OF SOME RAILROAD ACCIDENTS.

THE assertion has a strange, at first, indeed, almost a harsh and brutal sound, and yet it is unquestionably true, that, so far as the general welfare, the common good of mankind is concerned, few lives are so profitably expended as those of the unfortunate victims of railroad accidents. This, it is true, may not be saying much; for it is a melancholy fact that there are few things of which either nature or man is, as a rule, more lavish than human life; provided always that the methods used in extinguishing it are customary and not unduly obtrusive on the sight and nerves. As a necessary consequence of this wastefulness, it follows also that the results which flow from the extinguishment of the individual life are, as a rule, pitiably small. Any person curious to satisfy himself as to the truth of either or both of these propositions can do so easily enough by visiting those frequent haunts in which poverty and typhoid lurk in company; or yet more easily by a careful study of the weekly bills of mortality as they are issued by the authorities of any great city. Indeed, compared with the massive battalions daily sacrificed in the perpetual conflict which mankind seems forever doomed to wage against intemperance, bad sewerage, and worse ventilation, the victims of regular warfare by sea and land count as but single spies. The worst of it is, too, that if the blood of the martyrs is in these cases at all the seed of the church, it is a seed terribly slow of germination. Each step in the slow progress is a human Golgotha.

It is far otherwise with the victims of railroad disasters; they, at least, do not lose their lives without great and immediate compensating benefits to mankind. After each new railroad "horror," as it is called, the whole world travels with an appreciably increased degree of safety. The causes which led to it are anxiously investigated by ingenious men, new appliances are invented, new precautions are imposed, a greater and more watchful care is inculcated. And hence it has resulted that each year, and in obvious consequence of each fresh catastrophe, travel by rail has become safer and safer, until it has been said, and with no inconsiderable degree of truth too, that the very safest place into which a man can put himself is the inside of a first-class railroad carriage on a train in full motion.

The study of railroad horrors is, therefore, the furthest possible from being a useless one, and a record of them is hardly less instructive than interesting. If carried too far it is apt, as matter for light reading, to become somewhat monotonous; though, about railroad accidents as about everything else, there is none the less an almost endless variety. Even in the forms of sudden death on the rail, nature seems to take a grim delight in an infinitude of surprises.

With a true dramatic propriety, the ghastly record, which has since grown so long, begins with the opening of the first railroad, literally on the very morning which finally ushered the great system into existence as a successfully accomplished fact, the eventful 15th of September, 1830.

DEATH OF MR. HUSKISSON.

That day had opened upon Liverpool bright and warm; the city was thronged with strangers, while gay and eager crowds lined the new thoroughfare on either side throughout its entire length, from the Mount Olives cut to Manchester. The arrangements were very perfect, and, during its earlier hours, the great gala occasion seemed likely to pass away unmarred by any mishap. A brilliant party, consisting of the directors of the new enterprise and their invited guests, were to pass over the road from Liverpool to Manchester, dine at the latter place, and return to Liverpool in the

afternoon. Their number was large and they filled eight trains of carriages, drawn by as many locomotives. The Duke of Wellington, then prime minister, was the most prominent personage there, and he with his party occupied the state cars, which were drawn by the locomotive Northumbrian, upon which George Stephenson himself that day officiated as engineer. In a car of one of the succeeding trains was Mr. William Huskisson, then a member of Parliament for Liverpool and eminent among the more prominent public men of the day as a financier and economist. He had been very active in promoting the construction of the Liverpool & Manchester road, and now that it was completed he had exerted himself greatly to render its opening day a success worthy an enterprise the far-reaching consequences of which he was among the few to appreciate. All the trains had started promptly from Liverpool, and had proceeded gayly along through an ovation of applause until at eleven o'clock they had reached Parkside, seventeen miles upon their journey, where it had been arranged that the locomotives were to replenish their supplies of water. As soon as the trains had stopped, disregarding every caution against their so doing, the excited and joyous passengers left their carriages and mingled together, eagerly congratulating one another upon the unalloyed success of the occasion. Mr. Huskisson, though in poor health and somewhat lame, was one of the most excited of the throng, and among the first to thus expose himself. Presently he caught the eye of the Duke of Wellington, standing at the door of his car. Now it so happened that for some time previous a coolness had existed between the two public men, the duke having as premier, with that military curtness for which he was famed, dismissed Mr. Huskisson from the cabinet of which he had been a member, and that, as was generally considered, without any sufficient cause. There had in fact been a most noticeable absence of courtesy in that ministerial crisis. The two now met face to face for the first time since the breach between them had taken place, and the duke's manner evinced a disposition to be conciliatory which was by no means usual with that austere soldier. Mr. Huskisson at once responded to the overture, and, going up to the door of the state carriage, he and his former chief shook hands and then entered into conversation. As they were talking, the duke seated in his car and Mr. Huskisson standing between the tracks, the Rocket locomotive — the same famous Rocket which a year previous had won the five hundred pounds prize, and by so doing established forever the feasibility of rapid steam locomotion — came along upon the other track to take its place at the watering station. It came up slowly and so silently that its approach was hardly noticed; until, suddenly, an alarm was given, and, as every one immediately ran to resume his place, some commotion naturally ensued. In addition to being lame, Mr. Huskisson seemed also under these circumstances to be quite agitated, and, instead of quietly standing against the side of the carriage and allowing the Rocket to pass, he nervously tried to get round its open door, which was swinging out across the space between the two tracks in such a way that the approaching locomotive struck it, flinging it back, and at the same time throwing Mr. Huskisson down. He fell on his face in the open space between the tracks, but with his left leg over the inner of the two rails upon which the Rocket was moving, so that one of its wheels ran obliquely up the limb to the thigh, crushing it shockingly. As if to render the distressing circumstances of the catastrophe complete, it so happened that the unfortunate man had left his wife's side when he got out of his car, and now he had been flung down before her eyes as he sought to reënter it. He was immediately raised, but he knew that his hurt was mortal, and his first exclamation was, "I have met my death!" He was at once placed on one of the state carriages, to which the Northumbrian locomotive was attached, and in twenty-five minutes was carried to Eccles, a distance of fifteen

miles, where medical assistance was obtained. He was far beyond its reach, however, and upon the evening of the same day, before his companions of the morning had completed their journey, he was dead.

Necessarily the accident to Mr. Huskisson threw a deep gloom over the remainder of the celebration, and it was, indeed, only with the utmost difficulty that the Duke of Wellington was prevailed upon not at once to return to Liverpool. The party did at last go on, but the day, which in its earlier hours had promised to be so bright and so auspicious, proved in its later hours sad and anxious enough. In the first place, the crowd which thronged along the railroad track was so great as to be wholly beyond control; neither was it a peculiarly good-natured or well-disposed gathering. For just then the public distress and discontent throughout England was greater than it had been within the memory of any man living; and, indeed, even now, it may be fairly questioned whether England ever saw a sadder or more anxious year than that in which the railroad era at last struggled pain fully into life. Not unnaturally, in view of his official position and his hard, unyielding character, — set like a flint against any measure of sympathy or reform, — the premier-duke was probably the most unpopular man in the United Kingdom; so now, as the excursionists approached Manchester, the eyes of the prime minister were offended by distasteful mottoes and emblems, while more than once missiles even were thrown at the train. Finally, the directors were very glad to get the ministerial party out of Manchester and back to Liverpool at the cost of a derangement of their entire schedule for the day; nor did the duke subsequently hear Brougham's famous speech, made at the dinner given at Liverpool in honor of the event, in which with such infinite oratorical skill he referred at once to the wonders of the system that day inaugurated and to the catastrophe which had saddened its opening observances.

"When," he said, "I saw the difficulties of space, as it were, overcome; when I beheld a kind of miracle exhibited before my astonished eyes; when I saw the rocks excavated and the gigantic power of man penetrating through miles of the solid mass, and gaining a great, a lasting, an almost perennial conquest over the powers of nature by his skill and industry; when I contemplated all this, was it possible for me to avoid the reflections which crowded into my mind, not in praise of man's great success, not in admiration of the genius and perseverance he had displayed, or even of the courage he had shown in setting himself against the obstacles that matter afforded to his course — no! but the melancholy reflection, that these prodigious efforts of the human race, so fruitful of praise but so much more fruitful of lasting blessings to mankind, have forced a tear from my eye by that unhappy casualty which deprived me of a friend and you of a representative!"

Though wholly attributable to his own carelessness, the death of so prominent a character as Mr. Huskisson, on such an occasion, could not but make a deep impression on the public mind. The fact that the dying man was carried seventeen miles in twenty-five minutes, in search of rest and medical aid, served rather to stimulate the vague apprehension of danger which thereafter associated itself with the new means of transportation, and converted it into a dangerous method of carriage which called for no inconsiderable display of nerve on the part of those using it. Indeed, as respects the safety of travel by rail there is an edifying similarity between the impressions which prevailed in England forty-five years ago and those which prevail in China now; for, when only last year it was proposed to introduce railroads into the Celestial Empire, a vigorous native protest was fulminated against them, in which, among other things scarcely less astounding, it was alleged that "in all countries where railroads exist they are considered a very dangerous mode of locomotion, and, beyond those who have very urgent busi-

ness to transact, no one thinks of using them."

