been to disabuse the minds of those by whose patronage the work of M. de Warren has come to a second edition. And in our endeavour to vindicate the truth for their better information, we trust that we have been able to avoid, on the one side, that morbid sensibility which resents as national insults, mistakes or misrepresentations of our public character and conduct; and, on the other, that indifference to the opinion of our intelligent neighbours, which, in our judgment, little becomes those to whom God has committed a weighty and solemn trust, for the due fulfilment of which they are responsible both to Him, and to the great commonwealth of mankind.

ART. VII.—1. *Report of the Officers of the Railway Department to the Lords of the Committee of the Privy Council for Trade*—1844-5.

2. *Statistique Raisonnée de l'Exploitation des Chemins de Fer.* Paris: 1843.

3. *Dinglers Polytechnischer Journal.* Stutgard: 1844-5.

4. *Railway Legislation, with Suggestions for its Improvement.* By JAMES MORRISON, Esq. M.P. London: 1846.

5. *The American Railway Journal.* New York.

6. *Report of the Railway Gauge Commissioners.* London: 1846.

7. *Die Eisenbahnen Deutschlands Statistisch dargestelles.* BARON VON REDEN.

8. *Eisenbahnbuch.* VON REDEN.

9. *Grosse Eisenbahnkarte von Deutschland.* VON REDEN.

10. *Railways, their Rise, Progress, and Construction; with Remarks on Railway Accidents.* By ROBERT RITCHIE, Civil Engineer. 8vo. London: 1846.

WHEN we consider the great material resources of this country, her progress in commerce, and the antiquity of her naval supremacy, we cannot fail to be surprised at the late date of her advancement in the important art of Internal Transport. Yet from the conditions of her topography there must always have existed the strongest incentive to improve the means of inland communication. All her great seats of manufacture are situate near her geographical centre. There, her soil teems with mineral wealth. There, inexhaustible sources of iron and coal abound. Yet, until within little more than fifty years from the

present time, England was among the most backward countries in Europe, in this branch of the industrial arts.

Until the middle of the last century, goods continued to be conveyed in Scotland on pack-horses. The time required by common carriers to complete even short journeys in populous districts would seem, to our present modes of thinking, absolutely incredible. Sir Henry Parnell relates, that the ordinary Carrier between Edinburgh and Selkirk, a distance of thirty-eight miles, required a fortnight for his journey, going and returning! In 1750, the Stage-Coach between Edinburgh and Glasgow took a day and a half to complete the journey. In the year 1763, there was but one Stage-Coach between London and Edinburgh, which started once a month from each place, and took a fortnight to complete the trip! The tract of ground crossed by the Liverpool and Manchester railway, on which thousands of travellers are now daily transported at a speed varying from twenty-five to fifty miles an hour, just seventy-five years ago, was travelled by Arthur Young, who has left us the following description of it:—'I know not in the whole range of language terms 'sufficiently expressive to describe this infernal road. Let me 'most seriously caution all travellers who may accidentally pro-'pose to travel this terrible country, to avoid it as they would 'the devil; for a thousand to one they break their necks or 'their limbs by overthrows or breakings-down. They will 'here meet with ruts, which I actually measured, four feet deep, 'and floating with mud only from a wet summer. What, there-'fore, must it be after a winter? The only mending it receives 'is tumbling in some loose stones, which serve no other purpose 'than jolting a carriage in the most intolerable manner. These 'are not merely opinions, but facts; for I actually passed three 'carts broken down in these eighteen miles of execrable memory.'

To the close of the last century, the internal transport of goods by waggon, was not only intolerably slow, but so expensive as to exclude every object except manufactured articles; and such as, being of light weight, would allow of a high rate of transport. Thus the charge for waggon-carriage from London to Leeds was at the rate of L.13 per ton. The rate of charge between Liverpool and Manchester was 40s. a ton. Heavy articles, such as coals and other minerals, could only be available for commerce where their position favoured transport by sea; and consequently many of the richest districts of the country remained unproductive, awaiting the tardy advancement of the act of transport. The Bridgewater canal was not commenced till about the year 1767. The success which attended this enterprise excited the attention of other great proprietors: the Canal Companies were

formed, and the extensive system of inland navigation, which has so long served the purposes of English commerce, soon overspread the country.

Protected from all competition by the imperfect nature of the public roads, and the injurious operation of the turnpike tolls, these Companies soon monopolised the entire inland traffic of England, and began to realise immense profits. It was in vain that rival lines were in some instances constructed. The instinct of common interest soon produced a combination of the Companies, extinguished competition, and left the public victims to monopoly and exorbitant prices.

The commerce of the country supported this system of extortion long and patiently. It was not forgotten by the merchants and manufacturers, that, before the construction of the canal, they had no practicable means whatever for internal traffic; and the companies were allowed to continue in the enjoyment of their revenues. At length security engendered negligence. The service of transport was not only extravagantly charged for, but ill performed. Petitions were presented to Parliament in 1825, in which it was stated, and evidence offered, that the cotton which was transported three thousand miles across the Atlantic, from New York to Liverpool, in twenty days, took six weeks to be carried from Liverpool to the mills of the spinners at Manchester—a distance of only thirty miles. This was more than even the phlegmatic temperament of Englishmen could endure, and it was resolved to construct a Railway to perform the service.

Roused from their apathy, the wealthy and powerful canal companies at once resolved to propitiate the merchants by a reduction of their tariff. It was, however, too late. The decision was taken: the new project had been well considered, and its advantages were rendered too plain. Conciliation failing, and compromise rejected, the inland navigation interest rallied their partisans in Parliament to oppose the act authorising the construction of the Railway, and for two years they succeeded in their purpose. The commerce of Liverpool and Manchester, however, felt its interest too deeply involved to submit to be repulsed, and at length, in the year 1828, the act to incorporate the Railway Company received the royal assent.

Such was the origin of that singular advancement in the art of transport over land, which has formed so remarkable an event in the present age, and which has spread its influence, more or less, over all that portion of the terrestrial globe to which civilisation has extended. The unprecedented degree in which capital has been attracted to this improvement within the last two years—

the extraordinary manner in which it has engrossed the attention of every enlightened people, and more especially that of our own country—the great interests which are consequently involved in it, and, above all, the imperfect means of information which have been afforded to the public respecting it, combine to render it a fit subject for an extended notice. We propose, therefore, in the present Article, to take a brief retrospect of the progress of the art of Railway Transport, from the opening of the Liverpool and Manchester line to the present time—to lay before our readers the actual state and immediate prospects of Railway Transit, in the various countries where it has been commenced—to examine its effects on social and commercial intercourse, and to consider the often and anxiously discussed questions of its safety—of the uniformity of gauge—and of the relations between Railways and the State.

As originally designed, the sole object of the Liverpool and Manchester Railway was the transport of merchandise between these important towns. Manchester, a great manufacturing district, received its raw material from distant quarters of the globe by the port of Liverpool; and, on the other hand, shipped at the same port the manufactured produce of its mills and factories to its customers in every part of the world. The reciprocal transmission of these articles was the main object to which the new company looked, as the means of affording an adequate return for the capital they were about to expend.

As the enterprise advanced towards completion, the method of conducting the traffic upon it came to be considered. The project was originally regarded as an ordinary road, and the owners were authorised to demand toll from all who might desire to transport goods upon it. This method of proceeding would have been admissible, if the line were to be worked by horse power like a common road; and such, at one time, was the view of the matter taken by many who were interested in it. The Engineer, however, Mr George Stephenson, who had been employed to make the line, recommended the use of steam as an agent superior in economy and efficiency to animal power. There were two methods in which the agency of steam might be used. A rope might be carried on rollers along the line between the rails, to which the waggons containing the merchandise might be attached; and this rope being, at certain stations, coiled round large drums or cylinders, the waggons might be drawn from station to station by fixed steam-engines, applied to keep these drums or cylinders in revolution. Such was called the system of *stationary engines*. The second method

was that of smaller and lighter engines, which should be provided in greater number, and which should travel with the load as horses do with a waggon. This was called the system of *locomotive engines.*

Horse power being definitively rejected, the choice between these two systems of steam power was doubtful, and the Directors of the company were divided in opinion upon it. It was accordingly agreed that the best and most experienced practical engineering authorities should be commissioned to inquire and report upon the question. Accordingly, in the spring of 1829, Messrs George Stephenson, Joseph Locke, James Walker, and John U. Rastrick, all professionally conversant with railways and steam power, were appointed to visit the different coal districts, and collect information on the subject. The result was a report inclining in favour of the locomotive system, which at length, and not without much hesitation and doubt, it was decided to adopt.

Hitherto the transport of passengers on the proposed railway had not entered into the contemplation of the projectors, or if it did, it was regarded as practicable only to a limited extent, and as altogether secondary to the traffic in merchandise. It was now, however, suggested that locomotive engines might *possibly* be so constructed as to draw the waggons with a speed of *ten or twelve miles an hour!* and in that case, that it was worth considering whether the passenger traffic between Liverpool and Manchester might not be attracted to the railway.

It is curious to observe, now that the consequences of this great enterprise are before the world, how completely they were unforeseen. The idea of a steam-engine drawing a load twelve miles an hour, (which, we believe, was thrown out with some timidity by Mr Stephenson,) was received with ridicule by most of his engineering contemporaries. One distinguished writer on railways, who resided in the midst of a coal country, and under whose windows locomotives had been working for years, indignantly disavowed any participation in such extravagant speculations, and has left his disclaimer on record in a published work. He begged that he might not be confounded with those hot-brained enthusiasts who asserted the possibility of carriages being drawn by a steam-engine on a railway at such a speed as twelve miles an hour! Within a few months after the publication of this remarkable disclaimer, amidst the incredulity and ridicule of the majority of the engineering profession, and to the astonishment of the scientific world, the railway was traversed by the 'Rocket' with a speed of upwards of twenty-nine miles an hour.

This fact altogether changed the aspect of the enterprise. It was evident now that the projectors had at their feet the traffic in passengers, the most profitable species of transport; and that goods, hitherto regarded as the chief source of profit, must take a subordinate place. The railway was opened to the public in 1830; and immediately, of the thirty stage-coaches which had previously run daily between Liverpool and Manchester, one only remained on the road; and that was supported solely by passengers to intermediate places not lying in the direction of the railway.

The comparatively low fares, and extraordinary expedition offered by the railway, had the effect which might have been expected. Previously, the number of travellers, daily, by the coaches, was about five hundred; it was immediately augmented above three-fold. Sixteen hundred passengers per day passed between these towns. If the traffic in passengers exceeded all anticipation, the transport of goods, on the contrary, fell short of what was expected. The canal lowered its tariff to the level of the railway charges, and increased its speed and its attention to the accommodation of customers. The canal, moreover, winding through Manchester, washed the walls of the warehouses of the merchants and manufacturers. At the other end it communicated directly with the Liverpool docks. The goods were therefore received directly from the ship, and delivered directly to the warehouse, or *vice versâ;* without the cost, delay, and inconvenience of intermediate transhipment and cartage. These considerations went far to counterbalance the superior speed of the railway transit for goods; yet, notwithstanding this inconvenience and obstruction, the company soon found themselves carriers of merchandise at the rate of a thousand tons per day.

Thus, the problem of the rapid transport of passengers by steam on railways was solved in 1830, and the profitable character of the enterprise soon became apparent. Dividends of ten per cent were declared, and the shares were greedily bought up at an hundred and twenty per cent premium. Then followed in rapid succession those results which must necessarily have ensued. Other lines of railway, connecting the chief centres of population and industry with the metropolis, and with each other, were projected. In the four years which elapsed from 1832 to 1836, about four hundred and fifty miles of railway were completed, and three hundred and fifty miles were in progress of construction.

