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ART. XVII.—*On the Cost and Construction of the Railways in India.* BY J. C. MARSHMAN, ESQ.

[Presented by the Committee of Agriculture and Commerce, and read
20th April, 1863.]

It is now an admitted truth, which is passing into the stage of a truism, that the most effectual means of “developing the resources of India, augmenting its value as a national possession, and promoting the prosperity of its inhabitants, are to be found in the general establishment of internal communications, and more especially in the construction of railroads. It will therefore be interesting to the members of this Committee to pass in brief review the exertions which have been made in the last ten years to establish a system of railways in India, together with the measures now under discussion to give full efficiency to it.

It is fifteen years since the Court of Directors¹ determined to sanction two railroads in the Bengal and Bombay Presidencies by way of experiment. Sir Macdonald Stephenson took a prominent part in the establishment of the railway system of India; and the merit of having brought it into actual existence at the Bengal Presidency, is to be ascribed to his exertions. It was under his guidance that the East India Railway Company was constituted in 1845 by a deed of settlement; but the plan was interrupted by the mercantile crisis in England shortly after, and it was not till March, 1849, that the enterprize received the sanction of the Court of Directors. At the same period, the Court also gave its sanction to the first line at Bombay—which had been projected by Mr. Chapman, and supported by some of the most enlightened officers at that Presidency—and three years after to one at Madras. But these three lines were merely experimental; that at Calcutta was to extend only to the collieries at Ranee-gunge, a distance of one hundred and twenty miles; that at Bombay, thirty-four miles to Callian, and that at Madras, to a distance of fifty miles towards the western coast.

But the necessity of extending these facilities of communication throughout India became daily more apparent to the public authorities in India. Fortunately for the interests of that country the Government was at the time in the hands of Lord Dalhousie, the ablest Indian statesman since the days of Warren Hastings,

¹ In the year 1848.

and a man of the largest and most comprehensive views. He had been President of the Board of Trade during the great railway mania in England, and the original regulation of that great national movement devolved on him. He had thus an opportunity of becoming thoroughly master of the whole question of railroads in all its bearings, and, what was of particular value to India, was fully aware of the errors which had been committed at the time in England, which he was powerless to avert, and which are computed to have entailed a loss on railway undertakings little short of one hundred millions sterling. He was now in a position to give the system of Indian railways the benefit of his experience, and to place it upon a sound basis.

While the Government in Leadenhall-street was pausing upon the threshold of this great enterprise, Lord Dalhousie drew up his celebrated Minute, in 1853, in which he sketched a general system of trunk railways for all India, urging the Court of Directors to abandon the timid plan of experiments, and adopt the bolder policy of giving the various provinces and the Presidencies the most ample benefit of this means of communication. This despatch arrived in England at a most happy period. The question of renewing the privileges of the East India Company was then under discussion in Parliament, and the neglect of internal communications, which was the disgrace of our Government, was urged by the enemies of the India House, as one of the strongest arguments for refusing to prolong those privileges. It was in these circumstances that the plan of Lord Dalhousie for the construction of railroads, at a cost of twelve millions sterling, under the guarantee of the State, arrived in England, and was at once adopted. The system of Indian railroads may be considered to have substantially commenced from that time.

The principle on which the system is based may be thus stated:—

The Government of India gives the land to the companies for a period of ninety-nine years, and thus the demands of landholders, which have been found in some cases so exorbitant in England, as also the heavy legal expenses connected with them, are avoided.

The Government guarantees for the same period interest at the rate of 5 per cent. on the capital subscribed and expended with its sanction.

After a period of twenty-five or fifty years from the signing of the contract, Government has the right of purchasing the railway at the mean market value in London of the shares during the three preceding years.

The shareholders have likewise the power of surrendering the works into the hands of Government, after giving six months' notice, and Government would, in that case, be bound to repay the entire sum expended with their sanction on the undertaking.

The Government in India and in England exercises an absolute control over all the operations of each company, prescribing the mode of management, and regulating the tariff for goods and passengers.