On this subject, however, of the dangers incident to journeys by rail, a writer of nearly half a century back, who has left us one of the earliest descriptions of the Liverpool & Manchester road, thus reassured the public of those days, with a fresh quaintness of style which lends a present value to his words: "The occurrence of accidents is not so frequent as might be imagined, as the great weight of the carriages" (they weighed about one tenth part as much as those now in use in America) "prevents them from easily starting off the rails; and so great is the momentum acquired by these heavy loads moving with such rapidity, that they easily pass over considerable obstacles. Even in those melancholy accidents where loss of life has been sustained, the bodies of the unfortunate sufferers, though run over by the wheels, have caused little irregularity in the motion, and the passengers in the carriages have not been sensible that any impediment has been encountered on the road."

Indeed, from the time of Mr. Huskisson's death, during a period of over eleven years, railroads enjoyed a remarkable and most fortunate exemption from accidents. During all that time there did not occur a single disaster resulting in any considerable loss of life. This happy exemption was probably due to a variety of causes. Those early roads were, in the first place, remarkably well and thoroughly built, and were very cautiously operated under a light volume of traffic. The precautions then taken and the appliances in use would, it is true, strike the modern railroad superintendent as both primitive and comical; for instance, they involved the running of independent pilot locomotives in advance of all night passenger trains, and it was, by the way, on a pioneer locomotive of this description, on the return trip of the excursion party from Manchester after the accident to Mr. Huskisson, that the first recorded attempt was made in the direction of our present elaborate system of night signals. On that occasion obstacles were signaled to those in charge of the succeeding trains by a man on the pioneer locomotive, who used for that purpose a bit of lighted tarred rope. Through all the years between 1830 and 1841, nevertheless, not a single serious railroad disaster had to be recorded. Not that the corporations did not owe the exemption, among other things, to very fortunate and narrow escapes; and, curiously enough, the first accident which was at all serious in its character, which occurred after the death of Mr. Huskisson, was in its circumstances — except as respected loss of life — almost an exact parallel to the famous Revere disaster which happened in Massachusetts in August, 1871. It chanced on the Liverpool & Manchester Railway on the 23d of December, 1832.

THE RAINHILL COLLISION OF 1832.

The second-class morning train had stopped at the Rainhill station to take in passengers, when those upon it heard through the dense fog another train, which had left Manchester forty-five minutes later, coming towards them at a high rate of speed. When it first became visible it was but one hundred and fifty yards off, and a collision was inevitable. Those in charge of the stationary train, however, succeeded in getting it under a slight headway, and in so much diminished the shock of the collision; but the last five carriages were notwithstanding injured, the one at the end being totally demolished. Though quite a number of the passengers were cut and bruised, and several were severely hurt, one only, strange to say, was killed. This result was very different from that experienced by the Massachusetts corporation at Revere nearly forty years later, and, as the circumstances were much the same, it is necessary to conclude that luck varied.

Indeed, the luck — for it was nothing else — of those earlier times was truly amazing. Thus on this same Liverpool & Manchester road, as a first-class train on the morning of April 17, 1836, was

moving at a speed of some thirty miles an hour, an axle broke under the first passenger coach, causing the whole train to leave the track and throwing it down the embankment, which at that point was twenty feet high. The cars were rolled over, and the passengers in them tumbled about topsy-turvy; nor, as they were securely locked in, could they even extricate themselves when at last the wreck of the train reached firm bearings. And yet no one was killed. Here the corporation was saved by one chance in a thousand, and its almost miraculous good fortune received terrible illustration in a disaster which recently occurred on the Great Western Railway under almost precisely similar conditions, — that at Shipton-on-Cherwell, on December 24, 1874.

THE SHIPTON-ON-CHERWELL ACCIDENT.

It was the day immediately preceding Christmas, and every train which at that holiday season leaves London is densely packed, for all England seems then to gather away from its cities to the country hearths. Accordingly, the ten o'clock London express on the Great Western Railway, when it left Oxford that morning, was made up of no less than fifteen passenger carriages and baggage vans, drawn by two powerful locomotives and containing nearly three hundred passengers. About seven miles north of Oxford, as the train, moving at a speed of some thirty to forty miles an hour, was rounding a gentle curve in the approach to the bridge over the little river Cherwell, the tire of one of the wheels of the passenger coach next behind the locomotive broke, throwing it off the track. For a short distance it was dragged along in its place; but almost immediately those in charge of the locomotives noticed that something was wrong, and most naturally, and with the very best of intentions, they instantly did the very worst thing which under the circumstances it was in their power to do: they applied their brakes and reversed their engines; their single thought was to stop the train. Had locomotives and cars been equipped with the continuous train-brakes now so generally in use in America, this action of the engine drivers would have checked at the same instant the speed of each particular car, and probably any serious catastrophe would have been averted. With the train equipped as it was, however, had these men, instead of crowding on their brakes and reversing their engines, simply shut off their steam, and by a gentle application of the brakes checked the speed gradually, and so as to avoid any strain on the couplings, the cars would probably have held together and remained upon the road-bed. Instead of this, however, the sudden checking of the two ponderous locomotives converted them into an anvil, as it were, upon which the unfortunate leading car, already off the rails, was crushed under the weight and impetus of the succeeding cars. The train instantly zig-zagged in every direction under the pressure, the couplings which connected it together snapping; and the cars, after leaving the rails to the right and left and running down the embankment of about thirteen feet in height, came to a stand-still at last, several of them in the reverse order from that which they had held while in the train. The first carriage was run over and completely destroyed; the five rear ones were alone left upon the road-bed, and of these two only were on the rails; of the ten which went down the embankment, two were demolished. In this disaster thirty-four passengers lost their lives, and sixty-five others, besides four employés of the company, were injured.

These two disasters, divided from each other by the lapse of more than a third of a century, were similar in every respect except loss of life; for, while a surprising immunity in this respect marked the first, the last ranks among the most fatal railroad catastrophes on record. Yet, upon the other hand, it may well be questioned whether the first was not wholly barren of results in so far as any increased safety in travel by rail was concerned; for, like other mortals, railroad officers are apt after some hair-breadth

escape to bless their fortunate stars for the present good, rather than to take anxious heed for future dangers. The English, also, are especially prone to conservatism. In this respect there is, indeed, something almost ludicrously characteristic in the manner with which those interested in the railway management of that country strain at their gnats while they swallow their camels. They have grappled with the great question of city travel with a superb financial and engineering audacity which has left all other communities hopelessly distanced; but, while carrying their passengers under and over the ebb and flow of the Thames and among the chimney-pots of densest London, to leave them on the very steps of the Royal Exchange, they have never been able to devise any satisfactory means for putting the traveler, in case of disaster, in communication with the engineer of his train. It is, indeed, a fact which would be wholly curious were it not partly comical, that, after the ingenuity of all England had for a third of a century exhausted itself in vain efforts at the solution of this tremendous problem, it appeared at the Shipton-on-Cherwell investigation that the associated general managers of the leading railways "did not think that any [such] means of communication was at all required, or likely to be useful or successful." So also as respects the application of the train-brake, which places the speed of each car under the direct and instantaneous control of him who is in charge of the locomotive; for years the success of these brakes has been conceded even by the least progressive of American railroad managers, and the want of them had directly and obviously contributed to the Shipton-on-Cherwell disaster, even if it had not wholly caused its murderous destructiveness; and yet in the investigation which ensued from it, it appeared that the authorities of the Great Western Railway, being eminently "practical men," still entertained "very great doubts of the wisdom of adopting continuous brakes at all." Such conservatism as this is open to but one description of argument, the *ultima ratio* of railroad logic. So long as luck averts the loss of life in railroad disasters, no occasion is seen for disturbing time-honored precautions or antiquated appliances. While, however, a disaster like that of December 24, 1874, may not convince, it does compel: incredulity and conservatism vanish, silenced, at least, in presence of so frightful a row of corpses as on that morning made ghastly the banks of the Cherwell. The general introduction of train-brakes upon the railways of Great Britain will date from that event.

THE DEODAND.

To return, however, to those earlier years during which wholesale railroad slaughters were as yet unknown. One curious illustration of this fact appeared in the quaint penalty which was, in case of disasters on railways resulting in a loss of human life, imposed upon the corporations. It was a principle of English common law, derived from the feudal period, that anything through the instrumentality of which death occurred was forfeited to the crown as a deodand; accordingly, down to the year 1840, and even later, we find, in all cases where persons were killed, records of deodands levied by the coroner's juries upon the locomotives. These appear to have been arbitrarily imposed and graduated in amount accordingly as circumstances seemed to excite in greater or less degree the sympathies or the indignation of the jury. In November, 1838, for instance, a locomotive exploded upon the Liverpool & Manchester road, killing its engineer and fireman; and for this escapade a deodand of twenty pounds was assessed upon it by the coroner's jury; while upon another occasion, in 1839, where the locomotive struck and killed a man and horse at a street crossing, the deodand was fixed at no less a sum than fourteen hundred pounds, the full value of the engine. Yet in this last case there did not appear to be any circumstances rendering the corporation liable in civil damages. The deodand seems to have been looked upon as a species of rude penalty im-

posed on the use of dangerous appliances, a sharp reminder to the corporations to look closely after their locomotives and employés. As, however, accidents increased in frequency, it became painfully apparent that "crowner's 'quest law" was not in any appreciable degree better calculated to command the public respect in the days of Victoria than in those of Elizabeth, and the ancient usage was accordingly at last abolished. Certainly the position of railroad corporations would now be even more hazardous than it is, if, after every catastrophe resulting in death, the coroner's jury of the vicinage enjoyed the power of arbitrarily imposing on them such additional penalty, in addition to all other liabilities, as might seem to it proper under the circumstances of the case.