Meanwhile, the practical skill and the experience of the engineering profession did not keep pace with the increasing de-

mands of the public, and the avidity of capitalists. Enterprises were pushed forward before time had ripened the results of the earlier attempts into general principles; and it was still undecided on what plan and by what methods these novel lines of intercommunication, and the machinery to work upon them, might best be constructed. The very limited number of engineers who, having already been employed in the coal districts of the northern counties, were presumed to have had some experience in railway works, were soon engrossed to the full extent of their time and powers. Great enterprises, consequently, fell under the superintendence of persons having neither the peculiar knowledge nor experience which they required. It was fortunate for the country that the first important line of railway had been intrusted to the consummate practical skill and experience of Mr George Stephenson. The Liverpool and Manchester line, which will descend to succeeding ages as a monument of his skill, happily served as a model railway for those which more immediately succeeded it. His son and his pupils were intrusted with the execution of several of the most important lines; and the same successful results which had attended the first railway, were secured for those which came into operation afterwards. In other cases, however, the superintendence of great enterprises fell into less scrupulous and more presumptuous hands. The rashness of ignorance and inexperience prompted the adoption of fantastic novelties, which had no discoverable purpose save the acquisition of notoriety; and the spurious reputations thus obtained, combined with some tact in the management of Boards of Directors, led to results, the penalty for which has since been paid in the shape of large calls, heavy loans, and small dividends. Such cases, however, have been only exceptional; and, on the whole, the country and the world have reason to rejoice that an improvement so extensive and sudden has been effected with so few important failures and drawbacks.*

It was impossible for any human skill or foresight to provide, in a series of enterprises so novel, against all the contingencies which must arise in their practical operation. We accordingly

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* So great was the ignorance, even among the most eminent engineers, respecting railways and their machinery, so recently as 1837–8, that one gentleman in the highest rank of the profession, being examined before a Committee of the House of Commons, was unable to say whether the wheels of locomotives turned *with* their axles or *upon* them!

find, in tracing their progress, the same gradual advancement through a series of errors, which has marked the progress of every improvement in the arts and sciences. When the Liverpool and Manchester line was in progress of construction, a form of rail called the 'fish-bellied' rail had acquired much favour among engineers; and great praises were lavished on the scientific perfections of its form, in which the varying strength was so beautifully adapted to the varying action of the loads which passed upon it. The railway was accordingly laid down with 'fish-bellied' rails. Experience, however, soon showed that the form so beautiful in theory was most defective in practice; and these rails have since been consigned to a place in the *history* of engineering—the original 'parallel' rail having superseded them in all parts of the world.

The proper weight and strength of the rails was as little foreseen as their form. The Liverpool and Manchester line was originally laid with rails weighing thirty-five pounds per yard. This has been increased successively from year to year to forty, fifty, sixty, and even to seventy-five pounds. The distance between the supports has been likewise varied. Forty pound rails on three feet bearings, sixty pound rails on four feet bearings, and seventy-five pound rails on five feet bearings, have been adopted on different railways, and on different parts of the same railway. The nature of the supports themselves has undergone a revolution. Originally the rails were sustained on square stone-blocks, measuring two feet on the side, and twelve inches deep. Cross sleepers of timber were only used as temporary supports on embankments, until their settlement and consolidation should be effected by time and work. The stone blocks are, however, now every where abandoned, and the cross sleepers of timber permanently and universally established.

Nor has the machinery been the subject of less frequent and curious changes. The weight of the first locomotives was limited to six tons. This weight has been increased successively to eight, ten, and twelve tons; and on the Great Western Railway, engines have been placed weighing twenty tons—this weight being in every case exclusive of that of the tender which carries the fuel and water. Originally, the cylinders and the machinery by which the working wheels were driven, were placed outside the wheels. Soon afterwards they were transferred to the space between the wheels under the boiler. This was announced as a great improvement, inasmuch as the cylinders were inclosed in the smoke-box, and protected from cold, and the driving power was made to act nearer to the centre of *inertia* of the engine and

load. It was, however, accompanied by a serious drawback, in as far as the axle of the driving wheels, on which the major part of the weight of the engine rested, was obliged to be constructed with two cranks, so as in fact to be broken and discontinuous in two places. This was justly regarded as an anomaly in engineering; yet it was allowed, because of the countervailing advantages supposed to attend the arrangement.

More recently, however, it having been found impracticable to pack into the narrow space between the wheels, machinery sufficiently powerful for the speed now required, the cylinders and working gear have been restored to their primitive position outside the wheels; and the same engineering authorities who lauded the internal arrangement, have lately condemned it,—declaring that there is nothing like outside machinery.

The engines were originally supported on four wheels only; the number is now six. An increased security is thus obtained in case of an accidental fracture of an axle-tree. Since, however, the transfer of the machinery outside the wheels, this precaution is of less importance.

Since the power of the engine must necessarily have been regulated by the resistance which it would have to overcome, it might be supposed that one of the first questions to which practical men would direct their inquiries would have been to determine, with some degree of certainty and precision—what was the average amount of resistance, to the drawing power offered by a train of carriages, moving on a straight and level line of railway. Yet, strange as it may now appear, several hundred miles of railway were constructed and in full operation before that problem had been solved, even with any degree of approximation. A rough estimate had obtained favour in the profession, which assigned about ten pounds per ton of the load drawn, as the amount of this resistance; but no one could tell how this estimate had been made, and it is now certain that it had no better origin than conjecture. It was, moreover, always assumed, that the resistance to the moving power was independent of the speed. It was, of course, admitted that the resistance produced by the atmosphere must increase with the speed; but this was considered as forming so insignificant an element of the entire resistance, that it might be disregarded.

It was not until the years 1837-8, that this vitally important question was submitted to experimental investigation. In these years an extensive series of experiments were undertaken and executed by Dr Lardner, in which he was assisted by Mr Edward Woods, Engineer on the Liverpool and Manchester Railway, and Mr Hardman Earle—an active and intelligent director of

that line. The object of this inquiry was to settle the values of several data or conditions connected with the working of railways, or what might be called 'Railway Constants.' Among these the most important and the most difficult, was the determination of the resistance to the tractive power. After various unsuccessful attempts to apply dynamometric instruments to the purpose, the following expedient was resorted to, the result of which was completely successful:—The train of carriages whose resistance was desired to be ascertained, was placed near the summit of an inclined plane. An engine placed *behind* it put it in motion, and dismissed it down the plane with a high velocity. The consequence was not, as might have been expected, that the train descended with accelerated speed. On the contrary, it was found as it descended to be gradually *retarded*, until its motion was reduced to a certain uniform velocity, which it retained until it arrived at the foot of the plane. Mechanical considerations proved, that the gravity of the train resolved in the direction of the plane, must be equal to the resistance which the train would have opposed to a power moving it along a level.

But on submitting the same train to the same experiment on planes of various acclivities, it was found, that each acclivity gave a different uniform velocity of descent. From this followed the consequence, contrary to all that engineers had before taken for granted, that the resistance to the moving power augments in a very high ratio as the speed increases; and that at the usual speed of passenger trains, this resistance is much greater in amount than any estimate which engineers had previously allowed for it.

It was also rendered apparent, that the usual mode of estimating the resistance at so much per ton of the load was altogether fallacious, inasmuch as the same weight of load would offer different resistances to the moving power, according to the number and form of the carriages, and the speed of the motion.*

On every species of road, the acclivities which are admissible depend on the average resistance offered to the moving power on the level. If this resistance be great, then a considerable ascent will not be felt,—the additional resistance which it opposes to the moving power bearing an inconsiderable proportion to the whole amount of resistance which that power must at all times over-

* For the details of this investigation, see the Report of Dr Lardner in the Proceedings of the British Association, and the Appendix to the same, by Mr Edward Woods.

come. But if, from the mechanical perfection of the road and the carriages, the resistance habitually opposed to the moving power on the level be very small, (as is the consequence of the admirable perfection of railways,) then a very slight acclivity will be sufficient to disable the moving power altogether. It will therefore be easily understood, that the degrees of ascent which on a common Macadamised road are scarcely felt, are wholly inadmissible on railways worked by locomotive power. The more exquisite the perfection of the instrument, the more inconsistent with its efficiency are even slight defects: gaps and inequalities, which would not sensibly impair the excellence of a knife, would entirely destroy the utility of a razor.

Railways must therefore be so constructed as to be nearly level. An inclination rising at the rate of one foot in fifty would not be distinguishable from an absolute level, by mere inspection, without the aid of levelling instruments. Yet such an ascent would more than treble the resistance of a railway train moving with the usual speed.

If some mechanical causes forbid a railway to undulate, others render it difficult to wind or to pursue a serpentine course. The necessity for undulation might be avoided, and a general level course preserved, were it possible to carry it along the trendings of valleys and round the bases of hills. This, however, is rendered impossible, by the mechanical conditions of its structure. A railway carriage moves in a groove, or, at least, in what is equivalent to a groove. Without some violence to its principle, or some strain upon its structure, it is therefore capable of moving only in a straight and direct course. If it has to change its direction, it must be through a curve which bends so slowly and gradually, that the part of it occupied at any moment by the carriage shall not sensibly differ from a straight line. The curve, in short, must be one of very large *radius;* and even in such a curve the carriage can only be forced to turn by the constant pressure of the flanges of the wheels against the outer rail. This difficulty becomes greater as the speed of the motion is increased. A standing rule of railway Committees in Parliament was, that all curves of less than a mile radius should be matter of special inquiry and report.

Such are among the causes which have rendered the construction of railways expensive, by rendering inevitable vast works to preserve the necessary straightness, and continuous level of the course. As the line cannot descend to the level of valleys and rise over the surface of hills, the former must be filled up and the latter excavated. The road is conducted over the valley on an embankment, and through the hill by means of an excavation. But the valley may be occasionally too deep to

render an embankment practicable, or the earth to form it may not be attainable. In this case, the road is raised to the necessary level by a *viaduct* or bridge, of height and magnitude commensurate to the depth and width of the valley to be crossed. In like manner, the hill may be too lofty to allow a practicable cutting; in which case, a hole is bored through it of sufficient calibre to contain the railway, and allow trains to pass through, and it is lined with masonry; a *tunnel*, in a word, is constructed. When the necessity for such stupendous expedients is duly considered, we shall cease to wonder at the enormous cost of railways.

The system of internal communication by railways now in progress of construction throughout Great Britain, will form, under various points of view, a singular example in the history of public works. Their stupendous magnitude, and the many novel works of art upon them, are scarcely so remarkable as the rapidity of their execution, the amount of capital they have absorbed, and the still more enormous amount of capital they have created. The effects they have produced upon the social and commercial relations of different centres of population and commerce, by augmenting in an unforeseen and incredible ratio the personal communication between them, are not among the least memorable consequences of these undertakings.

We have stated that the first of this series was the Liverpool and Manchester line—thirty miles in length—which was opened for traffic in 1830. In the year 1840, there were thirteen hundred miles of railway in full operation in England, upon which, during that year, twelve millions of persons had been conveyed. In 1841, fifteen hundred and fifty miles were worked, on which twenty millions of passengers were carried. In 1843, the length of railway open was eighteen hundred miles, and the number of passengers transported nearly twenty-seven millions; and in 1844, the length was increased to nineteen hundred miles, and the passengers exceeded the incredible number of thirty millions!

Nearly sixty millions of capital had been expended in little more than ten years on these enterprises. But all the principal lines paid large profits. Dividends of ten per cent were declared, and the shares rose to cent per cent premium. The demand for railway shares was enormous; and a supply of corresponding magnitude soon met it. In 1845, three hundred miles of new railway were opened for traffic; and acts were passed by the Legislature, sanctioning projects in which the construction of a further extent of eighteen hundred miles of railway was undertaken.

Before we proceed to notice the enterprises which remain to be executed, let us examine a little more in detail what has been already effected, and its results.

If we take the principal railways which have been completed and brought into full operation, excluding only a few obviously exceptional ones,* we shall find that the average amount of capital which they have absorbed is at the rate of L.35,000 per mile. This amount has, in different cases, been distributed in different proportions among the several heads of expenditure; but the following may be taken as near the average distribution :—

Cost of land,	L.4,000
Way and works,	22,000
Office and sundries,	1,000
Locomotive power, and working stock,	8,000
Total,	L.35,000

The railways constructed with the wide Gauge were more expensive. An extent of two hundred and forty miles, had absorbed L.9,704,368, at the close of last year, being at the rate of above L.40,000 per mile.

Such being the cost of construction, let us consider the service rendered to the public, and the revenue produced.

By the returns published by the Railway Department of the Board of Trade, it appears that the traffic for the three years ending 30th June 1845, was as follows :—

Year Ending	Miles of Railway Opened.	Receipts from Passengers.	Receipts from Goods.	Total.
June 30, 1843	179$8\frac{1}{2}$	L.3,110,257	L.1,424,932	L.4,535,189
June 30, 1844	191$2\frac{3}{4}$	3,439,294	1,635,380	5,074,674
June 30, 1845	211$8\frac{1}{4}$	3,976,341	2,333,373	6,209,714

Hence we infer the amount of each kind of traffic per mile in each year, as follows :—

Year	Amount of Passenger traffic per mile.	Annual increase.	Amount of goods per mile.	Annual increase.	Total per mile.	Annual increase.
	£	per cent	£	per cent.	£	per cent.
1843	1729	...	792	...	2522	...
1844	1773	2.55	855	7.90	2653	5.20
1845	1877	5.87	1101	21.34	2936	10.70

* Such for example as the London and Blackwall, the London and Greenwich, and a few which, on the other hand, have been completed at an exceptionably low rate.

It appears, therefore, that there is an annually increasing amount of traffic; that the rate of increase on the Goods traffic, is even more rapid than the Passenger traffic; and that the average annual total amount received per mile, in 1845, was L.3000, omitting fractions.