When the line or any portion of it is brought into operation, one-half the surplus profits beyond 5 per cent. is to be devoted to the repayment of the interest which Government has advanced during the construction of the line, together with simple interest at the rate of 5 per cent.; the other moiety of the profits will go to the shareholders. But when the Government advances, with interest, have been completely liquidated, the whole of the surplus profits will go to the shareholders. The Government is pretty generally understood to be restricted from the reduction of fares till the interest paid to the shareholders shall amount to 10 per cent.; though this appears to be a moot point.

The system of Indian railways was gradually expanded under the influence of Lord Dalhousie's Minute. Not only were the operations of the existing Calcutta, Madras, and Bombay railways extended from about 200 miles to 3,200, but, in the course of the next four years, five other trunk lines received the sanction of the India House. The lines to which the guarantee has been granted now extend over 4,679 miles, the longest of them being 1,369, and the shortest 29, miles in extent. The following is a list of the various companies, with their local objects, and the spheres of operation connected with each.

1. *The East India Railway*, which has nearly completed a line from Calcutta to Delhi, with a branch to the collieries at Raneegunge, and another to meet the Bombay line at Jubbulpore. The whole length will be 1,369 miles.

2. *The Great India Peninsular line*, with its sea terminus at Bombay. The object of this line is to connect the western capital and emporium, in one direction, with Madras, and in the other with Delhi and Calcutta, by a junction with the East India Railway to Jubbulpore. In order to develop the resources of the great cotton field of Berar, a line runs also from Bombay to Nagpore. The total length of the lines confided to this company is 1,266 miles.

3. *The Madras line*, which commences at that Presidency, and

proceeds in a western direction to a place called Arconum, where it bifurcates; one line taking a south-westerly direction to Beypore, on the Malabar coast, and the other a north-west direction to Bellary, to join the Bombay line, and thus complete the triangulation of India. Two branches strike off from the south-western line; the one to the Nilgherrees, 30 miles; the other to Bangalore, 80 miles. The entire length of line under the management of this company is 850 miles.

4. The *Bombay, Baroda, and Central India Railway*, which commences at Bombay, and runs in a northern direction for a distance of 310 miles to Ahmedabad, the object being to bring the extensive cotton districts of Surat into direct communication with the port of Bombay.

5. The *Sinde and the Punjab Railways* are under one and the same direction. The object of the Sinde Railway is to connect the port of Kurrachee with Kotree, near Hyderabad, on the Indus, the distance being 114 miles. At that point the company has a flotilla for the conveyance of traffic up the Indus to Moulton. They then construct a railway from Moulton to Lahore and Umritsir, a distance of 252 miles, and from thence down to Delhi, 300 miles. The entire length of the lines under the management of this Company is 666 miles.

6. The *Eastern of Bengal Railway* is intended to afford rapid and regular communication between Calcutta and the districts lying to the north and east of it. A line has already been opened to Koostee, on the Ganges, which will bring the produce of the districts above that place to the port of Calcutta, without encountering the delays and difficulties of the navigation through the Soonderbunds. The length is 110 miles.

7. The *Great Southern of India Rail* is constructed to give the provinces south of Madras the benefit of railway communication. The first portion of the line, which has been completed, runs from Negapatam, on the Coromandel coast, to Trichinopoly, a distance of 79 miles.

8. The *Calcutta and South-Eastern Rail* is of the length of 29 miles, and is designed to establish a communication between Calcutta and an auxiliary port on the Mutlah, in order to relieve the difficulties now experienced from the crowded state of the Hooghly, and the increasing embarrassments of the navigation of this stream.

The extent of the lines of railway for which the Government guarantee has been granted, and the sums which, according to the

present estimates, will be required for their construction, stand thus:—

	Miles.	Capital.
		£
1. East India Rail	1,369	24,750,000
2. Great India Peninsular.. .. .	1,266	12,000,000
3. The Madras Rail	850	8,500,000
4. The Bombay and Baroda	310	4,500,000
5. The Sindh and Punjab	666	7,700,000
6. The Eastern of Bengal	110	1,500,000
7. The Great Southern of India	79	660,000
8. The Calcutta and South-Eastern	29	500,000
	4,679	£60,110,000

But there is a principle of expansion in the expenditure which seems to baffle control, and there can be little doubt that the cost of the 4,679 miles which have received the sanction of the Government of India, will eventually exceed sixty millions sterling. This will be at the rate of £12,894 per mile. That sum, however, will include the cost of constructing some of the largest railway bridges over the Soane, the Jumna, and the Ganges; as well as the cost of crossing, on two separate lines, the stupendous Western Ghats, by ascending to an elevation of 2,000 feet. These latter works are considered the greatest engineering triumphs in the world, except the passage of the Summering, in Austria.