The period of exemption lasted eleven years, and, curiously enough, the record of great catastrophes opened on the Great Western Railway and upon the 24th of December, a day which seems to have been peculiarly unfortunate in the annals of that company, seeing that it was likewise the date of the Shipton-on-Cherwell disaster. Upon that day in 1841, a train, while moving through a thick fog at a high rate of speed, came suddenly in contact with a mass of earth which had slid from the embankment at the side on to the track. Instantly the whole rear of the train was piled up on top of the first carriage, which happened to be crowded with passengers, eight of whom were killed on the spot, while seventeen others were more or less injured. The coroner's jury returned a verdict of accidental death, and at the same time, as if to give the corporation a forcible hint to look closer to the condition of its embankments, a deodand of one hundred pounds was levied on the locomotive and tender.

TELESCOPING.

The disaster in this case was due to the telescoping, as it is termed, of cars. That is, the cars are closed up in each other like the slides of a telescope, under the immense pressure of the instantaneous stopping of a train in rapid motion. This is, upon the whole, the most frightful danger to which travel by rail is liable, and there are but two ways in which provision can be made to meet it. The occurrence of accident may be guarded against through an unsleeping and all-pervading vigilance; or, where it must occur, an equipment may be provided so strong as to be capable of meeting and resisting it. Now, so long as trains go at great speed and depend for their safety on human precaution, it is inevitable that they will occasionally run upon some unexpected obstacle. The simple wonder is that they do this so infrequently. Were it not an accomplished fact, the security in this respect which has been attained would be deemed simply impossible. Though sometimes inevitable, the occurrence of accidents of this description may, however, in the vastly larger proportion of the few instances in which they must occur, be rendered harmless just in proportion as those in charge of a train can reduce its speed, or as the train itself, through its more perfect construction, can resist the pressure of a sudden shock. Improved brakes and stronger and heavier car construction are the great safeguards against telescoping, and the advance made in these respects of late years on the American railroads has been little short of wonderful. This has been due to two inventions, both of which have only recently been brought into general use: the atmospheric train-brake, and what is, from the name of its inventor, known as the Miller platform and buffer. By the first the velocity of the whole train in its every part is placed directly and immediately under the control of its engineer; and by the last the cars of a train are practically converted into one continuous body, in which there are no separate or loosely connected parts to be crushed into each other, or piled on top of each other. Had the train upon the Great Western Railway at Shipton-on-Cherwell, in 1874, been equipped with the continuous train-brake, the worst features of that catastrophe would

certainly have been averted, and it would have been passed over unnoticed as a simple, ordinary case of derailment. Had the cars of which that train was composed, or those of the other train on the same road just thirty-three years before, been built with the Miller platform and buffer, their strength, converting them into substances too hard to be crushed, would in both cases have resisted the shock caused by the sudden stopping of the locomotives.

THE FOXBOROUGH ACCIDENT.

A very apt illustration of what might have been the result in these cases was furnished in an accident, not dissimilar to that at Shipton-on-Cherwell in character, which happened in Massachusetts on the Boston & Providence Railroad upon July 15, 1872. As an express train was running up to Boston about noon of that day, and at a rate of speed of some forty miles an hour, it came in contact with a horse and wagon at a grade crossing in the town of Foxborough. The train was made up of thoroughly well-built cars, equipped with both the Miller platform and the Westinghouse train-brake. There was no time in which to check the speed, and it thus became a simple question of strength of construction, to be tested in an unavoidable collision. The engine struck the wagon, and instantly destroyed it. The horse had already cleared the rails when the wagon was struck, but, a portion of his harness getting caught on the locomotive, he was thrown down and dragged a short distance until his body came in contact with the platform of a station close to the spot of collision. The body was then forced under the cars, having been almost instantaneously rolled and pounded up into a hard, unyielding mass. The results which ensued were certainly very singular. Next to the locomotive was an ordinary baggage and mail car, and it was under this car, and between its forward and its hind truck, that the body of the horse was forced; coming then directly in contact with the truck of the rear wheels, it tore it from its fastenings and thus let the rear end of the car drop upon the track. In falling, this end snapped the coupling by its weight, and so disconnected the train, the locomotive going off towards Boston dragging this single car, with one end of it bumping along the track. Meanwhile the succeeding car of the train had swept over the body of the horse and the disconnected truck, which were thus brought in contact with its own wheels, which in their turn were also torn off; and so great was the impetus that in this way all of the four passenger cars which composed that part of the train were successively driven clean off their rolling gear, and not only did they then slide off the track, but they crossed a railroad siding which happened to be at that point, went down an embankment some three or four feet in height, demolished a fence, passed into an adjoining field, and then at last, after glancing from the stump of a large oak-tree, they finally came to a stand-still some two hundred feet from the point at which they had left the track. There was not in this case even an approach to telescoping; on the contrary, each car rested perfectly firmly in its place as regarded all the others, not a person was injured, and when the wheelless train at last became stationary the astonished passengers got up and hurried through the doors, the very glass in which as well as that in the windows was unbroken. Here was an indisputable victory of skill and science over accident, showing most vividly to what an infinitesimal extreme the dangers incident to telescoping may be reduced.

THE DIFFERENCE. 1854 AND 1874.

The vast progress in this direction made within twenty years was again even more forcibly illustrated by the results of two accidents almost precisely similar in character, which occurred, the one on the Great Western Railroad of Canada, in October, 1854, the other on the Boston & Albany, in Massachusetts, in October, 1874. In the first case a regular train made up of a locomotive and seven cars, while approach-

ing Detroit at a speed of some twenty miles an hour, ran into a gravel train of fifteen cars which was backing towards it at a speed of some ten miles an hour. The locomotive of the passenger train was thrown completely off the track and down the embankment, dragging after it a baggage car. At the head of the passenger portion of the train were two second-class cars filled with emigrants; both of these were telescoped and demolished, and all their unfortunate occupants either killed or injured. The front of the succeeding first-class car was then crushed in, and a number of those in it were hurt. In all, no less than forty-seven persons lost their lives, while sixty others were maimed or severely bruised. So much for a collision in October, 1854. In October, 1874, on the Boston & Albany road, the regular New York express train, consisting of a locomotive and seven cars, while going during the night at a speed of forty miles an hour, was suddenly, near the Brimfield station, thrown by a misplaced switch into a siding upon which a number of platform freight cars were standing. The train was thoroughly equipped, having both Miller platform and Westinghouse brake. The six seconds which intervened, in the darkness, between notice of displacement and the collision, did not enable the engineer to check perceptibly the speed of his train, and when the blow came it was a simple question of strength to resist. The shock must have been tremendous, for the locomotive and tender were flung off the track to the right and the baggage car to the left, the last being thrown across the interval between the siding and the main track and resting obliquely over the latter. The forward end of the first passenger car was thrown beyond the baggage car up over the tender, and its rear end, as well as the forward end of the succeeding car, was injured. As in the Foxborough case, several of the trucks were jerked out from under the cars to which they belonged, but not a person on the train was more than slightly bruised, the cars were not disconnected, nor was there a suggestion even of telescoping. Such contrasts are their own best comment.

THE VERSAILLES ACCIDENT IN 1842.