The proportion of this gross revenue, absorbed by the current expenses of the transport, is different on different lines. In some it is above 50 per cent; in some below 40 per cent. In 1842 it was estimated at 44 per cent of the gross revenue; but it is probable that, by improved machinery and increased economy, it is now diminished. It may be taken at present at 42 per cent of the revenue. Of the L.3000 per mile received then, 58 per cent, or L.1740 per mile may be taken as the profit on the L.35,000 per mile sunk—being at the average rate of 5 per cent.

Thus, it appears, that although several great enterprises give 10 per cent, the general average profit on these speculations does not amount to more than the ordinary profit on capital engaged in large commercial investments. Many unsuccessful lines pay little or no interest on the capital sunk, and some yield dividends of comparatively small amount; and thus the larger dividends of the more successful lines are neutralised. The increase of traffic, however, indicated in the above table of annual returns, would render it probable that the annual profits would become larger, unless the further extension of railways should check them.

It will be observed that of the total annual revenue of the railways, 63 per cent proceeds from passengers, and 37 per cent from goods.

In estimating the manner in which the railways minister to the public service, the question arises—whether they chiefly serve as means of personal intercourse between those great centres of population and commerce which are usually selected as their *termini;* or, whether they in a greater degree benefit the population located in those districts of the country through which they pass. Unquestionably the general impression was, and, so far as we have observed, still is, that the great mass of their traffic is derived from the large cities and towns at their *termini.* This question has much interest, not merely to the public in general, but to those who engage in railway speculations in particular. Is the population of the country through which a line of railway passes, or the population of its *termini,* to be considered most in calculating its probable success?

We shall arrive at a solution of this problem by comparing the total number of passengers carried on the railway, with the

total amount paid by them on the one hand, and the average fare per mile chargeable to them on the other. In the following table we have given the number of passengers of each class, booked in the year ending 30th June 1845; the total amount of fare they paid; the average paid per passenger; the average fare charged per mile; and the consequent average distance which each passenger travelled. In order to express the actual and relative amounts of passenger service rendered by the railways in that year, we have also given the equivalent number of passengers of each class, and the total carried one mile.

	Number of Passengers.	Receipts from Passengers.	Receipts per Passenger	Average fare per mile for each Passenger.	Average distance travelled by each Passenger.	Equivalent number of Passengers carried one mile.
		£	s. d.	miles.	miles.	
1st Class.....	5,474,163	1,516,805	5 7	$2\frac{6}{10}$d	$26\frac{7}{10}$	142,328,238
2d Class	14,325,825	1,598,115	2 2	$1\frac{86}{100}$	$13\frac{1}{4}$	196,263,802
3d Class.....	13,135,820	621,903	0 $11\frac{1}{4}$	1	11	147,777,975
Mixed.....	855,445	209,518	4 11	$2\frac{3}{10}$	$24\frac{1}{2}$	20,530,480
Total & mean	33,791,253	3,976,341	2 4	$1\frac{8}{10}$	15	506,900,695

The results exhibited here suggest several reflections, which must be as interesting to railway proprietors as to the public in general.

In the first place it is apparent, contrary to what might be expected, that the railways derive their revenue from passengers who travel short distances, and not from those who pass between the great centres of population which mark the *termini*, and which usually give the railway its name. The first-class passengers, whose excursions are the longest, travel on the average only twenty-six miles; and it must be observed, that the great majority of these must travel much less distances even than this. For one who makes a trip of 100 miles, there must be at least ten who go only 10 miles, otherwise the average could not be maintained. In like manner, the second-class passengers travel only 13 miles, and the third class 11 miles—giving, say 12 miles, as the mean of the two; and these constitute above 80 per cent of all the passengers transported on railways! Short passenger traffic—that is to say, trips of a dozen miles or thereabouts—these it is evident constitute the great staple of the railway business in passengers. It is clear, then, that the terminal populations have but little connexion with the financial success of railway projects. The main support is short traffic.

Of every hundred passengers booked, there is the following proportions of the different classes :—

1st Class	16½
2d Class	43½
3d Class	40
	100

Of every hundred pounds of gross revenue, the following proportions are contributed by the different classes :—

1st Class	£40 14
2d Class	42 16
3d Class	16 10
	£100 0

The existence of some unwise discouragement to third-class passengers, is very apparent in these numbers. Under the ordinary influences which govern personal economy, they ought to be the most numerous, if not the most productive. They are, nevertheless, inferior in number to the second class, and produce a revenue greatly inferior to either first or second class. We shall more clearly perceive the cause of this paradox by reference to the traffic of railways elsewhere. In Belgium, the relative numbers of the different classes is such, that of every 100 passengers there are

1st Class,	10
2d Class,	30
3d Class,	60

And of every L.100 gross revenue from passengers, the contribution of the respective classes is

1st Class,	L.20
2d Class,	33
3d Class,	47
	L.100

The revenue of the railways, in England, is therefore chiefly drawn from the first and second class passengers; while that of the Belgian lines is supplied by the second and third class, but chiefly by the latter. The one system contributes to the service of the lower orders of the population, and the other to the middle and higher.

Whether both objects might not be attained, would perhaps be best ascertained by a comparison of the fares. On the English lines, the third-class passengers are discouraged by four

causes, brought into operation, apparently with that intention, by the companies. These are, 1. high fares; 2. carriages uncomfortable and unsafe; 3. inconvenient hours; 4. slow speed.

The following show the English and Belgian fares in juxtaposition:

	British. 10ths of a penny.	Belgium. 10ths of a penny.
1st Class, per head per mile	26	$14\frac{8}{10}$
2d Class,	$18\frac{6}{10}$	8
3d Class,	10	6

Thus, while the fare of each class is considerably lower than the corresponding class on the British lines, the third class is little more than half of the third class on our railways; and the carriages for this class are started at all hours, and are protected by roofs from the weather, and from the discharge of the funnel of the engine.

It appears from the numbers in the last column of the above table, that the passenger service rendered by the British railways in 1844-5, was equivalent to five hundred millions of passengers carried one mile!

Let us see what number of ordinary stage coaches could have performed this service in the same time.

One hundred horses working in a coach, would carry 25 passengers per day 100 miles. Omitting fractions, the number carried in the year would be 10,000, which would be equivaleut to a million carried one mile. Such a coach, worked by 100 horses, would take five hundred years to execute the passenger traffic of the railways in the year 1844-5. In doing this, it would travel a distance equal to fifteen hundred times the circumference of the globe.

The locomotive engines, therefore, employed in drawing passenger trains in that year, performed the work of 50,000 stage-coach horses.

It is worth while to compare the cost at which this has been executed, with that at which the same service would have been performed by stage coaches. In making this comparison, it is necessary to remember that there are three sources of economy, which the railway offers, in comparison with stage coaches. First, the saving in the *fare*; secondly, the value of *time* saved; and thirdly, the saving of *tavern expenses* on the road.

First. If we take the coach fare on an average at fourpence per mile, (a low estimate,) the saving by the railway will be at the rate of $2\frac{1}{2}$d. per mile per head.

Secondly. The saving of time will be at the rate of nine hours, in

every hundred miles travelled. For one must allow thirteen and a half hours (at seven and a half miles an hour) for an ordinary stage coach to perform 100 miles, which on the railway would be travelled in less than five hours. If we estimate the time of the class which travel on the average at six shillings per working day of twelve hours, this will be sixpence per hour.

Thirdly. A traveller thirteen hours on the road, must take at least one meal at a tavern; many will take two. A traveller four or five hours on the road takes nothing. Let this saving be put down on the average at 2d per 100 miles. We shall then have the following account of the amount saved by those who travelled on the railways in 1844-5, compared with what travelling the same distance in stage coaches would have cost:—

506,900,695 miles at 2½d per mile, fare saved .	L.5,280,215
45,621,063 hours saved, at 6d per hour . .	1,140,526
506,900,695 miles, tavern expenses at 2d per 100 miles	506,900
	L.6,927,641

The total saving is, therefore, nearly double the sum paid as railway fare. In other words, the locomotive engine has reduced the cost of travelling to one-third of its former amount,—even at the rate of fare charged under a system of monopoly, as compared with the open competition of stage coaches.

Let us now turn our attention for a moment from what has been actually accomplished to what is in progress of completion, or projected.

We have seen that, on the 30th June 1845, 2118 miles of railway were open for traffic. During the year 1845 nearly 500 miles more were completed, and inspected by General Pasley. Besides these, there were many lines which had obtained their acts before January 1845, of which we have no return. We shall be considerably within the truth if we assume, that the total length of railways for which Acts were obtained previous to 1845, was 2500 miles. In the session of 1845, Acts were passed authorizing the construction of a further extent of 1793 miles—making a total to December 1845 of 5300 miles.

In the session which has just terminated, however, it was reserved for the world to witness an extent of speculation, of which history, we believe, can produce no similar example. Four thousand miles of additional railways have actually received the sanction of the legislature, which, if completed, will make up the enormous extent of 9300 miles.

The amount of capital of the companies whose Acts were

passed in 1845, exclusive of loans, was £29,168,640; which, divided among 1793 miles, is at the rate of £16,268 per mile. Now we have shown that the 2000 miles of railway in operation have absorbed capital to the amount of £35,000 per mile; and it may, therefore, be asked, how nearly an equal length, is now to be constructed, at less than half the cost? But there is no mystery in the matter. If we compare the capital originally estimated for any of the principal lines, with their actual cost, we shall find the explanation of this apparent inconsistency. Take the three following lines:—

	Original Capital.	Actual Cost of the Line.
Liverpool and Manchester,	L.510,000	L.1,774,000.
London and Birmingham,	3,500,000	6,000,000.
Birmingham and Liverpool,	1,000,000	1,500,000.

In fact, the estimated capital is not even a tolerable approximation to the cost of a railway.

It is contended that, owing to improved machinery and other causes, railways can be constructed at a less expense now than formerly. In some of the items of expenditure this is true: but others, such as the cost of land, certainly are not changed; and some, such as wages of labour, will certainly be augmented. We shall probably be near the truth if we allow L.30,000 per mile, for the lines still to be constructed.

The capital of the companies, which have obtained Acts for about 4000 miles of railway, during the last session, amounts to about L.150,000,000, exclusive of loans. This is at the rate of L.37,500 per mile, which is rather above the average cost of the completed lines.

It appears, then, that there are now in progress, and sanctioned by Parliament, 5800 miles of railway, to complete which, and bring them into operation, will absorb at least two hundred millions sterling! Most of the companies promise the completion of their enterprises in three years; but, allowing for engineering casualties, and unforeseen causes of delay, there is no reason to suppose that any of them should exceed five years,—assuming, of course, that the necessary capital and labour shall be forthcoming. The annual instalments of capital necessary to accomplish this will, therefore, be forty millions.

Such is the sum which must be taken yearly, from the surplus savings of British industry, for the next five years, if these projects are to be realised. There is no escape from this astounding inference. We say nothing of the amount of British capital promised to foreign railways, which, however, is not inconsiderable. Those who are best acquainted with the public finances,

and the laws which regulate money and labour, regard the consequences of such a yearly demand with serious apprehension. If it were possible to ascertain the average net savings of the country, and to estimate the proportion of these which could, without injury, be withdrawn from other undertakings which are in a growing state, the effect of these prospective operations might to some extent be foreseen. But, as it is, all is left to conjecture. It is, however, past all doubt that a serious pressure on the money market must take place, and which must produce great loss and inconvenience to the manufacturing and trading interests; and, as a concomitant effect, the unusual demand temporarily created and then suddenly relaxed, must occasion very injurious derangements in the market for labour.*

It may, perhaps, be urged, that the operations of past years have not been productive of any such effects. It is necessary, however, to remember that the seventy-five millions of capital, which have already been invested in railways, have been spread over a period of more than fifteen years,—giving an average annual absorption of only five millions, while we are now to supply forty millions, and that generally that period was one of great national prosperity.

But let us assume the work to be done. Let us suppose the capital to be sunk, and the 9000 miles of railway to be in full operation. The shareholders will expect at least as good average profits as those who have already made a like investment. We have seen that a gross revenue of L.3000 per mile, on the existing lines, only pays an average profit of about 5 per cent. What must be the gross revenue of the system of lines, now contemplated, to give the same profits?

In order that 9000 miles of railway should produce L.3000 per mile, it is necessary that the public should expend on that species of inland transport twenty-seven millions a-year! Assuming that this expenditure is distributed between passengers and merchandise, as it is at present, seventeen millions will be paid for passengers and ten millions for merchandise.

At present the number of passengers booked on 2000 miles of railway annually is nearly thirty-four millions. When the enlarged system comes into complete operation, the number must be an hundred and fifty-three millions!

This subject opens many curious and interesting views; but our limits warn us that we must at present dismiss it.