The guarantee of interest on the part of Government involves a charge on the Indian exchequer of about three millions a-year. But this sum is gradually lessened as different sections of the line are opened to traffic. There is no doubt that it will cease altogether when they are completed, and that Lord Dalhousie's prediction will be fully verified, that "the Government will never be called upon, after a line shall have been in full operation, to pay the interest guaranteed upon the capital." The sums which Government has advanced for interest during the construction of the lines—which bear interest at 5 per cent. until fully liquidated—will, at no distant period, be also refunded from their profits.

It will thus be eventually found that these grand undertakings, which will give such an impulse to improvement in India as was never dreamt of twenty years ago, will have been brought into full operation without having subjected the Government to the loss of a farthing. At the same time, the State will reap the highest benefit from them by their increasing to an indefinite extent the

security of our dominion, and reducing the military charge of defending it. It is thus that India will derive from its subjugation to England the advantage of drawing on an inexhaustible capital for those local improvements which its own resources could not have furnished. England will be repaid by a safe and remunerative investment for its capital, and by the increase of its traffic to India. Even without the facilities of the rail, the commerce of India in exports and imports had increased from twenty-five millions in 1848, to fifty-nine millions in 1858.

With regard to the completion of the most important of these lines, it may be observed that the East India Railway opened its line to Benares on the 22nd of December last, and that the line from Calcutta to the immediate vicinity of Delhi, a distance of 1,100 miles, through the entire length of the valley of the Ganges, will be opened by the middle of the present year. The Bombay lines will be completed before the end of 1865, when the vast cotton fields of Berar will be placed in direct communication with the port of Bombay. The Bombay and Baroda line is rapidly approaching its completion, when it is expected that the cotton from Surat and the neighbouring districts will reach Bombay in a purer state, and with greater expedition and economy. The line between Allahabad and Jubbulpore will be finished in less than four years; the great idea of Lord Dalhousie will then be realized, and troops from England may be landed at Bombay and sent to the North West Provinces in a little over 30 days. If these facilities of locomotion had existed at the time of the mutiny, it might have been crushed out before the end of the year in which it arose.

The fares for third-class passengers on these lines have been fixed at a much easier rate than prevails in England, because the great aim of the undertaking is to place the facilities of communication within the reach of all but paupers. Thus, while the charge for the first class on the East India Railway is $2\frac{1}{4}d.$ per mile, that for the third class is only $\frac{3}{8}$ of a penny, or less than two farthings a-mile. To understand the bearing of this low tariff on the cost of travelling, we must compare it with that of an English line. Take for example the Great Western; the distance from London to Bristol is about the same distance as from Calcutta to Raneegunge, that is 120 miles more or less.

The difference stands thus:—

	First Class.	Second Class.	Third Class.
Great Western	s. 20·10	15·8	9·10
East Indian	s. 22·6	11·4	3·10

Or, take the Brighton *excursion* trains, the cheapest in the world, a miracle of cheapness; the fare for a journey there and back, a distance of about 100 miles, is 30 pence. But the ordinary third-class fare on the Indian line is cheaper than this; and on the Bombay lines of the Great India Peninsular there is a fourth class still cheaper.

The result of the system has been most singular. When railways were first proposed for India, it was considered certain that they must depend for remuneration almost exclusively on the conveyance of goods, as the immutable habits of the natives would, it was affirmed, be an insuperable bar to the use of a means of conveyance so novel. But this idea has proved fallacious; the immutability was imaginary. Travelling by rail became at once a passion with the lower classes, and the number of third-class passengers conveyed on the East Indian line, though it is scarcely half open, is at the rate of two millions and a half a-year. But the rail has done more, it has broken the strength of caste, and a Brahmin of the purest descent, who would have considered it the greatest act of pollution to come in contact with a man of low caste, may be seen sitting side by side with him in a third-class railway carriage, in order to save his money.