Going back once more to the early days, a third of a century since, before yet the periodical recurrence of slaughters had caused either train-brake or Miller platform to be imagined as possibilities, before, indeed, there was yet any record of what we would now consider a regular railroad field-day, with its long train of accompanying horrors, including in the grisly array death by crushing, scalding, drowning, burning, and impalement, — going back to the year 1840, or thereabouts, we find that the railroad companies experienced a notable illustration of the truth of the ancient adage that it never rains but it pours; for it was then that the long immunity was rudely broken in upon. After that time disasters on the rail seemed to tread upon one another's heels in quick and frightful succession. Within a few months of the English catastrophe of December 24, 1841, there happened in France one of the most famous and most horrible railroad slaughters ever recorded. It took place on the 8th of May, 1842. It was the birthday of the king, Louis Philippe, and, in accordance with the usual practice, the occasion had been celebrated at Versailles by a great display of the fountains. At half past five o'clock these had stopped playing, and a general rush ensued for the trains then about to leave for Paris. That which went by the road along the left bank of the Seine was densely crowded, and was so long that it required two locomotives to draw it. As it was moving at a high rate of speed between Bellevue and Meudon, the axle of the foremost of these two locomotives broke, letting the body of the engine drop to the ground. It instantly stopped, and the second locomotive was then driven by its impetus on top of the first, crushing its engineer and fireman, while the contents of both the fire-boxes were scattered over the roadway and among the *débris*. Three carriages crowded with passengers were then piled on top of this burning mass,

and there crushed together into each other. The doors of the train were all locked, as was then and indeed is still the custom in Europe, and it so chanced that the carriages had all been newly painted. They blazed up like pine kindlings. Some of the carriages were so shattered that a portion of those in them were enabled to extricate themselves, but no less than forty were held fast; and of these such as were not so fortunate as to be crushed to death in the first shock perished hopelessly in the flames before the eyes of a throng of impotent lookers-on. Some fifty-two or fifty-three persons were supposed to have lost their lives in this disaster, and more than forty others were injured; the exact number of the killed, however, could never be ascertained, as the telescoping of the cars on top of the two locomotives had made of the destroyed portion of the train a veritable holocaust of the most hideous description. Not only did whole families perish together, — in one case no less than eleven members of the same family sharing a common fate, — but the remains of such as were destroyed could neither be identified nor separated. In one case a female foot was alone recognizable, while in others the bodies were calcined and fused into an indistinguishable mass. The Academy of Sciences appointed a committee to inquire whether Admiral D'Urville, a distinguished French navigator, was among the victims. His body was thought to be found, but it was so terribly mutilated that it could be recognized only by a sculptor, who chanced some time before to have taken a phrenological cast of his skull. His wife and only son had perished with him.

It is not easy now to conceive the excitement and dismay which this catastrophe caused throughout France. The new invention was at once associated in the minds of an excitable people with novel forms of imminent death. France had at best been laggard enough in its adoption of the new appliance, and now it seemed for a time as if the Versailles disaster was to operate as a barrier in the way of all further railroad development. Persons availed themselves of the steam roads already constructed as rarely as possible, and then in fear and trembling, while steps were taken to substitute horse for steam power on other roads then in process of construction.

The disaster was, indeed, one well calculated to make a deep impression on the popular mind, for it lacked almost no attribute of the dramatic and terrible. There were circumstances connected with it, too, which gave it a sort of moral significance, — contrasting so suddenly the joyous return from the country *fête* in the pleasant afternoon of May, with what De Quincey has called the terror of sudden death. It contained a whole homily on the familiar text. As respects the number of those killed and injured, also, the Versailles accident has not often been surpassed; perhaps never in Europe. In this country it was surpassed on one occasion at least, and then under circumstances very similar to it. This was the accident at Camphill station, about twelve miles from Philadelphia, on the 17th of July, 1856, which befell an excursion train carrying some eleven hundred children, who had gone out on a Sunday-school picnic in charge of their teachers and friends.

THE CAMPHILL ACCIDENT.

It was the usual story. The road had but a single track, and the train, both long and heavy, had been delayed and was running behind its schedule time. The conductor thought, however, that the next station could yet be reached in time to meet and there pass a regular train coming towards him. It may have been a miscalculation of seconds, it may have been a difference of watches, or perhaps the regular train was slightly before its time; but, however it happened, as the excursion train, while running at speed, was rounding a reverse curve, it came full upon the regular train, which had just left the station. In those days, as compared with the present, the cars were but egg-shells, and the shock was terrific. The loco-

motives struck each other, and, after rearing themselves up for an instant, it is said, like living animals, fell to the ground, mere masses of rubbish. In any case the force of the shock was sufficient to hurl both engines from the track and lay them side by side at right angles and some distance from it. As only the excursion train happened to be running at speed, it alone had all the impetus necessary for telescoping; three of its cars accordingly closed in upon each other, and the children in them were crushed; as in the Versailles accident, two succeeding cars were driven on to this mass, and then fire was set to the whole from the ruins of the locomotives. It would be hard to imagine anything more thoroughly heart-rending, for the holocaust was of little children on a party of pleasure. Five cars in all were burned, and sixty-six persons perished; the injured numbered more than a hundred.

Of this disaster nothing could be said either in excuse or in extenuation; it was not only one of the worst description, but it was one of that description the occurrence of which is most frequent. An excursion train, while running against time on a single-track road, came in collision with a regular train. The record is full of similar disasters, closing with that at Far Rockaway on the South Side Railroad of Long Island, upon the 5th of July, 1875, with its ten killed and thirty injured. Primarily, of course, the conductors of the excursion trains were at fault in all these cases; nor should it be forgotten that the unfortunate man who had charge of the Camphill train destroyed himself the next day by swallowing arsenic. But in reality, in these and in all similar cases, — both those which have happened and those hereafter surely destined to happen, — the final responsibility does not rest upon the unfortunate or careless subordinate; nor should the weight of punishment be visited upon him. It belongs elsewhere. At this late day no board of directors, nor president, nor superintendent has any right to operate a single-track road without the constant use of the telegraph; and, if they persist in so doing, it should be under a constant and well understood liability to the penalties for manslaughter. That the telegraph can be used to block, as it is termed, double-track roads, by dividing them into sections, upon no one of which two trains can be running at the same time, is matter of long and daily experience. There is nothing new or experimental about it. It is a system which has been forced on the more crowded lines of the world as an alternative to perennial killings. That in the year 1875, excursion trains should rush along single-track roads and hurl themselves against regular trains is sufficiently incredible; but that such roads should be operated without the constant aid of the telegraph as a means of blocking their tracks for every irregular train indicates a degree of wanton carelessness, or an excess of incompetence, for which adequate provision should be made in the criminal law.

COLLISIONS CAUSED BY THE TELEGRAPH.

And yet, even with the wires in active use, collisions like those at Far Rockaway and at Camphill will occasionally take place. They have sometimes, indeed, even been caused by the telegraph, so that railroad officials at two adjoining stations on the same road, having launched trains at each other beyond recall, have busied themselves while waiting for tidings of the inevitable collision in summoning medical assistance for those sure soon to be injured. In such cases, however, the mishap can almost invariably be traced to some defect in the system under which the telegraph is used; such as a neglect to exact return messages to insure accuracy, or the delegating to inexperienced subordinates the work which can be properly performed only by a principal. This was singularly illustrated in a terrible collision which took place at Thorpe, between Norwich and Great Yarmouth, on the Great Eastern Railway in England, on the 10th of September, 1874. The line had in this place but a single track, and the mail train to Norwich, under the rule,

had to wait at a station called Brundell until the arrival there of the evening express from Yarmouth, or until it received permission by the telegraph to proceed. On the evening of the disaster the express train was somewhat behind its time, and the inspector wrote a dispatch directing the mail to come forward without waiting for it. This dispatch he left in the telegraph office unsigned, while he went to attend to other matters. Just then the express train came along, and he at once allowed it to proceed. Hardly was it under way when the unsigned dispatch occurred to him, and the unfortunate man dashed to the telegraph office only to learn that the operator had forwarded it. Under the rules of the company no return message was required. A second dispatch was instantly sent to Brundell to stop the mail; the reply came back that the mail was gone. A collision was inevitable.

The two trains were of very equal weight, the one consisting of fourteen and the other of thirteen carriages. They were both drawn by powerful locomotives, the drivers of which had reason for putting on an increased speed, believing, as each had cause to believe, that the other was waiting for him. The night was intensely dark and it was raining heavily, so that, even if the brakes were applied, the wheels would slide along the slippery track. Under these circumstances the two trains rushed upon each other round a slight curve which sufficed to obscure their headlights. The combined momentum must have amounted to little less than sixty miles an hour, and the shock was heard through all the neighboring village. The funnel of the locomotive drawing the mail train was swept away, and the other locomotive seemed to rush on top of it, while the carriages of both trains followed until a mound of locomotives and shattered cars was formed which the descending torrents alone hindered from becoming a funeral pyre. So sudden was the collision that the driver of one of the engines did not apparently have an opportunity to shut off the steam, and his locomotive, though forced from the track and disabled, yet remained some time in operation in the midst of the wreck. In both trains, very fortunately, there were a number of empty cars between the locomotives and the carriages in which the passengers were seated, and they were utterly demolished; but for this fortunate circumstance, the Thorpe collision might well have proved the most disastrous of all railroad accidents. As it was, the men on both the locomotives were instantly killed, together with seventeen passengers, and four other passengers subsequently died of their injuries; making a total of twenty-five deaths, besides fifty cases of injury.

No more violent collision than this at Thorpe probably ever took place; and yet, as curiously illustrating how rapidly the most severe shock expends its force, it is said that two gentlemen in the last carriage of one of the trains, finding themselves suddenly stopped close to their destination, supposed it was for some unimportant cause, and concluded at once to take advantage of such a happy chance by getting out and walking to their homes, which they did, and learned only the next morning of the catastrophe in which they had been unconscious participants.

Charles Francis Adams, Jr.

OF SOME RAILROAD ACCIDENTS.

II.