When the results of the operations in England became known

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* Morrison, pp. 6, 7.

in America, the advantages which such means of intercommunication must produce in that country became immediately apparent; and, in various parts of the Union, the enterprising spirit of the population was directed to the construction of railways. The progress was rapid; and a few years witnessed an extensive system of steam communication by land, throughout the most populous and active of the Atlantic States.

The total length of railway now actually constructed, and in operation in the United States, amounts to about 4500 miles; of which 500 miles consist of short lines, connected with coal works and private establishments;—leaving about 4000 miles of swift steam conveyance, by railway, for passengers and merchandise. Besides this, there are about 10,000 miles projected, the construction of most of which has been suspended, since the financial and monetary revulsions which took place some years since. Of the railways completed, and in operation, the chief part are in the Atlantic States. A few short lines, however, have been constructed in the south and west. Thus there are seven railways in Alabama, four in Florida, ten in Louisiana, and five in Mississippi.

Pennsylvania, New York, and the States of New England, are the great theatres of American railway enterprise. The State of Pennsylvania is intersected by nearly a thousand miles of railway; and an equal length is in operation, or process of construction, in the State of New York. The New England States are in every direction intersected by railways. Boston is connected towards the west with the Hudson, at Albany, by a continuous line. It is connected, towards the south, with Long Island Sound, by lines to Providence and Stonington, and to Worcester and New London. The communication is carried on from these points to New York, both by railway over Long Island, and by steam-boats on the Sound and the East River.

From the Hudson, there is an unbroken line of railway communication to the great northern lakes. By these and the Illinois river, the communication is continued by steam-boats nearly to the banks of the Upper Mississippi; where it is continued for some thousand miles westward by the Missouri towards the Rocky Mountains; and southward by the Lower Mississippi to New Orleans and the Gulf of Mexico.

Another artery of railway communication proceeds from New York southwards—traversing the States of New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North and South Carolina,—and turning westward through Georgia, terminates near the banks of the Alabama River. There, the line is continued by steam boats to the mouth of that river; and thence to Lake

Pontchartrain, where it meets a line of railway which terminates finally at New Orleans. The entire territory of the Union is thus inclosed in an uninterrupted circle of steam communication.

Nor are great transverse arteries wanting to complete the interfusion of the commerce of the country. From the artery running north and south just mentioned, their issues a lateral branch at Baltimore, proceeding westward towards the Alleghany range. At present this is continued only as far as Cumberland—at the foot of the ridge, which is from that point crossed by an excellent Macadamized road, on which stage-coaches work at a speed equal to the best English coach travelling. It is, however, intended to supersede this road, by a continuation of the railway to Wheeling and Pittsburg on the Ohio. Thence the communication is carried on by steam-boats on that river, to the point where its waters are received by the Mississippi.

We have here traced the great main arteries of the internal commerce of the United States, but these only. From these at every point diverge innumerable ramifications, either by tributary navigable rivers, by branch railways, or by common roads.

There are also isolated instances of the irrepressible spirit of enterprise, which so strongly characterises this people, to be found in railways constructed and in operation, where the highest refinements of locomotion would be the last thing the wanderer of the wilds would expect to meet. In the backwoods of Mississippi, traversing native forests where, till within a few years, human foot never trod, through solitudes the silence of which was never disturbed even by the Red man, we are now transported on railways. The impression produced on the traveller as he is whirled through these wilds, and sees the frightened deer start from its lair at the snorting of the ponderous machine which moves him, and reflects on all that man has accomplished in these regions within half a century, cannot be described.*

When the expenditure involved in the construction and operation of British railways is considered, the financier, the statistician, and the economist, will naturally ask how, with a population so sparse and a territory so vast, such a system of communication could be established and sustained? If the great mass of the passenger lines in England have cost at the rate of thirty-five

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* A railway is in operation between Vicksburg, on the eastern bank of the Mississippi, and the town of Jackson, in the centre of the State, which throughout its entire length traverses the native forests, where the engineers who made it were probably the first of the human race that had ever set their foot.

thousand pounds per mile, and the profits gained even on the most successful among them do not exceed ten per cent, while the average profits of all do not amount to more than half that rate,—how, it may be asked, can this stupendous system of American railways, with a traffic comparatively so insignificant, among a people where profits on capital are high and the rate of interest from six to ten per cent, be made to answer?

This difficulty is explained, partly by the general nature of the country, partly by the mode of constructing the railways, and partly by the manner of working them.

With certain exceptions, few in number, the tracts of country over which these railways pass form nearly a dead level. Of earth-work, therefore, there is but little. Occasionally, low embankments and shallow cuttings are all the difficulties the engineer has to surmount. Of works of art, such as viaducts and tunnels, there are almost none. Where the lines have to be conducted over streams or rivers, bridges are constructed, in a rude but substantial and secure manner, of timber, which is supplied from forests at the road side, subject to no other cost save that of hewing it. The station houses, booking offices, and other buildings, are likewise slightly and cheaply constructed of timber.

Where the lines of road intersect considerable rivers, such as the Hudson, the Delaware, or the Susquehanna, the latter are crossed by steam-boats, the railway being resumed on the opposite bank. This operation is effected without objectionable inconvenience or delay, and is often so regulated as to correspond with the meals of the passengers, which are in that case supplied in the boat while crossing. The passengers' luggage, and such light goods as are transported by passenger trains, are carried in Vans supported on cast-iron rollers, which are placed on the railway trucks. On the arrival at a ferry, these Vans are rolled without delay along a platform level with the truck, to the upper deck of the steam-boat, which is at the same level or nearly so; and on arriving at the opposite bank they are rolled by a like expedient upon the trucks of the train which waits.

But, besides the facilities afforded for the construction of railways by the flat and level character of the country, and the boundless supply of timber at a trifling cost, a further and much larger economy is effected, as compared with European lines, by the method of construction.

Formed to supply a very limited amount of traffic in proportion to their length, the American railways are, generally, single lines. Sidings are of course provided at convenient stations, in which one train waits until the train in the contrary direction has passed. Collision is impossible, for the first

train which arrives must, by the rules of the road, move into the siding. This arrangement would be attended with inconvenience, on lines where a frequent passage of trains takes place; but on the principal American lines, the quick trains seldom pass in each direction more than twice a-day, and the time and place of their meeting is perfectly regulated. In fact, no inconvenience is felt or complained of from this cause in the practical working of the lines. In cases where the traffic is so considerable as to require them, double lines have been constructed.

In the structure of the roads themselves, principles have been adopted which have been attended with great economy compared with European lines,—the application of which was rendered admissible by the lightness of the traffic and the moderate speed contemplated. In laying out these lines the engineers did not, as in England, impose on themselves the difficult and expensive condition of excluding all curves but those of a large radius. On the other hand, curves having a radius of one thousand feet are usual; and occasionally those of five hundred feet, and even less, are allowed. Nor are the gradients restricted to the same low limits as with us. Acclivities rising at the rate of one foot in a hundred and thirty, are considered a moderate ascent; and there are not less than fifty lines, in which the gradients are laid down at a rate varying from one in a hundred to one in seventy-five. Nevertheless, these lines are worked without difficulty by locomotives, without the expedient either of assistant or stationary engines. The consequences of this have been to diminish the cost of earth-work, bridges, and viaducts; even in parts of the country where the character of the surface is least favourable. But the chief source of economy in the construction of these lines has arisen from the structure of the road surface. In many cases where there is a light traffic, the rails consist of flat bars of iron two and a half inches broad, and from five to seven tenths of an inch thick,—nailed or spiked down to planks of timber laid longitudinally on the road in parallel lines, at the proper width, so as to form what are called continuous bearings. Some of the most profitable lines, and those of which the maintenance has proved the least expensive, have been constructed in this manner.

The structure of the road, however, varies in its character according to the traffic. Rails are sometimes laid down weighing from twenty-five to thirty pounds per yard. In some cases of still greater traffic, the rails are laid on transverse sleepers of wood, in the same manner as on the European railways; but, in consequence of the comparative cheapness of wood and high price of iron, the strength necessary for the road is obtained by

reducing the distance between the sleepers, so as to supersede the necessity of giving greater weight to the rails.

In all cases where augmented traffic may be expected from the increase of population and commerce, the earth-work, and structures on the lines are made so as to admit of a double line of rails, whenever they may be required.

In the working of their railways, the same attention to the economy rendered necessary by their limited traffic is observable. The engines are strongly built, perfectly safe, and sufficiently powerful; but they are destitute of much of that elegance of exterior, and luxurious beauty of workmanship, which are seen upon the British locomotives. The fuel used to work them is generally wood. On certain lines, however, in the neighbourhood of coal-mines—such, for example, as the Philadelphia and Pottsville Railway, which penetrates into the great coal-fields of Pennsylvania—coal is the fuel used. The use of coke is nowhere resorted to. Its expense would make it inadmissible; and in a country so thinly inhabited, the smoke proceeding from coal or wood is not objected to.

The ordinary speed, stoppages included, is fourteen or fifteen miles an hour. Independently of other considerations, the light structure of most of the railways would not allow of a greater velocity without considerable danger: on some of the better constructed lines, we have, however, frequently travelled at the rate of twenty-five miles an hour when at full speed. This is not uncommon on some of the New England lines,—on the railway from Baltimore to Washington, and some of the southern lines; as for example that between Charleston and Augusta in Georgia, the Columbia line in South Carolina, and the line from Augusta to the University of Athens in Georgia.

Notwithstanding the apparently feeble and unsubstantial structure of some of the lines, accidents to passenger trains are scarcely ever heard of in America. With an experience of nearly twenty thousand miles of railway travelling in the United States, we have never encountered an accident of any kind, or heard of a fatal or injurious one. This security may be explained by the moderate speed of the trains, and the absence of a highly active traffic.*

The form and structure of the carriages is a source of con-

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* In some cases of lightly constructed roads, where the bars spiked down on the planks are not kept in good order, an accident called (from its analogy to a catastrophe common on American rivers) *snagging* is said sometimes to have happened. In this case the iron bar, worn thin

siderable economy in the working of the lines. The passenger carriages are not distinguished, as in Europe, by different modes of providing for the ease and comfort of the traveller. There are no first, second, and third classes. All are first class, or rather all are of the same class. The carriage consists of a long body like that of a London omnibus, but much wider, and twice or thrice the length. The doors of exit and entrance are at each end; a line of windows being placed at each side, similar exactly to those of an omnibus. Along the centre of this species of caravan is an alley or passage, just wide enough to allow one person to walk from end to end. On either side of this alley are seats for the passengers, extending crossways. Each seat accommodates two persons; so that four sit in each row, two at each side of the alley. There are sometimes fourteen of these seats, so that the carriage accommodates fifty-six passengers. In cold weather, a small stove is placed near the centre of the carriage, the smoke-pipe of which passes out through the roof; and a good lamp is placed at each end for illumination during the night. The vehicle is perfectly lighted and warmed. The seats are cushioned; and their backs, consisting of a simple padded board, about six inches broad, are so supported that the passenger may at his pleasure turn them either way, so as to turn his face or his back to the engine. For the convenience of ladies who travel unaccompanied by gentlemen, or who otherwise desire to be apart, a small room, appropriately furnished, is sometimes attached at the end of the carriage, admission to which is forbidden to gentlemen.

It will occur at once to the engineer, that vehicles of such extraordinary length would require a railway absolutely straight; it would be impossible to move them through any portion of a line which has sensible curvature. However, in the construction of American railways curves are admitted without difficulty or hesitation, which would be wholly inadmissible on any European line, and through these curves the vehicles just described move with the utmost facility. This is accomplished by a simple and effectual arrangement. Each end of this oblong caravan is supported on a small four-wheeled railway truck, on which it rests on a pivot; exactly similar to the expedient by which the fore-wheels of a carriage sustain the perch. These railway carriages have in fact

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and unspiked, gets detached from the plank, and as the wheel passes upon it, springs up and pierces the bottom of the carriage to the great danger of the passengers. We have, however, never met with a well authenticated case of this kind.

two perches, one at each end; but instead of resting on two wheels, each of them rests on four. The vehicle has therefore the facility of changing the direction of its motion at each end; and in moving through a curve, one of the trucks will be in one part of the curve while the other is at another,—the length of the body of the carriage forming the *cord* of the intermediate arc! For the purposes they are designed to answer, these carriages present many advantages. The simplicity of the structure renders the expense of their construction incomparably less than that of any class of carriage on an European railway. But a still greater source of saving is apparent in their operation. The proportion of the dead weight, to the profitable weight, is far less than in the first or second class carriages on the English railways, or even than the third class. It is quite true that these carriages do not offer to the wealthy passenger all the luxurious accommodation which he finds in the best first-class carriages on the English railways; but they afford every necessary convenience and comfort, and are decidedly preferable to any second-class carriages on European lines.

