due regard to instructions in this respect, or from a want of accurate knowledge of the distances