THE record of railroad horrors in the most aggravated form began at Versailles on the 8th of May, 1842; and doubtless it is destined to an indefinite continuance. Since then it has sometimes seemed as though locomotives had run mad or were indulging in a very carnival of disasters, so rapidly has one catastrophe trodden upon the heels of another. At least twice in England their frequent occurrence has occasioned so much public uneasiness as to lead to circulars addressed to the corporations, in one case by the Queen herself, and in the other by the government through the President of the Board of Trade. As a rule, these accidents were of a strikingly similar description, and a dry chronological enumeration of them would be neither profitable nor instructive. There are, however, those of them which are very memorable; some because of dramatic features in their occurrence, others because of the results which they produced in a permanently increased safety of travel. These are not without a lasting interest, although it is almost startling to see how soon and how completely they are forgotten. For instance, who now remembers even the name of the Abergele disaster? And yet it occurred but seven years since, and it would not be easy to conceive anything more striking and terribly dramatic than those incidents connected with it which caused all England for a space to think and speak of nothing else.

THE ABERGELE ACCIDENT.

The Irish mail is a famous train in England. Leaving London at shortly after seven A. M. it was timed in 1868 to make the distance to Chester, one hundred and sixty-six miles, in four hours and eighteen minutes; from Chester to Holyhead is eighty-five miles, for running which the space of one hundred and twenty-five minutes was allowed. Abergele is a point on the sea-coast in the north of Wales, nearly midway between these two places. On the 20th of August, 1868, the Irish mail left Chester as usual. It was made up of thirteen carriages in all, which were occupied, as the carriages of that train usually were, by a large number of persons whose names at least were widely known. Among these, on this particular occasion, were the Duchess of Abercorn, wife of the then Lord Lieutenant of Ireland, with five children. Under the running arrangements of the London & North-Western road a freight, or as it is there called a goods train, left Chester half an hour before the mail, and was placed upon the siding at Llanddulas, a station about a mile and a half beyond Abergele, to allow the mail to pass. From Abergele to Llanddulas the track ascended by a gradient of some sixty feet to the mile. On the day of the accident it chanced that certain wagons between the engine and the rear end of the goods train had to be taken out to be left at Llanddulas, and in doing this it became necessary to separate the train and to leave five or six of the last cars in it standing on the tracks of the main line, while those which were to be left were backed on to a siding. The employé whose duty it was to have done so neglected to set the brakes on the wagons thus left standing, and consequently when the engine and the rest of the train returned for them, the moment they were touched, and before a coupling could be effected, the jar set them in motion down the incline towards Abergele. They started so slowly that a brakeman of the train ran after them, fully expecting to catch and stop them, but as they went down the grade they soon outstripped him, and it became clear that there was nothing to check them until they should meet the Irish

mail, then almost due. It also chanced that the cars thus loosened were oil cars.

The track of the North-Western road between Abergele and Llanddulas runs along the sides of the picturesque Welsh hills, which rise up to the south, while to the north there stretches out a wide expanse of sea. The mail train was skirting the hills and laboring up the grade at a speed of some thirty miles an hour, when its engineer suddenly perceived the loose wagons coming down upon it around the curve, and then but a few yards off. Seeing that they were oil cars he almost instinctively sprang from his locomotive, and was thrown down by the impetus and rolled to the side of the road-bed. Picking himself up, bruised but not seriously hurt, he saw that the collision had already taken place, that the tender had ridden directly over the engine, that the colliding cars were demolished, and that the foremost carriages of the train were already on fire. Running quickly to the rear of the train he succeeded in uncoupling six carriages and a van, which were drawn away from the rest before the flames extended to them by an engine which most fortunately was following the train. All the other carriages were utterly destroyed, and every person in them perished.

The Abergele was probably a solitary instance, in the record of railroad accidents, in which but a single survivor sustained any injury. There was no maiming. It was death or entire escape. The collision was not a particularly severe one, and the engineer of the mail train especially stated that at the moment it occurred the loose cars were still moving so slowly that he would not have sprung from his engine had he not seen that they were loaded with oil. The very instant the collision took place, however, the fluid seemed to ignite and to flash along the train like lightning, so that it was impossible to approach a carriage when once it caught fire. The fact was that the oil in vast quantities was spilled upon the track and ignited by the fire of the locomotive, and then the impetus of the mail train forced all of its leading carriages into the dense mass of smoke and flame. All those who were present concurred in positively stating that not a cry, nor a moan, nor a sound of any description was heard from the burning carriages, nor did any one in them apparently make an effort to escape.

The most graphic description of this extraordinary and terrible catastrophe was that given by the Marquis of Hamilton, the eldest son of the Duke of Abercorn, whose wife and family, fortunately for themselves, occupied one of those rear carriages which were unshackled and saved. In his account the Marquis of Hamilton said: "We were startled by a collision and a shock which, though not very severe, were sufficient to throw every one against his opposite neighbor. I immediately jumped out of the carriage, when a fearful sight met my view. Already the whole of the three passengers' carriages in front of ours, the vans, and the engine were enveloped in dense sheets of flame and smoke, rising fully twenty feet high, and spreading out in every direction. It was the work of an instant. No words can convey the instantaneous nature of the explosion and conflagration. I had actually got out almost before the shock of the collision was over, and this was the spectacle which already presented itself. Not a sound, not a scream, not a struggle to escape, not a movement of any sort was apparent in the doomed carriages. It was as though an electric flash had at once paralyzed and stricken every one of their occupants. So complete was the absence of any presence of living or struggling life in them that, as soon as the passengers from the other parts of the train were in some degree recovered from their first shock and consternation, it was imagined that the burning carriages were destitute of passengers; a hope soon changed into feelings of horror when their contents of charred and mutilated remains were discovered an hour afterward. From the extent, however, of the flames, the suddenness of the conflagration, and the absence of

any power to extricate themselves, no human aid would have been of any assistance to the sufferers, who, in all probability, were instantaneously suffocated by the black and fetid smoke peculiar to paraffine, which rose in volumes around the spreading flames."

Though the collision took place before one o'clock, in spite of the efforts of a large gang of men who were kept throwing water on the tracks, the perfect sea of flame which covered the line for a distance of some forty or fifty yards could not be extinguished until nearly eight o'clock in the evening; for the petroleum had flowed down into the ballasting of the road, and the rails themselves were red-hot. It was therefore small occasion for surprise that when the fire was at last gotten under, the remains of those who lost their lives were in some cases wholly undistinguishable, and in others almost so. Among the thirty-three victims of the disaster the body of no single one retained any traces of individuality; the faces of all were wholly destroyed, and in no case were there found feet or legs or anything at all approaching to a perfect head. Ten corpses were finally identified as those of males, and thirteen as those of females, while the sex of ten others could not be determined. The body of one passenger, Lord Farnham, was identified by the crest on his watch; and, indeed, no better evidence of the wealth and social position of the victims of this accident could have been asked for than the collection of articles found on its site. It included diamonds of great size and singular brilliancy; rubies, opals, emeralds, gold tops of smelling-bottles, twenty-four watches, of which but two or three were not gold, chains, clasps of bags, and very many bundles of keys. Of these the diamonds alone had successfully resisted the intense heat of the flame; the settings were nearly all destroyed.

Of the causes of this accident little need or can be said. No human appliances, no more ingenious brakes or increased strength of construction, could have averted it or warded off its consequences once it was inevitable. It was occasioned primarily by two things, the most dangerous and the most difficult to reach of all the many sources of danger against which those managing railroads have unsleepingly to contend: a somewhat defective discipline, aggravated by a little not unnatural carelessness. The rule of the company was specific that all the wagons of every goods train should be out of the way and the track clear at least ten minutes before a passenger train was due; but in this case shunting was going actively on when the Irish mail was within a mile and a half. A careless brakeman then forgot for once that he was leaving his wagons standing close to the head of an incline; a blow in coupling, a little heavier perhaps than usual, sufficed to set them in motion; and they happened to be loaded with oil.

Behind all this, however, there was apparent a grave and radical defect in the construction of the road or the arrangement of its sidings, in that the station at Landdulas was placed upon an incline at all. As will hereafter be seen, this practice on the part of those laying out railroads has been the cause of frequent disaster, and must continue to be so as long as it exists. Every engineer knows perfectly well what the angle of equilibrium is, and to establish sidings or to habitually permit shunting where that angle is exceeded at the head of an incline is simply to insure soon or late a disaster.

THE NEW HAMBURG ACCIDENT.