In several of the principal American cities, the railways are continued to the very centre of the town, following the windings of the streets, and turning without difficulty the sharpest corners. The locomotive station is, however, always in the suburbs. Having arrived there, the engine is detached from the train, and horses are yoked to the carriages, by which they are drawn to the passenger depot, usually established at some central situation. Four horses are attached to each of these oblong carriages. The sharp curves at the corners of the streets are turned, by causing the outer wheels of the trucks to run upon their flanges, so that they become (while passing round the curve) virtually larger wheels than the inner ones. We have seen, by this means, the longest railway carriages enter the depots in Philadelphia, Baltimore, and New York, with as much precision and facility as is exhibited by the coaches that enter the gateway of the Golden Cross or the Saracen's Head.

The cost of construction of the American railways has varied between very wide limits, as the traffic upon them has been greater or less. The average cost of the passenger lines may be taken at about L.9000 per mile.

Of all the European states, after Great Britain, that which first and most energetically directed its efforts to the establishment of improved means of intercommunication, was Belgium. The revolution of 1830 having separated this country from Holland, it lost the mouths of the Scheldt as an issue for its commerce. The communications with the German states could

not be continued by sea, and were attended with expenses by land, on the common roads, which rendered them impracticable. The coal-producing province of Liege, which before the revolution supplied the Dutch markets, was now isolated, while those of Hainault communicated with all the chief cities. Pressed by these difficulties, the new government decided on constructing an effectual and economical communication between the ocean and the point of the frontier nearest to the Rhine, crossing the kingdom from east to west. A canal was first suggested, but MM. Lebeau and Rogier had the sagacity to perceive that an extensive system of railways would conduce much more effectually to the national prosperity; and the project was presented to the Chambers, and passed into a Law, on the first of May 1834; in virtue of which the railways which now overspread Belgium were constructed at the charge of the state. The works were commenced on the 1st June 1834, and were completed, and successively brought into operation, in the following years. In 1843, ten years after the project was adopted, the following system of lines was completed and in full work:

	Miles.
Eastern Line—from Malines to Cologne by Louvaine, Tirlemont, Landen, Waremme, Liege and Verviers, with a branch to St Trond, ...	91
Western Line—from Malines to the sea on the north, by Termonde, Ghent, Bruges, and Ostend, with a branch from Ghent to the French frontier by Menin and Courtrai, .	126
Northern Line—from Malines to Antwerp, with a branch to Lievre, ...	16
Southern Line—to the frontier of France by Brussels and Mons, with a branch to Charleroi and Namur, . . .	115
Total, .	348

The earlier of these lines were opened in 1837, and the others followed in quick succession. The result of the first year fully justified the government in the policy which dictated this measure. Before the establishment of these lines of communication, the number of passengers between Brussels and Antwerp per annum was 75,000. In the first eight months after the opening of the railway, the number was 541,129; and afterwards the annual intercourse between these cities amounted to a million! The profits, on the capital expended on the line between Brussels and Malines, amounted in the first year to 8 per cent; and those on the line between Brussels and Antwerp to 16 per cent. A secondary system of lines, (about 200 miles,)

to communicate with the inferior order of towns, has been undertaken, with the authority of the State, by private companies. Considered relatively to the population and territory of Belgium, this is the greatest work of public utility which any European State has executed in our times.

The general character of the country was favourable to the construction of railways, but this facility was not without some qualification. In the parts of the country through which the lines first constructed, passed, the surface is generally flat, and no earthworks or great works of art were necessary. It was, however, intersected by numerous and important rivers and canals, over or under which the lines were conducted by means of bridges and aqueducts. On the eastern line, a series of deep valleys were crossed by embankments from fifty to seventy-five feet in height, alternated with cuttings from thirty to forty-five feet deep, and a tunnel of nearly three-quarters of a mile in length. In crossing these valleys, the railway is carried over and under the roads and canals by means of innumerable bridges, aqueducts, and viaducts. From Ans to Liege, the declivity leading to the valley of the Meuse is worked by an inclined plane; on which the trains are drawn by a pair of stationary engines of 360 horse power. From Liege to the frontier of Prussia, the imaginary difficulties have been as considerable as on any of the English railways.

The cost of construction and other statistical particulars connected with the Belgian railways, for the years 1842, 1843, and 1844, are given in this table:

Year.	Miles Worked.	Cost of Construction.	Number of Passengrs.	Receipts from Passengrs.	Receipts for Merchandise, &c.	Total receipts.	Expenses of working.	Net profit.
1842	246	L.3,454,804	2,724,104	L.187,372	L.111,090	L.298,462	L.188,013	L.110,049
1843	308	5,784,000	3,085,349	219,296	141,960	361,256	219,064	142,192
1844	348	5,789,872	3,381,529	271,383	177,837	449,220	230,617	218,603

Hence it appears, that the average cost of establishing the system of Belgian lines, has been L.16,600 per mile. This sum consists of the following items:

Construction of the lines, . . .	L.12,900
Stations and their appendages, . .	1100
General expenses, salaries, offices, &c., .	500
Material, ...	2100
	L.16,600

The expense of working has, from increased attention to eco-

nomy, and from exciting, by promotion and rewards, the good conduct and efficiency of engineers and other persons employed, gradually diminished from year to year. In 1844 it amounted to L.660 per mile; being fifty-one per cent of the gross receipts. A net profit of forty-nine per cent of the receipts remained, which amounted to nearly four per cent on the capital.

The Belgian railways have been constructed and worked by her government, not with a view to revenue, but solely with reference to the advancement of the general prosperity and well-being of the population. The tariff for passengers and goods has, therefore, been so regulated that the profits shall not exceed the interest of the capital sunk. The present fares for passengers are as follows:

		Tenths of a penny.	
For 1st Class	Passengers,	$14\frac{8}{10}$	per Passenger per mile.
2d	do.	8	...
3d	do.	6	...

By the returns given above, we find that the average receipts per head per annum from passengers was $19\frac{1}{4}$d.; and, since the average fare per head per mile is seven and a half tenths of a penny, it follows, that the average distance travelled by the passengers is twenty-five miles. By comparing this with the results of the traffic on the British lines, the effect of the lower fares is apparent. The second and third class on the latter, travel, on an average, distances of only twelve miles; on the Belgian lines, they move twice that distance. On the Belgian lines merchandise supplies forty per cent of the gross revenue; on the British lines it supplies thirty-seven per cent. The chief part of the revenue derived from passengers on the Belgian, as well as on the British lines, arises from short traffic. This, in effect, will be found to prevail generally, wherever railways are brought into operation. It follows from what we have proved above, that the great majority of travellers on the Belgian lines, are those whose excursions are under twenty-five miles. The gross annual revenue per mile, on the Belgian railways, is only L.1290, being less than half the amount received on the British lines. Yet the net profit on the capital is but little less.

By a system of most judicious and liberal management, these railways have been rendered eminently serviceable to the country in the transport of every description of merchandise.

Admirable arrangements are made for the safe, expeditious, and cheap delivery of every package and parcel at the address of the consignee, who is subject to no additional or arbitrary

expense whatever, beyond the amount of the tariff, which varies, of course, according to the nature of the goods; but in all cases is on the lowest scale. The effect of these measures has been conspicuously apparent in the rapid augmentation of this department of transport. In 1841, before they were matured, the total receipts for merchandise was L.19,000. In 1844 its amount was L.177,800! Before the establishment of the Eastern branch of the railway, the highest amount of heavy goods sent to the German frontiers, by the old conveyances, was twelve thousand tons: in 1844 the amount transported was sixty-seven thousand five hundred tons! In 1842, before the railway took the traffic, the amount of light goods was one hundred and ninety-four thousand tons: in 1844 it exceeded five hundred thousand tons.

Although this general cheapness of transit necessarily entails on the passenger trains a diminished speed, compared with that which British railway travellers are accustomed to enjoy, considerable expedition is nevertheless effected. The mean speed of the passenger trains, while in full motion, is estimated at twenty miles an hour, and the rate, including stoppages, at seventeen and a half miles an hour.

The progress of this new instrument of social and national advancement in France, has not hitherto been commensurate with the position and pretensions of that great country. How far this backwardness is ascribable to the genius of her institutions; or to the distractions to which her Government has been exposed, and the engrossing nature of the political questions which have occupied her Chambers since the Revolution of July; or, in fine, to a salutary foresight and enlightened caution, which prompted the policy of waiting to profit by the errors, and reap the harvest of the dearly-paid-for experience, of Great Britain, we shall not stop to enquire. Whatever may have been the cause, she has unquestionably before her advantages of no ordinary magnitude and importance, arising from it.

Previously to 1830 a few railways had been constructed and worked in some of the mining districts of France similar to those which had long been used in the northern counties of England. It was not, however, till about the year 1836, that the true character which steam transport on railways was destined to assume, began to reveal itself to her government. The wonders of the Liverpool and Manchester line had been noised abroad. Its expedition and cheapness were the theme of general conversation. It was, however, regarded as in some measure an exceptional case, and few believed in its capability of general

application. It was not until the railway from Paris to St Germain (twelve miles) brought these effects under the very eyes of the Parisians, that a true sense of the importance of this improvement in locomotion was excited. This was soon followed by the opening of several other short lines—such as those from Paris to Versailles, from Montpelier to Cette, and from Alais to La Grand Comté.

At length, the government, being fully alive to the importance of this new way of internal communication, it was resolved, in 1842, that a system of railways should be planned and executed. With this view, it was determined, that from Paris as a centre, main branch lines should issue, to be directed to those points of the frontiers, by land and sea, that should best serve the purposes of foreign commerce; and that the demands of the interior should be consulted in the courses which these lines should follow in passing through it, and in the various ramifications which they should throw off. In accordance with this plan, six great lines would issue from the capital. The first, proceeding northwards to the Belgian frontier, would unite with the railways of that state, near Lille and Valenciennes. Branches from Amiens and Lille would communicate with the Channel at Boulogne, Calais, and Dunkirk; thus opening a rapid and easy communication with England, and affording a means of transit with the fifth commercial port, and the great granary of the northern section of the kingdom.

The object of the second great artery was to open a communication with Spain. 'When,' said the minister of public works in 1838, 'Spain, restored to tranquillity, shall be 'able to renew with France those commercial relations which 'must contribute so largely to the wealth of our southern de-'partments, what great results may we not expect from a rail-'way from Paris to Bayonne, carrying the fruits of our industry 'at a low price into the frontier provinces of Spain! What 'beneficial influences, also, may not this new way of communica-'tion exert upon the political relations of the two countries—'relations which every day proves the necessity of rendering 'more numerous and more close!' This line was to proceed from Paris southwards, through Orleans, Tours, Poitiers, Angoulême, and Bordeaux, to Bayonne,—throwing off branches to Nantes and Vierzon.

The eastern line would pass through Champagne and Lorraine, connecting Paris with Strasbourg and Bâle, with a branch to Metz; thus forming a direct communication with the Rhenish frontier, and uniting with the system of German railways. It

was expected by this to share that traffic which now flows through the Belgian lines from Antwerp and Ostend to the Rhine.

A line to be carried from Paris to Brest, through Rennes, would afford to the products of the western provinces a passage to the Atlantic; in addition to that afforded by the branch of the great southern line directed on Nantes.

Between the southern and eastern lines just mentioned, is included a tract of country, more than one hundred leagues in width, occupied by a dense and industrious population, and covered with a fertile soil. To enrich this tract, easy ways of communication alone are wanting. It was, therefore, decided to carry through it another great central line, which should extend to the base of the Pyrenees, thus opening a way to Saragossa and the central parts of Spain.

Finally, the western line would be directed upon Rouen, with branches to Havre and Dieppe; thus completing the system of communication with the ports of the Channel and the Atlantic.

Such were the lines designed to issue from Paris as a centre. It was determined to complete the great communication of the country by two main lines proceeding from Marseilles, one leading to the Atlantic at Bordeaux, and the other communicating by Lyons with Switzerland, Alsace, and Northern Germany; and running into the eastern line from Paris, at Dijon.

By the line from Marseilles to Bordeaux, it is intended to join the Mediterranean with the Atlantic, to put in close connection the two chief ports of France, and to aid in restoring to Bordeaux its former importance. This line will throw out two branches on Tarbes and Perpignan, by which the communications with Spain will be completed.

By the line proceeding from Marseilles to the east, it is intended to supply a means of internal transport for the commerce of the Levant; which has been hitherto supplied to Europe chiefly through the port of Marseilles. The line of railway from Vienna to Trieste, carried, as it will be, through the heart of the German States, and having unbroken communication with the Baltic and the Northern seas, threatens to divert the Levant trade from Marseilles to Trieste. The line to which we now advert is designed to avert this loss.

Such is the system of railway communication which has been projected in France. Let us now see what progress has been made in its realisation.