The proportion of each class of passengers stands thus:—

1st class	..	..	..	..	..	1·2
2nd „	..	..	..	..	..	6·2
3rd „	..	..	..	..	..	92·6

Nine-tenths of the passengers, therefore, are of the third class, and it is their custom which furnishes the sinews of revenue.

The charge for the conveyance of goods has been fixed at a very moderate rate; for such articles as bricks, firewood, lime, ores, salt, and unwrought timber, it is a penny and half-a-farthing a-mile. Traffic, however, requires time to get out of the old grooves; and, except in the article of coal, the conveyance of goods has not yet kept pace with the transit of passengers. But, as the superior convenience and economy of using the rail becomes more apparent, there can be no doubt that the waggons of the rail will be crowded with goods, as much as the carriages now are with passengers.

The gauge adopted throughout the Indian lines at all the Presidencies, is the medium of 5 feet 6 inches, which was considered best calculated to combine the advantages of economy and speed.

The expense of these railways has been furnished almost exclusively by English capital. The total number of proprietors of

all the eight lines is 26,160 ; of whom only 833 are native shareholders in India, or about 3 per cent. Of the sum expended in the construction of the lines, more than one half has been laid out in this country, in the purchase and transmission of iron rails, sleepers, girders for bridges, locomotives, and other stock ; and the smaller moiety in India.

It is gratifying to observe that, while the law and Parliamentary expenses of the eight chief English railways have amounted to £3,700,000, the entire cost under these heads of the eight Indian railways, has been £21,700, not even one half per cent. of the English outlay.

The railways in India have been constructed on the principle of their being great trunk lines, intended as the main arteries of communication throughout the country ; they have therefore been constructed of so solid and permanent a character as to ensure an uninterrupted traffic throughout the year, and to afford the means of high speed locomotion. But for the full development of the commerce of the country, it is necessary that they should be supplemented by light branch railways, to connect the opulent districts and towns lying on either side of the main line with it. There are few metalled roads in India, and the consequence is, that during the rainy season, all communication is interrupted, while even in the dry months it is slow, tedious, and expensive.

Branch lines have come into disrepute in England, because they have been found to impair the resources of the main lines, instead of augmenting them ; in fact, to act as *suckers*, and not as *feeders*. But the case is different in India. Without the supplies furnished by such branch lines, the trunk lines must be to a great extent starved, and unable to afford that remuneration which, with adequate nutriment, they are certain to afford. In these branch lines, there is no necessity for aiming at a higher rate of speed than ten miles an hour. The conveyances need not be expensive, and the rails may be lighter, though it appears important that they should preserve the established and universal gauge of 5 feet 6 inches. And these railways it will be found in every respect more economical and efficient to work by locomotive than by animal power.

Proposals have been submitted to the Government in India and in England by associations, distinct from the railway companies, who are willing to undertake the construction of light railways without a guarantee, but with such other assistance as may be found desirable. The cost of a single line, exclusive of the

construction of bridges, has been computed at from £4,000 to £6,000 per mile.

Of these companies, one, which is rather inappropriately called the Indian Tramway Company, inasmuch as it proposes to work the trains by steam, has drawn up a railway map of India, and marked down the various branches on each side, which appear to require the aid of feeders. The Company has already raised capital for the completion of one short line, at the Bombay Presidency, by way of experiment; and one of the Directors has been deputed to India to make the necessary arrangements with the local authorities.

Another association, called the Branch Light Railway Company, has been for some time in communication with the Government in India on the same subject. The Government was anxious to connect the city of Moorshedabad with the East India Rail at Nulhatty, a place twenty-seven miles distant, and had already thrown up the embankment and thoroughly metalled the road. At the request of this Company the road was transferred to it, and it will soon be furnished with permanent way and rolling stock. The same Company has gone up to the Government of India, and obtained a concession, which now awaits the sanction of the Secretary of State for India, embracing the entire provinces of Rohilkund, Oude, and Benares, with a population of ten or twelve millions; and the extent of rail contemplated in the arrangements will fall little short of six hundred miles. The importance of such light railways to bring the contributions of traffic and passengers from the interior to the main lines, and to distribute the traffic conveyed by them, cannot be exaggerated; and there can be no doubt of its eventually receiving such consideration at the India House as will result in attracting ten millions more of English capital to the system of locomotive communication in India.