A catastrophe strikingly similar to that at Abergele befell an express train on the Hudson River Railroad, upon the night of the 6th of February, 1871. The weather for a number of days preceding the accident had been unusually cold, and it is to the suffering of employés incident to exposure, and the consequent neglect of precautions on their part, that accidents are peculiarly due. On this night a freight train was going south, all those in charge of which were sheltering themselves during a

steady run in the caboose car at its rear end. Suddenly, when near a bridge over Wappinger's Creek, not far from New Hamburg, they discovered that a car in the centre of the train was off the track. The train was finally stopped on the bridge, but in stopping it other cars were also derailed, and one of these, bearing on it two large oil tanks, finally rested obliquely across the bridge with one end projecting over the up track. Hardly had the disabled train been brought to a stand still, when, before signal lanterns could in the confusion incident to the disaster be sent out, the Pacific express from New York, which was a little behind its time, came rapidly along. As it approached the bridge, its engineer saw a red lantern swung, and instantly gave the signal to apply the brakes. It was too late to avoid the collision; but what ensued had in it, so far as the engineer was concerned, an element of the heroic, which his companion, the fireman of the engine, afterwards described on the witness stand with a directness and simplicity of language which exceeded all art. The engineer's name was Simmons, and he was familiarly known among his companions as "Doc." His fireman, Nicholas Tallon, also saw the red light swing on the bridge, and called out to him that the draw was open. In reply Simmons told him to spring the patent brake, which he did, and by this time they were alongside of the locomotive of the disabled train and running with a somewhat slackened speed. Tallon had now got out upon the step of the locomotive, preparatory to springing off, and turning asked his companion if he also proposed to do the same: "Doc looked around at me but made no reply, and then looked ahead again, watching his business; then I jumped and rolled down on the ice in the creek; the next I knew I heard the crash and saw the fire and smoke." The next seen of "Doc" Simmons, he was dragged up days afterwards from under his locomotive at the bottom of the river. But it was a good way to die. He went out of the world and of the sight of men with his hand on the lever, making no reply to the suggestion that he should leave his post, but "looking ahead and watching his business."

Dante himself could not have imagined a greater complication of horrors than then ensued: liquid fire and solid frost combined to make the work of destruction perfect. The shock of the collision broke in pieces the oil car, igniting its contents and flinging them about in every direction. In an instant bridge, river, locomotive, cars, and the glittering surface of the ice were wrapped in a sheet of flame; at the same time the strain proved too severe for the trestle-work, which gave way, precipitating the locomotive, tender, baggage cars, and one passenger car on to the ice, through which they instantly crushed and sank deep out of sight beneath the water. Of the remaining seven cars of the passenger train, two, besides several of the freight train, were destroyed by fire, and shortly, as the supports of the remaining portions of the bridge burned away, the superstructure fell on the half-submerged train and buried it from view.

Twenty-one persons lost their lives in this disaster, and a large number of others were injured; but the loss of life, it will be noticed, was only two thirds of that at Abergele. The New Hamburg catastrophe also differed from that at Abergele in that, under its particular circumstances, it was far more preventable, and, indeed, with the appliances since brought into use it would surely have been avoided. The modern train-brake had, however, not then been perfected, so that even the hundred rods at which the signal was seen did not afford a sufficient space in which to stop the train. Under any circumstances, however, it is difficult to see how it is possible to guard against contingencies like those at either Abergele or New Hamburg. At the time, as is usual in such cases, the public indignation expended itself in vague denunciation of the Hudson River Railroad Company, because the disaster happened to take place upon a bridge in which there was a draw to admit the passage of vessels. There seemed to be a vague but very general

impression that draw-bridges were dangerous things, and, because other accidents due to different causes had happened upon them, that the occurrence of this accident, from whatever cause, was in itself sufficient evidence of gross carelessness. The fact was that not even the clumsy Connecticut rule, which compels the stopping of all trains before entering on any draw-bridge, would have sufficed to avert the New Hamburg disaster, for the river was then frozen and the draw was not in use, so that for the time being the bridge was an ordinary bridge; and not even in the frenzy of crude suggestions which invariably succeeds each new accident was any one ever found ignorant enough to suggest the stopping of all trains before entering upon every bridge, which, as railroads generally follow water-courses, would not infrequently necessitate an average of one stop to every thousand feet or so. Only incidentally did the bridge at New Hamburg have anything to do with the disaster there, the essence of which lay in the sudden derailment of an oil car in front of a passenger train running in the opposite direction and on the other track. Of course, if the derailment had occurred long enough before the passenger train came up to allow the proper signals to be given, and this precaution had been neglected, then the disaster would have been due, not to the original cause, but to the defective discipline of the employés. Such does not appear to have been the case at New Hamburg, nor was that disaster by any means the first due to derailment and the throwing of cars from one track in front of a train passing upon the other. Indeed, an accident hardly less destructive, arising from that very cause, had occurred only eight months previous in England, and resulted in eighteen deaths and more than fifty cases of injury.

THE CLAYBRIDGE LANE ACCIDENT.

A goods train made up of a locomotive and twenty-nine wagons was running at a speed of some twenty miles an hour on the Great Northern road, between Newark and Claypole, about one hundred miles from London, when the forward axle under one of the wagons broke. As a result of the derailment which ensued, the train became divided, and presently the disabled car was driven by the pressure behind it out of its course and over the interval, so that it finally rested partly across the other track. At just this moment an excursion train from London, made up of twenty-three carriages and containing some three hundred and forty passengers, came along at a speed of about thirty-five miles an hour. It was quite dark, and the engineer of the freight train in vain waved his arm as a signal of danger; one of the guards, also, showed a red light with his hand lantern, but his action either was not seen or was misunderstood, for, without any reduction of the speed being made, the engine of the excursion train plunged headlong into the disabled goods wagon. The collision was so violent as to turn the engine aside off the track and cause it to strike the stone pier of a bridge near by, by which it was flung completely around and then driven up the slope of the embankment, where it toppled over like a rearing horse and fell back into the roadway. The tender likewise was overturned, but not so the carriages; they rushed along holding to the track, and the side of each as it passed was ripped and torn by the projecting end of the freight car. Of the twenty-three carriages and vans in the train scarcely one escaped damage, while the more forward ones were in several cases lifted one on top of the other or forced partly up the embankment, whence they fell back again, crushing the passengers beneath them.

This accident occurred on the 21st of June, 1870; it was very thoroughly investigated by Captain Tyler on behalf of the Board of Trade, with the apparent conclusion that it was one which could hardly have been guarded against. The freight car whose broken axle occasioned the disaster did not belong to the Great Northern company, and the wheels of the train had been properly

examined by viewing and tapping at the several stopping-places; the flaw which led to the fracture was, however, of such a nature that it could have been detected only by the removal of the wheel. It did not appear that the employés of the company had been guilty of any negligence; but it was difficult to avoid the conclusion that the accident was due to one of those defects to which the results of even the most perfect human workmanship must ever remain liable, and this had revealed itself under exactly those conditions which must involve the most disastrous consequences.

The English accident did, however, establish one thing, if nothing else; it showed the immeasurable superiority of the system of investigation pursued in the case of railroad accidents in England over that pursued in this country. There a trained expert after the occurrence of each disaster visits the spot and sifts the affair to the very bottom, locating responsibility and pointing out distinctly the measures necessary to guard against its repetition. Here the case goes to a coroner's jury, whose findings as a rule admirably sustain the ancient reputation of that august tribunal. It is absolutely sad to follow the course of these investigations, they are conducted with such an entire disregard of method and lead to such inadequate conclusions. Indeed, how could it be otherwise? The same man never investigates two accidents, and for the one investigation he does make he is competent only in his own esteem.

Take the New Hamburg accident as an example. Rarely has any catastrophe merited a more careful investigation, and few indeed have ever called forth more ill-considered criticism or crude suggestions. Almost nothing of interest respecting it was elicited at the inquest, and now no reliable criticism can be ventured upon it. The question of responsibility in that case, and of prevention thereafter, involved careful inquiry into at least four subjects: First, the ownership and condition of the freight car the fractured axle of which occasioned the disaster, together with the precautions taken by the company, usually and in this particular case, to test the wheels of freight cars moving over its road, especially during times of severe cold. Second, the conduct of those in charge of the freight train immediately preceding and at the time of the accident; was the fracture of the axle at once noticed and were measures taken to stop the train, or was the derailment aggravated into the form it finally took by neglect? Third, was there any neglect in signaling the accident on the part of those in charge of the disabled train, and how much time elapsed between the accident and the collision? Fourth, what, if any, improved appliances would have enabled those in charge of either train to have averted the accident, and what, if any, defects either in the rules or the equipment in use were revealed?

No satisfactory conclusion can now be arrived at upon any of these points, though the probabilities are that with the appliances since introduced the train might have been stopped in time. In this case, as in that at Claybridge, the coroner's jury returned a verdict exonerating every one concerned from responsibility, and very possibly they were justified in so doing; though it is extremely questionable whether Captain Tyler would have arrived at a similar conclusion. There is a strong probability that the investigation went off, so to speak, on a wholly false issue, — turned on the draw-bridge frenzy instead of upon the question of care. So far as the verdict declared that the disaster was due to a collision between a passenger train and a derailed oil car, and not to the existence of a draw in the bridge on which it happened to occur, it was, indeed, entitled to respect, and yet it was on this very point that it excited the most criticism. Loud commendation was heard through the press of the Connecticut law, which had been in force in that State for twenty years, and, indeed, still is in force there, under which all trains are compelled to come to a full stop before entering on any bridge which has a draw in it, — a law which may best be described as a useless nui-

sance. Yet the grand jury of the Court of Oyer and Terminer of New York city even went so far as to recommend, in a report made by it on the 23d of February, 1871, — sixteen days after the accident, — the passage by the legislature then in session at Albany of a similar legal absurdity. Fortunately better counsels prevailed, and as the public recovered its equilibrium the matter was allowed to drop.