It appears by a statement published by M. Teisserenc, a member of the Superior Railway Commission, and which may be considered as having an official character, that at the end of 1844, the total length of the railways open to the public, in

progress of construction, and projected and recognised by the legislature, but not commenced, was as follows:

	Miles.
Open for commerce, ...	537
In progress of construction, ...	1837
Planned	961
Total length of the contemplated system,	3335

The total amount of capital absorbed by the 537 miles then open, was £11,464,000. The average capital per mile was, therefore, £21,348. Assuming that the remainder of the system will be constructed at the same rate, which will probably be the case, the total amount of capital invested will be L.71,195,580. Since the end of 1844, nearly 300 miles more have been opened for traffic; and it is expected that at the end of the present year 1846, the total length of French railways open for commerce will be nearly 1000 miles.

To find the general financial averages resulting from the operation of the French railways, we have taken four hundred miles of those which have been used a sufficient time to afford annual returns; and the results are as follows:

Total cost of construction, and material per mile, . .	L.21,400
Gross annual receipts per mile, . .	2,114
Annual expenses per mile, . .	1,106
Annual net profit per mile, . .	1,008

Taking these amounts in proportion to the capital sunk, and to each other, we find:—

Annual receipts, . .	10 per cent of capital sunk,
Annual expenses, . .	52 per cent of receipts,
Annual profits, . .	48 per cent of receipts,
Profits, . .	$4\frac{7}{10}$ per cent of capital.

It appears, therefore, that the average net profits on the capital invested, is about $4\frac{3}{4}$ per cent, and that a little more than half the gross receipts go to defray the current expenses of the lines.

In comparing these conclusions with the current returns of particular lines, it is necessary not only to remember that they are average results, but that the financial condition of each line fluctuates from year to year. Generally, the best lines give improving returns.

When the entire system as designed by the State has been completed, the following results must ensue, in order that the capital to be invested may produce a net 5 per cent annual profit:

Capital invested in 3335 miles, at L.21,348 per mile,	L.71,195,580
Gross annual receipts, . . .	7,416,207
Gross annual expenses, . . .	3,856,424
Net annual profits, . . .	2,559,783

The population of France being thirty-four millions, this will require an annual expenditure of L.218,000 on railway transport, for every million of inhabitants.

The legislature has fixed the major limit of the fares chargeable to passengers as follows:

	Tenths of a penny.
1st Class, per Passenger per mile, . .	16
2nd	12
3d	$8\frac{8}{10}$

The companies are obliged by law to supply covered carriages, with curtains at the windows, for third-class passengers. These carriages are decidedly superior in convenience and comfort, to the second-class carriages on the British railways. Taking the returns of the traffic of the principal lines now in operation, we find that the average sum received from each passenger is 30d. Now, if we take the average fare per head per mile, at twelve-tenths of a penny, we shall find that the average distance which each passenger travels is twenty-five miles. Short passenger traffic is, therefore, the main source of the railway revenue here, as elsewhere.

The proximity of Belgium and France has necessarily rendered the British public more or less familiar with the extent of the system of railways already in operation in these States. Few, however, have any distinct notion of the advancement of railway transport in the other States of Europe; and still fewer, of the vast system which is designed to be executed by the Germanic states;—of which a very considerable part is already in a forward state of construction. Although these States are united by community of manners, race, and language, yet, being under different Sovereigns, and subject to different administrations, they have not proceeded with this great improvement, with that unity of design which has marked the proceedings in France. Each government has acted for itself independently of the others. Nevertheless, partly from the physical character of the countries, and partly from the distribution of the population and seats of industry, and a consequent harmony of interests, these separate and independent measures have of themselves assumed a considerable uniformity of plan; and the Germanic states will erelong be overspread by one of the most magnificent

systems of interior communication of which Europe can afford any example.

The Austrian system consists of what may be called four great arteries or lines, which meet at Vienna; and from thence proceed north, south, east, and west. The southern line, passing through Gratz and Laybach, terminates at Trieste. The northern directs its course by Prague, on the frontiers of Saxony,—throwing off a branch to form a union by Olmutz with the great line through Prussian Silesia. These two lines, running north and south, are destined to form part of a more extensive meridional line, by which the Adriatic will be united with the northern seas. The two arteries which run east and west will connect Vienna with the confines of Hungary, by Pesth and Debreczin, and with Munich, by Lintz. By these a profitable communication will be opened with those rich and hitherto inaccessible tracts of eastern Europe intersected by the valley of the Danube,—possessing vast pasturages, regions fertile in wheat, maize, and rice, flourishing plantations of hemp and tobacco, and extensive vineyards.

Nor has Austria neglected to extend similar improvements to her Italian possessions. A line of railway, measuring nearly two hundred miles, will traverse the Lombardo-Venetian territory, connecting Venice with Milan, and communicating by easy steam navigation with the *terminus* of the great northern and southern line at Trieste. That the Austrian government may have been moved to confer this great benefit on northern Italy by other motives than those of a desire to promote the well-being of its people, is very possible; but, be this as it may, results greatly beneficial to them must ensue.

We here annex a view, taken from recent documents, of the actual state of the railways within the Austrian dominions:

	Total length. Miles.	Completed & open for commerce. Miles.
Vienna to Trieste, (finished to Gratz,)	335	148
Northern Line, . . .	497	190
Vienna to frontier of Bavaria, .	194	16
Eastern Line, . . .	311	84
Venice to Milan, . . .	190	19
Vienna to Tirnan by Presburg, .	51	51
Grunden to Prague by Lintz and Budweis,	286	156
Budweis to Prague, . .	71	—
Total, . . .	1935	664

In the system of railways projected by Prussia is apparent the

combined views suggested by the military traditions of its former sovereigns, and the commercial spirit of northern Germany, of which it is the centre. To throw its distant provinces, bordering on the constitutional states of Belgium and France, in more immediate relation with the central government, lines issuing from Berlin will rest upon the Rhine at Cologne and Frankfort-on-the-Maine; the one communicating with the network of Belgian lines, by the railway to Aix-la-Chapelle, and the other with the French lines by the railway of the Taurus. The former is completed, with the exception of the line between Cologne and Minden. Another main line issues from Berlin eastwards, directed towards Russia and the Polish provinces, by Frankfort-on-the-Oder, Posen, Dantzic, and Konigsberg. This line is in a forward state of progress.

There are three other lines partially or totally executed. Two proceed from Berlin to Hamburg and Stettin respectively, and the third will put the capital in immediate communication with Silesia, and unite with the great northern Austrian line already mentioned. It is in this way that the continuous communication between the Mediterranean and the North Sea and the Baltic will be completed.

	Total length. Miles.	Length open for traffic. Miles.
Berlin to Stettin, . . .	89	89
... to frontier of Saxony, . .	94	94
... to Austrian frontier by Frankfort and Breslau,	323	240
Breslau to Saxon frontier, . . .	66	25
... to Fribourg, . .	36	36
Berlin to Potsdam and Magdeburg, . .	80	16
... to Hamburg, . . .	174	—
Leipsic to frontier of Brunswick, . .	110	110
Cologne to Belgian frontier, .	54	54
... to Bonn, . . .	20	20
Dusseldorf to Elberfield, . . .	17	17
Total, . . .	1063	701

Besides these, which are already planned and in actual progress, there are several other lines in contemplation by the Prussian government. Among them may be mentioned a more direct line from Berlin to Dresden, by Iüterbogt and Riesa; the line from Cologne to Minden, and the line from Lippstadt to Cassel.

We have lately seen the traffic returns, and other accounts, to 31st December 1845, of eleven principal Prussian lines, which were open throughout that year,—the total length of which is

600 miles. The total cost of constructing these has been L.5,640,000, being at the rate of L.9400 per mile. The gross receipts for passengers, was L.306,570, and for merchandise, L.179,980. The number of passengers booked was 4,006,814. The amount, therefore, received per passenger was 19d. Thus, the average distance travelled by each passenger does not exceed twenty miles,—showing again that short fares are the main source of railway revenue. The quantity of merchandise transported was 475,000 tons, for which L.17,980 were paid; being at the average rate of 7s. 6d. per ton. Taking the average rate of the traffic at 2½d. per ton per mile, this would show that the average distance to which the goods have been transported was thirty-six miles. The expense of working these lines was L.285,000, which, deducted from the gross receipts, left a net profit of L.201,550, giving a dividend of 5½ per cent on the capital: a portion of the expense of constructing the lines was defrayed by loans obtained at 4 per cent.

The Bavarian system of railways consists of three great trunk lines, which intersect the kingdom in different directions. The first rests at one extremity on the Lake of Constance, at Lindau; and at the other, unites with the Prusso-Saxon system at Hof—traversing in its course, Augsburg, Donauworth, Nuremberg, and Bamberg. A great portion of this line is open for traffic. The second line crosses the kingdom east and west; joining, on the one side, the railways of Wirtemberg and Baden, and on the other, those of Austria. The third great line issues from Bamberg to Frankfort-on-the-Maine, where it unites with the numerous systems centring there.

Of this system of lines, the total length is	573 miles.
Length of the part open for commerce,	159 miles.

The enlightened zeal of the present monarch of Bavaria for every improvement which tends to advance the arts and civilisation, is well known. He appropriates each year, to the construction of this system of railways, a considerable revenue saved from his privy purse, and the public revenues of his kingdom.

The measures adopted by the more considerable of the Germanic states for the establishment of improved means of internal commerce, necessarily gave a corresponding impulse in the same direction to the smaller ones. Saxony and Hesse have undertaken the continuation of the great northern Bavarian railway from Hof to Leipsic, and of the Austrian line from Breslau to Leipsic by Dresden. Lines are also in progress connecting Dresden, Gorlitz, Chemnitz, Riesa, Bamberg, and Eisenach: also Dresden with Prague, Cassel with Frankfort-on-the-Maine,

Lippstadt, and Hanover. These small states have planned above a thousand miles of railway; more than one fourth of which is completed, and open for commerce.

The smaller northern states—Hanover, Brunswick, Mechlinburg, and the Hanse Towns—have not been backward in contributing their quota to this vast work. By a law passed by the Legislative Chamber of Hanover in 1842, the construction of a system of railways in that state was decided on. The main line is to run east and west, connecting Hanover with Brunswick, Magdeburg, and Minden. Another is directed northwards upon Hamburg by Lünebourg and Zell; another north-west on Bremen, and a short line to unite with the Cassel railway. These lines are all in a state of advancement, and considerable parts are already open for commerce.

In the Duchy of Brunswick, with a population not greater than an eighth of that of the British metropolis, there are already seventy-five miles of railway completed, or nearly so. The Duchy of Mechlinburg is traversed by the main line of railway from Berlin to Hamburg, and by a branch connecting Weimar with Berlin by Schwena and Boëtzenburg.

The Hanse Towns form a common centre for most of these lines; and in immediate connexion with them is the important line from Altona to Keil, with branches on Sleswig and Tonningen.

The total length of railways projected in these smaller states is 700 miles; of which about one-third is open for traffic.

To complete this view of the German railways, it remains to notice those of Baden, Wirtemburg, and the free city of Frankfort. The great Baden line runs parallel with the Rhine,—forming the continuation of the line from Cassel through Frankfort and Darmstadt. This line, which terminates at Bâle, passing through all the chief towns traversed by the Berg Strass, and lying between the Rhine and the Black Forest, is open for traffic throughout nearly its entire extent. Its object is to facilitate the communications of Germany with Switzerland and Italy. Another line, traversing Wirtemburg from south to north, issues from Frederickshofen on the Lake of Constance,—meets the Austro-Bavarian line at Ulm, and, passing through Stuttgard, terminates at Heidelburg, where it unites with the great Baden railway. Thus will be united Vienna, Munich, and Stuttgard, the three capitals of southern Germany; while a similar chain of lines unites Berlin, Warsaw, Dresden, Hamburg, and the other capitals of the north. The total length of railways projected by Baden, Wirtemberg, and Frankfort, is 500 miles, of which above 200 are completed.

According to the work of Baron Von Reden, to which we are indebted for much valuable information concerning the railways of his country, the entire system of Germanic lines, when completed, will consist of 1600 German miles, equal to 7600 British miles, of railway. At the close of 1845, the part of this open for traffic was 4760 miles. When the system shall have been completed, one-third will have been constructed by the state, and two-thirds by companies under the authority of, and subject to, the control of the state. The total amount of capital absorbed by this great undertaking, will be L.74,793,600, being very nearly at the rate of L.10,000 per running mile. The average cost of the part already constructed has been very little above L.8000 per running mile.

The low cost of construction, as compared with the railways of France and England, is due, in a great measure, to the low price of the land, and the inferior rate, generally, of the wages of common labour. On the other hand, however, the German States have to struggle with peculiar disadvantages. The country, in many places, has presented formidable engineering difficulties. The rails and road materials generally, as well as the machinery and the mechanicians, have to be imported from England and Belgium, and even from the United States of America. And the favourable circumstance of cheap hand-labour has been, in some degree, done away by the demand for it, created by the railways themselves. In 1844, eight millions of labourers were employed on the German railways; and their wages had then risen thirty-three per cent. Still the works proceed with speed and activity.

A movement affecting in so many important respects the social condition and commercial relations of states, could not take place among those to which we have adverted, without being shared more or less by the other countries of Europe. Russia, Denmark, Holland, Switzerland, the Italian States, and even the Peninsula, have shown signs of their consciousness of the expediency of some similar undertakings. Several of them have already taken active measures in the construction of lines through their respective territories; and those which have not gone so far have caused surveys to be made, and other preliminary steps to be taken. Sweden stands alone quiescent among the nations of Europe.

The system of Russian railways projected, and in progress of construction, consists of four principal lines. The first will be carried from St Petersburg to Warsaw, and thence to Cracow, where it will unite with the northern chain of German lines; thus opening a continuous communication with all the chief cities of

central Europe. Of this line, a large part of the section between Warsaw and Cracow is completed, and the remainder in a forward state of progress. The second line will connect Petersburg with Moscow: this is nearly completed. The third line will be the continuation of the Austro-Hungarian line to Odessa. The fourth line, intended for goods only, will connect the Volga and the Duna. The total length of this system of railways will be sixteen hundred miles.

The example of Belgium necessarily attracted the attention of Holland to the subject of railway communication, and suggested the policy of at least attempting to share that German traffic which was established between the northern country and the sea, by the Belgian and Prussian chain of railways. The Dutch Chambers were not, however, as keenly sensible of these advantages as the Sovereign, and declined to give the desired legislative encouragement to such enterprises. Under these circumstances, William I. gave his personal guarantee to a Company which undertook the line from Amsterdam to Rotterdam; which was opened in successive sections to Harlem in 1839, to Leyden in 1842, to the Hague in 1843, and to Rotterdam in 1844. The length of this line is fifty-three miles, and is laid down for a double line of rails; one line, however, being only laid for the present. The cost of the line (with two lines of rails) will be little more than L.5000 per mile, exclusive of the stock. This low cost is owing to the easy nature of the ground, which requires no engineering works of any considerable cost.

The line from Amsterdam to the frontier of Prussia is completed, and open as far as Arnheim, a distance of fifty-eight miles. This was constructed by the State, but afterwards leased to an Anglo-Dutch Company. The capital invested being L.800,000, the cost is L.15,000 per mile. Privileges have been granted to companies for the construction of various other lines.

In a late session of the Second Chamber of the States-General, the Minister of the Interior announced the approaching execution, through the instrumentality of private companies, of a complete system of railways; surveyed and laid out under the immediate superintendence of the government,—the total capital to be invested in which would amount to from six to seven millions sterling.

Passing over the Italian States and Portugal, where little has yet been done in railway undertakings, we shall only add, as to Spain, that if behind other European powers in the improvement of inland transport at home, she has not been so supine in her colonies. A railway, forty-five miles in length, was constructed

across the most fertile part of the beautiful island of Cuba, so early as 1838, and has since been in constant use. It is difficult to convey any adequate impression of the effects produced on the mind of the traveller as he is carried over this natural garden, in a way so little to be expected, amid such scenery. Emerging from the Tacon suburbs of the Havanna, he traverses fields of pine-apples, bordered by hedgerows bending under the burden of the ripe orange, and sprinkled at intervals with the banana, the plantain, and the Cocoa-tree. These are alternated with sugar plantations and tobacco. Through this scene, redolent of the Tropics, and calling up the historic recollections of Columbus and his adventurous companions, he is whirled at the rate of twenty miles an hour, by machines bearing the name of a Manchester manufacturer, impelled by fuel from Lancashire, and worked by an engineer from Newcastle-on-Tyne! The swarthy African, as the strange apparition passes him, pauses from his toil, and gazes at it with a wonder which time and custom can hardly abate.

The advantages which railway transit presents on the score of expedition, economy, and certainty, have, in the estimation of a considerable portion of the public, not only in England but elsewhere, been regarded as subject to a serious drawback and qualification, in consequence of the terrible character of the accidents which have from time to time occurred. The circumstantial details of cases, circulated in highly-coloured accounts by the daily press, are certainly calculated to raise much apprehension. We shall now, therefore, lay before the public such data of a well-ascertained nature, as may enable every one endowed with common sense and reflection, to decide on the actual nature and degree of danger to which he exposes his person when he makes a journey by railway conveyance.

By the official reports of the Belgian Railways we find that 6,609,215 passengers travelled on these lines between 1835 and 1839. Of this number fifteen were killed and sixteen wounded by railway accidents. But of these numbers twenty-six were persons employed on the road or in working the trains. Only three passengers were killed and two wounded. The chances of the death of a passenger from railway accident were therefore 1 to 2,203,215. In 1842, the number of passengers was 2,716,755. Of these three only were killed, one of whom was a suicide, and the other two met their deaths by crossing the line.

On the French lines, the deaths from accident have been still more rare. According to an official return for the first six months of 1843, upon the six lines which issued from the capi-

tal, of which the total length was 212 miles, the circulation had amounted to 18,446 trains, which transported 1,889,718 passengers. The distance travelled over was 316,945 miles. No traveller was either killed or wounded. Only three agents of the railway suffered.

It may not be uninteresting to put in juxtaposition with this, the returns of accidents produced by ordinary horse-coaches, travelling in Paris and its environs:

Year.	Killed.	Wounded.
1834	4	134
1835	12	214
1836	5	220
1837	11	361
1838	19	366
1839	9	384
1840	14	394
Total, -	74	2073

On the English railways, of which the extent and traffic are much greater, the absolute number of accidents fatal or injurious must of course be expected to be more numerous. But we shall find, by referring to the Parliamentary returns, that the actual amount of danger to life or limb, on English railways, is quite insignificant. We take the following Statement from the last return of the Railway Department to Parliament:

Years.	Number of Accidents.	Number of Persons Injured.			Number of Miles of Railway open.	Total Number of Passengers carried.	Proportion of the Number of persons injured to the total number carried.
		Killed.	Injured, not Fatally.	Total.			
1840. (five months.)	28	22	131	153	1330	6,029,866	1 in 39,410
1841.	29	24	72	96	1556¼	20,449,754	1 in 213,018
1842.	10	5	14	19	1717½	21,358,445	1 in 1,124,128
1843.	5	3	3	6	1798½	25,572,525	1 in 4,262,087
1844.	34	10	74	84	1912¾	30,363,052	1 in 356,702
1845.	15	2	30	32	2118¼	16,720,550	1 in 522,517

It appears, therefore, that the chance in favour of the safety of travellers who conduct themselves with ordinary prudence, is half a million to one.

It may perhaps be asked, what is the kind or degree of prudence or caution expected from railway travellers, as more especially necessary to their security. We answer, as the result of rather large experience of railway travelling in nearly every

part of the globe, that the best general rule is to *keep your place in the carriage, if possible, to the end of your journey; never getting out and in at stations, except when indispensably necessary.*

Among the numerous questions which have arisen out of the conflicting interests engaged in railway speculations in England, there is one which demands some notice, were it only on account of the extraordinary extent to which it has lately engrossed public attention. Nothing can more strikingly demonstrate the profound and general interest felt in every thing connected with railways than the bitterness which has marked a contest, in which dispassionate and disinterested parties would find it difficult to discover any ground for a reasonable doubt as to the proper decision to be come to.

We have seen that there were in operation, at the close of last year, about 2100 miles of railway. In the construction of 1860 miles of these, the space between the rails was fixed, in accordance with that adopted in the earlier lines, at 56½ inches; an uniformity rendered necessary in order to enable engines and carriages freely to pass from line to line throughout the country. A line called the Great Western had been laid down through a certain tract of the country, with an exceptional width (or gauge as it has been called) of 84 inches; and from this line subsequently branches were extended, having, of necessity, the same gauge. It was, of course, evident from the beginning, that this system of exceptional lines, now amounting to 240 miles, by the adoption of a different gauge, dissociated itself from all other British railways; the commerce of which could never flow into it, nor could they receive from it any commerce except by transshipment. It was said at the time, by the superintending engineer of these lines, that the departure from the ordinary gauge was 'undoubtedly an inconvenience. It amounts to a prohibi-'tion to almost any railway running northward from London; as 'they must all, more or less, depend for their supply on other 'lines or districts where railways already exist, and with which 'they must hope to be connected. In such cases there is no 'alternative. The Great Western Railway, however, broke 'ground in an entirely new district in which railways were 'unknown. * * * It can have no connexion with any other 'of the main lines; and the principal branches were well consi-'dered, and almost formed part of the original plan; nor can 'these be dependent on any other existing lines, for the traffic 'which they will bring to the main trunk.' *

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* *Report of J. K. Brunel to Directors of Great Western Railway.* 1838.

The commercial isolation of this exceptional system was, therefore, contemplated by the engineer and directors, and consequently no inconvenience to themselves or the public was feared. Indeed none, in that case, would have ensued. But, in the event, the development of railway transport far transcended the anticipations of the engineer and directors of the exceptional gauge, as well as all the rest of the world; and, contrary to their expectations, the ramifications of the general gauge have already come into contact with those of the exceptional gauge; and experience has proved Mr Brunel to have fallen into a serious error, when he declared, so explicitly, that the exceptional system could never derive its traffic from the general lines of the country. One point of contact has been produced, and a line of others must ensue. The question then arises, what is to be done?

The narrow strip of England, extending westward from London towards Bristol and Exeter, where the exceptional system of railways now prevails, is about to be insulated from the remainder of the country, north and south. It will be, so far as regards railway communication, as though it were separated from the rest of the kingdom by a river, too wide and too deep to be crossed by a bridge. The commerce between it and the districts north and south must be conveyed by ferries at each point, on the banks of this river, where the railways respectively abut. Passengers arriving on either side must leave their carriages, taking with them their *impedimenta*, great and small—such as great-coats, umbrellas, parasols, and carpet-bags. And all this must happen night and day, in fair weather and in foul. The wife and children must, equally in the pelting storm, and in the darkness of night, bustle their way through the mud from the one train to the other. The trains of merchandise must all be unloaded and unpacked on one side, and reloaded and repacked on the other; to the loss and damage of the owners, and delay and cost of transit; for *some one* must pay for all this labour, and who that some one shall be, it is not difficult to tell. Regiments of porters must be maintained at these limits of the region of the exceptional gauge; and must be relieved by relays from time to time, for the work will be incessant night and day. And this is to be going on perpetually through the year, and from year to year, as long as railways shall endure, along a boundary line running on both sides parallel to a main railway, 200 miles long!

But it may be asked, whether there is no countervailing advantage to set off against this intolerable evil? A long

and expensive inquest has been held on the matter by the Queen's Commissioners, duly appointed, and a ponderous mass of evidence has been collected. The result is, that either the ordinary or the exceptional system of railway affords all the safety, comfort, regularity, and speed which the public can possibly desire; that they both have ample power and capacity to satisfy all the wants of commerce which either exist or can be reasonably anticipated. The partisans of each system contend for relative superiorities in various respects; but the differences claimed, are so minute as to be discoverable only by those pledged to the success of the one system or the other; and are such as cannot, in the remotest degree, interest the public.

The magnitude of the nuisance, then, being admitted on all hands, and the utter impracticability of all expedients suggested for its abatement, nothing remains but to remove it; either by replacing the general gauge of the country by the exceptional gauge, (which would render necessary the enlargement of all bridges, viaducts, tunnels, embankments, and cuttings, and a reconstruction of the stations and depots,) or to bring the rails on the 240 miles of exceptional lines closer together, and modify the carriages and engines accordingly. The former measure is of course out of the question, but the latter could be accomplished, without interruption to the traffic, at a cost of something less than a million sterling.*

It is contended, however, that the exceptional lines having been constructed under the sanction of an act of Parliament,

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* The question of the relative merits of the two gauges, involving many complicated points of practical engineering, is one upon which all that part of the world beyond the immediate profession of civil engineers, can only judge by the weight of authority on the one side and the other among the members of the profession itself. Perhaps there never was a question on which so little real practical difference of opinion prevailed. Nearly the entire profession of England are in favour of the ordinary gauge. A few, *were it all to do again*, would have adopted a somewhat wider, but not the exceptional gauge. But none would now think of disturbing the uniformity which all agree to be of paramount necessity. The engineering profession of France, Belgium, the Germanic States, and other countries of Europe, and that of America, have adopted the ordinary gauge, (56½ inches,) although *they* were free to have selected a wider one. Thus, so far as regards engineering authority, we have in one scale the entire engineering profession in every country in the world; and in the other, the solitary individual authority of Mr Brunel.

the shareholders could not with justice be required to subject themselves to such an expense for the common good; that still less could the shareholders of other lines be so required. We are not disposed, nor will our limits allow us, to discuss this question of vested rights. But it appears to us very evident, that the British public cannot, and ought not to suffer itself to be made the victims of this nuisance; and that if the expense of its abatement can be obtained, consistently with justice, from no other quarter, it must come from the public treasury.