The Connecticut law in question, however, originated in an accident which at the time had startled and shocked the community as much even as that at Versailles before or at Abergele has since done. It occurred on the New York & New Haven road at Norwalk, on the 6th of May, 1853.

THE NORWALK ACCIDENT.

The railroad at Norwalk crosses a small inlet of Long Island Sound by means of a draw-bridge, which is approached from the direction of New York around a sharp curve. A ball at the mast-head was in 1853 the signal that the draw was open and the bridge closed to the passage of trains. The express passenger train for Boston, consisting of a locomotive and two baggage and five passenger cars, containing about one hundred and fifty persons, left New York as usual at eight o'clock that morning. The locomotive was not in charge of its usual engineer, but of a substitute named Tucker, a man who some seven years before had been injured in a previous collision on the same road, for which he did not appear to have been in any way responsible; but who had then given up his position and gone to California, whence he had recently returned and was now again an applicant for an engineer's situation. This was his third trip over the road, as substitute. In approaching the bridge at Norwalk he apparently wholly neglected to look for the draw signal. He was running his train at about the usual rate of speed, and first became aware that the draw was open when within four hundred feet of it and after it had become wholly impossible to stop the train in time. He immediately whistled for brakes and reversed his engine, and then, without setting the brakes on his tender, both he and the fireman sprang off and escaped with trifling injuries. The train at this time did not appear to be moving at a speed of over fifteen miles an hour. The draw was sixty feet in width; the water in the then state of the tide was about twelve feet deep, and the same distance below the level of the bridge. Although the speed of the train had been materially reduced, yet when it came to the opening it was still moving with sufficient impetus to send its locomotive clean across the sixty-foot interval and to cause it to strike the opposite abutment about eight feet below the track; it then fell heavily to the bottom. The tender lodged on top of it, bottom up and resting against the pier, while on top of this again was the first baggage car. The second baggage car, which contained also a compartment for smokers, followed, but in falling was canted over to the north side of the draw in such a way as not to be wholly submerged, so that most of those in it were saved. The first passenger car plunged into the opening next; its forward end crushed in, as it fell against the baggage car in front of it, while its rear end dropped into the deep water below; and on top of it came the second passenger car, burying the passengers in the first beneath the *débris*, and partially submerging itself. The succeeding or third passenger car, instead of following the others, broke in two in the middle, the forward part hanging down over the edge of the draw, while the rear of it rested on the track and stayed the course of the remainder of the train. Including those in the smoking compartment more than a hundred persons were plunged into the channel, of whom forty-six lost their lives, while some thirty others were more or less severely injured. The killed were mainly among the passengers in the first car; for in falling the roof of the second car was split open, and it finally rested in such a position that, as no succeeding car came on top of it, many of those in it were enabled to extricate themselves; indeed, more than one of

the passengers in falling were absolutely thrown through the aperture in the roof, and, without any volition on their part, were saved with unmoistened garments.

This terrible disaster was due, not alone to the carelessness of an engineer, but to the use of a crude and inadequate system of signals. It so happened, however, that the legislature of the State was unfortunately in session at the time, and consequently the public panic and indignation took shape in a law compelling every train on a Connecticut railroad to come to a dead stand-still before entering upon any bridge in which there was a draw. This law is still in force, and from time to time, as after the New Hamburg catastrophe, an unreasoning clamor is raised for its enactment in other States. In point of fact it imposes a most absurd, unnecessary, and annoying delay on traveling, and rests upon the Connecticut statute book a curious illustration of what usually happens when legislators undertake to incorporate running railroad regulations into the statutes-at-large. There is probably no source of danger to which travel by rail is subject which admits of such certain and infallible signaling as draws in bridges. The idea of stopping before approaching them is entitled to about the same respect as would be a proposal to recur to pioneer locomotives before all night trains.

ACCIDENTS AT DRAW-BRIDGES.

The machinery by which draws must be worked can be automatically connected with signals of almost any description at any desired distance. By one method in use a careless engineer is suddenly aroused to a proper performance of his duties and a consciousness of impending danger by the disappearance of the smoke-stack of his locomotive; by yet others his passing a given point in defiance of signals sends him crashing through a gate and causes the sounding of an alarm sufficient to arouse all but the dead. Either of these methods secures a much greater degree of safety than a mere stopping of trains, which in more than one instance has proved a wholly insufficient protection.

This was curiously illustrated in the case of an accident which occurred upon the Boston & Maine Railroad on the morning of the 21st of November, 1862, when the early local passenger train was run into the open draw of the bridge almost at the entrance to the Boston station. It so happened that the train had stopped at the Charlestown station just before going on to the bridge, and at the time the accident occurred was moving at a speed scarcely faster than a man could walk; and yet the locomotive was entirely submerged, as the water at that point is deep, and the only thing which probably saved the train was that the draw was so narrow and the cars were so long that the foremost one lodged across the opening, and its forward end only was beneath the water. At the rate at which the train was moving, the resistance thus offered was sufficient to stop it, though, even as it was, no less than six persons lost their lives and a much larger number were more or less injured. Here all the precautions imposed by the Connecticut law were taken, and served only to reveal the weak point in it. The accident was due to the neglect of the corporation in not having the draw and its system of signals interlocked in such a way that the movement of the one should automatically cause a corresponding movement of the other; and this neglect in high quarters made it possible for a careless employé to open the draw on a particularly dark and foggy morning, while he forgot at the same time to shift his signals. A statute provision making compulsory the interlocking of all draws in railroad bridges with a proper and infallible system of signals might, therefore, have claims on the consideration of an intelligent legislature; not so an enactment which compels the stopping of trains at points where danger is small, and makes no provision as respects other points where it is great.

And yet bridge accidents always have been and will probably always remain among the worst to which travel by rail

is exposed. It would be impossible for corporations to take too great precautions against them, and that the precautions taken are very great is conclusively shown by the fact that with thousands of bridges many times each day subjected to the strain of the passage at speed of heavy trains, so very few disasters occur. Nevertheless there are many precautions which, in the face of terrible experience, corporations do not and will not take. For instance, every railroad bridge, not only throughout its length but throughout its approaches, should have its track protected against possible derailment. It is the exception and not the rule, however, that this is done. Long immunity from disaster breeds a species of recklessness even in the most cautious, and yet the single mishap in a thousand must surely fall to the lot of some one. Many years ago the terrible results which must soon or late be expected, wherever the consequences of a derailment on the approaches to a bridge are not surely guarded against, were illustrated by a disaster on the Great Western Railroad of Canada which combined many of the worst horrors of both the Norwalk and the New Hamburg tragedies; more recently the almost forgotten lesson was enforced again on the Vermont & Massachusetts road, upon the bridge over the Miller River, at Athol. The accident last referred to occurred on the 16th of June, 1870, but, though forcible enough as a reminder, it was tame indeed in comparison with the Des Jardines Canal disaster, which is still remembered though it happened as long ago as the 17th of March, 1857.

THE DES JARDINES CANAL ACCIDENT.

The Great Western Railroad of Canada crossed the canal by a bridge at an elevation of about sixty feet. At the time of the accident there were some eighteen feet of water in the canal, though, as is usual in Canada at that season, it was covered by ice some two feet in thickness. On the afternoon of the 17th of March, as the local accommodation train from Hamilton was nearing the bridge, its locomotive, though it was then moving at a very slow rate of speed, was in some way thrown from the track and on to the timbers of the bridge. These it cut through, and then, falling heavily on the string-pieces, it parted them and instantly pitched headlong on to the frozen surface of the canal below, dragging after it the tender, baggage car, and two passenger cars, which composed the whole train. There was nothing whatever to break the fall of sixty feet; and even then two feet of ice only intervened between the ruins of the train and the bottom of the canal eighteen feet below. Two feet of solid ice will afford no contemptible resistance to a falling body; the locomotive and tender crushed heavily through it and instantly sank out of sight. In falling the baggage car struck a corner of the tender and was thus thrown some ten yards to one side, and was followed by the first passenger car, which, turning a somersault as it went down, fell on its roof and was crushed to fragments, but only partially broke through the ice. Upon which the next car fell endwise, and rested in that position. That every human being in the first car was either crushed or drowned seems most natural; the only cause for astonishment is found in the fact that any one should have survived such a catastrophe, — a tumble of sixty feet on ice as solid as a rock! Yet of four persons in the baggage car three went down with it, and not one of them was more than slightly injured. The engineer and fireman, and the occupants of the second passenger car, were less fortunate. The former were found crushed under the locomotive in the bottom of the canal; while of the latter ten were killed, and not one escaped severe injury. Very rarely indeed in the history of railroad accidents have so large a portion of those on the train lost their lives as in this case, for out of ninety persons sixty perished, and in the number was included every woman and child among the passengers, with a single exception.