When the earlier railway bills passed the legislature, the privileges and rights contemplated, as well by the companies as by Parliament, were merely those necessary to enable them to construct and maintain a road, which was to be open to all who might desire to use it, on the payment of a certain toll to the company. In fact, at that time, a railway presented no condition or features to distinguish it essentially from any other highway. But simultaneously with the construction of these roads, the invention and improvement of the machinery for transport on them, made advances. The locomotive engine broke its shell and emerged in its incipient form. Its growth was rapid and precocious. The vehicles which it drew, and in which the business of transport was executed, were novel. In a word, a system of carrying mechanism, of an entirely new structure, was produced. This mechanism was made for the railway, and the railway was made for it. The system had unity and connexion. It was impossible to separate it; and the carrying business could only be conducted by those who had the direction and management of the railway. The companies, therefore, found themselves—by a necessity arising from the very nature of things, and whether they liked it or not—carriers as well as road-owners. Not only was this the case, but they were necessarily the *only* carriers. It was impossible even to imagine the public bringing their private engines and private carriages on the road. A colossal monopoly, never contemplated by Parliament, nor even foreseen by the companies themselves, had come into being.

The moment that it became apparent, in the practical results of the operation of railways in England, that these lines of communication must displace, in a great degree, if not altogether, the public highways, as well for the conveyance of passengers as for the transport of merchandise, it was perceived, in other countries, that the right of the state over all high-roads, must be equally asserted over the new ways of intercommunication which were about to be substituted for them. But a further and more stringent power was every where claimed, as the

consequence of the inevitable establishment of the monopoly of transport on these roads. The state must either assume that monopoly itself, as it does universally in regard to the conveyance of the Correspondence of the public; or if it were conferred on private bodies, it must be under rigorously prescribed conditions and for limited periods. Such were the broad general principles assumed, admitted, and acted upon, in every country of the world—*Great Britain alone excepted.*

In some cases, it was the policy of the state to reserve to itself not only the construction but the maintenance and working of the principal railways. An obvious advantage attended this. If it seemed expedient to the legislature, the transport of goods and persons might be used as a source of revenue; as the conveyance of correspondence generally has. Or, if the state were guided by a different policy, and considered facility of intercommunication an advantage paramount to revenue, it could fix the tariff so that the net produce would merely pay the expense of the transport. Thus, as England sacrificed a proportion of her revenue for the public advantage of a *penny postage*, other countries might consider it good to establish a system of *penny travelling*. The indirect advantages to the exchequer might more than balance the revenue lost.

Belgium acted on this principle with complete success. All the principal railways of that country are in the hands of the state; and the tariff is so regulated as to produce about four per cent interest, on the capital invested in the construction of the lines.

In cases where the state decides against working the railways, it sometimes, wholly or partially, constructs them; and then lets them for a term of years, to a company who pays a premium for the lease, and completes the lines at its own charge, if they are unfinished. In these leases, there are various clauses restricting the powers of the company,—reserving a right of revision to the state, fixing the major limit of the fares, the conditions on which the state can cancel the lease, and the terms on which the line is to be surrendered by the company at its termination.

In Austria, the railways were, in the first instance, conceded to companies on leases for fifty years. But, subsequently, the government recovered by purchase the roads, and now for the most part the railways are under the control and management of the state.

In Prussia, the construction and management of railways are conceded to companies, subject to the control of the state. The tariff is subject to revision by the government, and the profits

are not in any case to be allowed to exceed ten per cent. The companies submit their accounts annually to the Minister; and when, by a sinking fund established on prescribed conditions, the capital has been replaced, the tariff is to be so modified that the profit shall not exceed the expenses of working the lines.

In Bavaria, the lines are leased to companies for a term of years, the tariff being revised by the state annually, for the first three years after the opening of each line, and subsequently every third year. Privileges are in some cases conceded to companies—such as exemption from, or reduction of, the import duties for materials, and gratuitous occupation of the state lands. In some cases the state levels the ground at its own charge; in others, it executes the earth-works. In fine, the establishment of railways is generally a matter of bargain between the state and the company. The latter receives a lease for a term of years, for which it pays a certain premium. This premium is expended in the total or partial construction of the road. It submits to certain clauses authorising the interference of the state with its tariff; and at the expiration of the lease, receives a fair value for its stock of moving power and machinery for transport.

In France, the system of railways, with a few exceptions, has been planned, and in many cases constructed, by the government, through the intervention of the department *des ponts et chaussées*. Ultimately the line is offered to competition by the Minister of public works, who names the major limits of the duration of the lease, and rate of the tariff. The company or individual who, complying with the other conditions, offers in sealed proposals to accept the shortest lease, obtains the grant.

Before the successful establishment of some of the earlier passenger lines, the French government found it necessary to extend some further inducements to attract capital to these enterprises. Thus, in the cases of the lines from Paris to St Germain, Versailles, Rouen, and Orleans, leases of ninety-nine years were granted. Since, however, the results of these first lines have become known, and capital has been elsewhere more generally attracted to railway enterprises, the state has effected much more advantageous bargains. The great northern line to Brussels has been taken on a lease of thirty-eight years; the Orleans and Bordeaux on a lease of twenty-eight years; the line from Tours to Nantes on a lease for thirty-four years. Of the entire system of French lines, there are not more than one hundred and twenty miles granted in perpetuity; and these are chiefly coal and mineral railways,—established long before lines for passengers and general traffic were contemplated.

In the United States, the state governments have generally

reserved, in one form or another, a right of control over railways. In some cases, they are themselves the chief shareholders; in some, they have lent to the companies capital at a low rate of interest; in some they have given the guarantee of the state for the capital raised. In all such cases, the right of control is admitted. In some cases, the dividends are limited to ten per cent, the legal interest of money being six or seven per cent. In some cases there is reserved a right of revision of the fares every four years. In some of the principal states—New York, Pennsylvania, and Virginia, for example—the charters of the companies contain a clause investing the legislature with an absolute right at any time of modifying them. Subject to such conditions, the railway charters in some states are not limited in duration; but in the principal states the duration varies from fifty to one hundred years.

By the system so wisely pursued in France, and most other countries, the advantages arising from private enterprise are combined with sufficient security for the public, against the abuse of the powers intrusted to railway companies. Not only is a general power of supervision and control reserved; but the tenure of the companies being limited in duration, the entire internal communications of the country must revert to the state after a certain period. Thus, at the expiration of forty years, all the chief railways of France will be in the hands of the government; and in about ninety years, private companies will cease to exist,—unless such as the government may think fit to re-constitute.

It thus appears, that England is the only country in the world whose legislature has committed the singular imprudence, of surrendering, without available conditions, and for an indefinite time, its public communications into private hands. That such monopolies can continue to exercise the powers granted to them, without the abuses to which all monopolies have been obnoxious, is not to be conceived. There are already tendencies manifested to struggle for the private objects of these bodies, against the fair claims and interests of the public. The railway companies, as they first acquired their rights of incorporation, were numerous. Each line was a separate property, and ruled by a separate Board of Directors. Although it appears that no such thing as a competing line is practicable, yet in this multitude of lines, there might be expected something approaching to competition; many small monopolies, it might be hoped, would check each other. The practice of amalgamation and combination which has begun already to prevail so extensively, must, however, dispel these hopes. The lesser companies are several y gravitating towards, and coalescing with the greater bodies; and instead of a great

number of small monopolies, in which the system commenced, it is now tending towards a small number of great monopolies, in which it must ultimately terminate.

The indisputable existence of these monopolies, and the liability of the abuse of their powers to the prejudice of the public, necessarily seems to infer the assumption of a corresponding control on the part of the legislature; for to suppose the indefinite continuance of an arbitrary power over the personal and commercial communications of the country, exempt alike from the operation of competition and legislative control, is an absurdity too palpable to be, by any one, seriously asserted.

It may, however, be contended that no case for interference has yet arisen, and that, when it occurs, it will be time enough to provide for it. But is it not certain, that measures have been already taken to neutralise the competition of the canals in the transport of merchandise? It was proved before Mr Morrison's committee, that some of the companies have already succeeded in getting possession of portions of canals, on which they have raised the tolls to their parliamentary limit; thereby paralysing the business of the entire line, and driving the traffic to the railway, on its own terms. It is proved also, that in order to evade the provisions, few and ineffectual as they are, which the Legislature has made to check the evils of their monopoly, the larger and more powerful companies have created fictitious shares in enormous numbers, so as to make their capital appear larger, and their profits consequently smaller, and thus to exclude parliamentary interference, in the only case in which it was contemplated.

It may be said, that as Parliament has established limits to the tariff of railway traffic, so long as the companies keep within these, they should be subject to no interference. To this, however, it may be answered, that when these limits were fixed, the legislature had no sufficient data by which an equitable amount could be established. Can it for a moment be maintained, that if, by any new inventions, railways could be constructed by the expenditure of half the capital sunk on those now open, and worked at half the present current expense, the public would not have right to demand a proportionate reduction in the carrying tariff?

'If a new line could in any case be constructed for half the expense of an existing line, or, supposing the expense to be the same, if it were constructed by parties who would be satisfied with a dividend of five instead of ten per cent, parliament is bound to sanction the new line, unless the company make a corresponding reduction in the fares on the present line. One or other of these results must take place: for if the

principle be true, that capital will force its way into those employments which yield more than the ordinary rate of profit, it will be impossible to maintain the monopoly and the high charges of the old companies.' *

The fares on British Railways are higher than on any other European lines. The first-class fares are sixty-three per cent higher than those on the French and German railways, seventy-five per cent higher than the Belgian, one hundred per cent higher than the Italian, and one hundred and sixty per cent higher than on the Danish lines. The second-class fares are fifty per cent higher than those of France and Germany, and one hundred and twenty per cent higher than those of Belgium and Denmark. They are one hundred per cent higher than those of Italy. The third-class fares are sixty-six per cent higher than in Belgium, one hundred per cent higher than in Denmark and Italy, thirty-three per cent higher than in Germany, and fourteen per cent higher than in France. In no other country are the working-classes conveyed in a manner so discreditable to humanity, and to the true interests of the carriers themselves. In short, it is evident that the abuses which have at all times and every where attended monopolies, have already manifested themselves in our Railway management, and are certain to augment, to the great prejudice of the public.

It would be folly to close our eyes upon the fact, that the British public has committed a serious error, in permitting the Legislature to proceed from session to session, in the course of legislation which has prevailed in regard to railways. With an enlightened public, a vigilant and free press, an unrestricted right of discussion and petition, and the habit of the legislature to wait for the expression of public sentiment on such matters, it would be unjust to throw upon Parliament, or the administrations of the day, the exclusive blame of the mistake that has been committed. The public itself must bear the principal share of that blame. What is the actual state of the case? A new method of intercommunication was discovered, infinitely exceeding all former methods in cheapness, expedition, certainty, and regularity. Surely this rare opportunity ought to have been seized, to procure the establishment by law of a suitable administrative body, under which a prudent system of inland communication might be constructed. But what, in fact, has been done? In this, the most active country in the world, with a press absolutely free, with unparalleled facilities for the diffusion of knowledge, and the most perfect of all representative governments, we have passively surrendered the entire system of national

* *Morrison*, p. 12.

highways, without a single practicable reservation or exception, into the hands of a number of private individuals, to deal with us and our posterity, so far as respects our intercourse with each other, as may seem best to them and their heirs, now and for ever. England has ceased to possess highways. The country is intersected only by roads, which no one can use except by the permission and on the conditions prescribed by their owners!

Although it be not till the eleventh hour, still, the attention of Parliament has been called to this most important subject; and measures are in progress which, it may be hoped, will correct these evils, as far as retrospective legislation can correct them. The right of Parliament to establish a system of reasonable control over the inland communications of the country, cannot, as we conceive, be denied. All practicable competition having ceased to be possible, administrative control must supply its place. A Board of Railway Control must be established. But, to be really useful, it must be invested with powers much more extensive than those possessed by the late railway department of the Board of Trade. The great object of the government should be, to bring the power of such a body to bear on the existing railway companies, in such a manner as to protect the public from the abuses incidental to them, without violating in spirit that contract, whatever it may be, which they may have made with the State. The benefit of such a system of control, rightly administered, will not be confined to the public as opposed to the monopoly of the companies. It will extend to the companies themselves,—some of which have already discovered that the maximum of profits is not necessarily attained by the maximum of fares; and that it is possible to consult the interests of the Public, by moderating *their tariffs*, without endangering their prospective dividends.

NOTE to the First Article.

This Article was wholly written and printed early in August last, which is here mentioned to account for its taking no notice of the subsequent proceedings of Parliament respecting its subject.

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