There were two circumstances about this disaster worthy of especial notice. In the first place, as well as can now be

ascertained, in the absence of any trustworthy record of an investigation into causes, the accident was easily preventable, though by means of appliances which even yet have never been brought into general use. It appears to have been immediately caused by the derailment of a locomotive, however occasioned, just as it was entering on a swing draw-bridge. Thrown from the tracks, there was nothing in the flooring to prevent the derailed locomotive from deflecting from its course until it toppled over the ends of the ties, nor were the ties and the flooring apparently sufficiently strong to sustain it even while it held to its course. Under such circumstances the derailment of a locomotive upon any bridge can mean only destruction; it meant it then, it means it now; and yet our country is to-day full of bridges constructed in an exactly similar way. A very simple and inexpensive appliance would make accidents from this cause, if not impossible, at least highly improbable. It is only necessary to make the ties and flooring of all bridges between the tracks and for three feet on either side of them sufficiently strong to sustain the whole weight of a train off the track and in motion, while a third rail, or strong truss of wood, securely fastened, should be laid down midway between the rails throughout the entire length of the bridge and its approaches. With this arrangement, as the flanges of the wheels are on the inside, it must follow that in case of derailment and a divergence to one side or the other of the bridge, the inner side of the flange will come against the central rail or truss just so soon as the divergence amounts to half the space between the rails, which in the ordinary gauge is two feet and ten inches. The wheels must then glide along this guard, holding the train from any further divergence from its course, until it can be checked. Meanwhile, as the ties and flooring extend for the space of three feet outside of the track, a sufficient support is furnished by them for the other wheels. A legislative enactment compelling the construction of all bridges in this way, coupled with additional provisions for the interlocking of draws with their signals in the cases of bridges across navigable waters, would be open to the objection that laws against dangers of accident by rail have almost invariably proved ineffective when they were not absurd, but in itself, if enforced, it might not improbably render disasters like those at Norwalk and Des Jardines terrors of the past. The New Hamburg accident depended on other conditions.

There was, also, one rather noteworthy feature in the Des Jardines accident. The question as to what is the best method of coupling together the several individual vehicles which make up every railroad train has always been much discussed among railroad mechanics. The decided weight of opinion has been in favor of the strongest and closest couplings, so that under no circumstances should the train separate into parts. Taking all forms of railroad accident together, this conclusion is probably sound. It is, however, at best only a balancing of disadvantages, a mere question as to which practice involves the least amount of danger. Yet a very terrible demonstration that there are two sides to this as to most other questions was furnished at Des Jardines. It was the custom on the Great Western road not only to couple the cars together in the usual method then in use, but also, as is often done now, to connect them by heavy chains on each side of the bumpers. Accordingly when the locomotive broke through the Des Jardines bridge, it dragged the rest of the train hopelessly after it. This certainly would not have happened had the modern self-coupler been in use, and probably would not have happened had the cars been connected only by the ordinary link and pins; for the train was going very slowly and the signal for brakes was given in ample time to apply them vigorously before the last cars came to the opening, into which they were finally dragged by the dead weight before them and not hurried by their own impetus.

On the other hand, we have not far to go in search of scarcely less fatal disasters illustrating with equal force the

other side of the proposition, in the terrible consequences which have ensued from the separation of cars in cases of derailment. Take the memorable accident of the 17th of June, 1858, near Port Jervis, on the Erie Railway, for instance.

THE PORT JERVIS ACCIDENT.

As the express train from New York was running at a speed of about thirty miles an hour over a perfectly straight piece of track between Otisville and Port Jervis, shortly after dark on the evening of that day, it encountered a broken rail. The train was made up of a locomotive, two baggage cars, and five passenger cars, all of which except the last passed safely over the fractured rail. The last car was apparently derailed by this, and drew the car before it off the track. These two cars were then dragged along, swaying fearfully from side to side, for a distance of some four hundred feet, when the couplings at last snapped and they went over the embankment, which was there some thirty feet in height. As they rushed down the slope, the last car turned fairly over, resting finally on its roof, while one of its heavy iron trucks broke through and fell upon the passengers beneath, killing and maiming them. The other car, more fortunate, rested at last upon its side on a pile of stones at the foot of the embankment. Six persons were killed and fifty severely injured; all of the former in the last car.

In this case, had the couplings held, the derailed cars would not have gone over the embankment and but slight injuries would have been sustained. Modern improvements have, however, created safeguards sufficient to prevent the recurrence of other accidents under the some conditions as that at Port Jervis. The difficulty lay in the inability to stop a train, though moving at only moderate speed, within a reasonable time. The wretched inefficiency of the old hand-brake in a sudden emergency received one more illustration. The train seems to have run nearly half a mile, after the accident took place, before it could be stopped, although the engineer had instant notice of it and reversed his locomotive. The couplings did not snap until a distance had been traversed in which the modern train-brake would have reduced the speed to a point at which they would have been subjected to no dangerous strain.

THE CAR'S ROCK ACCIDENT.

The accident ten years later at Car's Rock, on the same road, sixteen miles west of Port Jervis, was again very similar to the one just described; and yet in this case the parting of the couplings alone prevented the rear of the train from dragging its head to destruction. Both disasters were occasioned by broken rails; but, while the first occurred on a tangent, the last was on a curve at a point where the road, skirting along the hills, had on one side of it a bold elevation and on the other a steep declivity of some eighty feet, jagged with rock and bowlders. The train was a long one, consisting of the locomotive, three baggage and express, and seven passenger cars, and it encountered the broken rail while rounding the curve at a high rate of speed. Again all the train passed over the fracture in safety, except the last car, which was snapped, as it were, off the track and over the embankment. At first it was dragged along, but only for a short distance; the intense strain then broke the coupling between the four rear cars and the head of the train, and the last of the four being already over the precipice the others almost instantly toppled over after it and plunged and rolled down the ravine. A passenger on this portion of the train, who went with it, described the car he was in "as going over and over, until the outer roof was torn off, the sides fell out, and the inner roof was crushed in." Twenty-four persons were killed and eighty injured; but in this instance, as in that at Des Jardines, the only subject for surprise was that there were any survivors.

Accidents arising from the parting of defective couplings have of course not been uncommon, and they constitute

one of the greatest dangers incident to heavy gradients; in surmounting inclines freight trains will, it is found, break in two, and their hinder parts come thundering down the grade, as was seen at Abergele. The American passenger trains, in which each car is provided with brakes, are much less liable than the English, the speed of which is regulated by brake vans, to accidents of this description. Indeed, it may be questioned whether in America any serious disaster has occurred from the fact that a portion of a passenger train on a road operated by steam got beyond control in descending an incline. There have been, however, terrible catastrophes from this cause in England, and that on the Lancashire & Yorkshire road near Helmshere, a station some fourteen miles north of Manchester, deserves a prominent place in the record of railroad accidents.

THE HELMSHERE ACCIDENT.

It occurred in the early hours of the morning of the 4th of September, 1860. There had been a great *fête* at the Bellevue Gardens in Manchester on the 3d, upon the conclusion of which some twenty-five hundred persons crowded at once upon the return trains. Of these there were, on the Lancashire & Yorkshire road, three; the first consisting of fourteen, the second of thirty-one, and the last of twenty-four carriages; and they were started, with intervals of ten minutes between them, at about eleven o'clock at night. The first train finished its journey in safety. Not so the second and the third. The Helmshere station is at the top of a steep incline. This the second train, drawn by two locomotives, surmounted, and then stopped for the delivery of passengers. While these were leaving the carriages, a snap as of fractured iron was heard, and the guards, looking back, saw the whole rear portion of the train, consisting of seventeen carriages and a brake-van, detached from the rest of it and quietly slipping down the incline. The detached portion was moving so slowly that one of the guards succeeded in catching the van and applying the brakes; it was, however, already too late. The velocity was greater than the brake-power could overcome, and the seventeen carriages kept descending more and more rapidly. Meanwhile the third train had reached the foot of the incline and begun to ascend it, when its engineer, on rounding a curve, caught sight of the descending carriages. He immediately reversed his engine, but before he could bring his train to a stand they were upon him. Fortunately the van-brakes of the detached carriages, though insufficient to stop them, yet did reduce their speed; the collision nevertheless was terrific. The force of the blow, so far as the advancing train was concerned, expended itself on the locomotive, which was demolished, while the passengers escaped with a fright. Not so those in the descending carriages. With them there was nothing to break the blow, and the two foremost of them were crushed to fragments and their passengers scattered over the line. It was shortly after midnight, and the excursionists clambered out of the trains and rushed frantically about, impeding every effort to clear away the débris and rescue the injured, whose shrieks and cries were incessant. The bodies of ten persons, one of whom had died of suffocation, were ultimately extricated from the ruins, and twenty-two others sustained fractures of limbs.

At Des Jardines the couplings were too strong; at Port Jervis and at Helmshere they were not strong enough; at Car's Rock they gave way not a moment too soon. "There are objections to a plenum and there are objections to a vacuum," as Dr. Johnson remarked, "but a plenum or a vacuum it must be;" but there are no arguments in favor of railroad stations or sidings upon an inclined plane. Abergele was one illustration of what soon or late must result from them, and Helmshere was another. In railroad mechanics there are after all some points susceptible of demonstration. That they should still be ignored is hardly less singular than it is surprising.

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