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this direction is only possible if undertaken on the scale suitable for a railway, and a railway is now in course of slow construction between these two points. But the rivers that are crossed, and which are too large to admit of being bridged for a road, serve as most useful feeders for a canal between the two places, while the features of the country are in all other respects most favourable for the construction of that class of works. And a canal also connecting the two places has long been in course of being gradually carried out.

Canal  
navigation  
in North-  
ern India.

The extensive irrigation canals of Northern India, running as they do through a highly populated country, are very favourably situated for the development of an extensive navigation, but the use made of them for this purpose has proved to be quite insignificant. The rapid current of these artificial rivers renders haulage against the stream expensive and slow, while in the desire to keep down the first cost of the undertaking the works connected with the navigation were constructed on an insufficient scale. The locks are too small to admit steamers of any power, and the bridges are not high enough to admit the passage of large or heavily laden boats. These defects of construction are being gradually remedied, but it seems improbable that the traffic will ever be much more than a traffic one way, mainly of timber floated down the stream.

Road-  
making  
trans-  
ferred to  
provincial  
govern-  
ments.

The construction of roads to keep pace with the extension of railways, involving not only the first cost, but an annually increasing charge for maintenance, must always continue to form an important obligation on the State and a great and increasing liability on the finances of India. The business has long been too large and scattered for the central authorities to deal with properly, and the finance and administration of it has been entirely localised, and made over to the different provincial governments, with whom it now rests to find the necessary ways and means for the prosecution of the work.

## CHAPTER XVIII

## IRRIGATION WORKS.

THE liability of India to drought and its attendant famine; the remarkable benefits resulting from irrigation in all seasons, good as well as bad; and the magnitude of the undertakings carried out by the Indian Government in this connection, make the subject of Indian Irrigation one of special interest and importance.

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Importance of  
Indian  
irrigation  
works.

Various modes of irrigating the soil artificially are practised in India. Leaving out the use of wells, in which case the earth itself acts as the reservoir, the most simple, as well as one of the most effective kinds of irrigation is derived from tanks. The ordinary Indian irrigating tank is formed by intercepting the drainage of the country by an embankment. If a gorge between two hills be selected for the place of construction, a single embankment across the lower part of the valley is sufficient for the purpose; but where, as is most commonly the case, the scene of operations is a gently sloping plain, the embankment must be constructed on three sides. In these tanks the depth of water is of course greatest against the lower embankment, and gradually becomes shallower toward the opposite end, till the bed rises above the level of the water. Sluices are constructed at the lower end of the tank, in the embankment, whence the water is led off and distributed among the fields below it.

Different  
systems of  
irrigation.

Tanks.

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For the construction of these tanks, a moderate and equable slope of the country is required. If the fall of the land be great, an excessive height of embankment becomes necessary; if it be slight, the shallowness of the tank, and consequently the extent of surface in proportion to its contents, causes great waste from evaporation, while the area of land occupied by the tank is disproportionately large.

The configuration of the coast of the Carnatic, or eastern portion of the Madras Presidency, is peculiarly favourable for tank irrigation, and the whole of this part of the peninsula is studded with these reservoirs, some of them enormous works many miles in circumference. These were almost all constructed before the occupation of the country by the English, whose connection with them has been limited to their maintenance and in some cases restoration. Tank irrigation is also largely practised in Bombay and Central India, as well as in Behar. But this last country has too small a surface inclination to admit of the full development of the system, and the water from the tanks has there to be lifted into the irrigating channel, usually by manual labour.

Irrigation  
from  
rivers.  
Madras  
system.

The other system of irrigation practised is by the diversion of river-waters. This is differently carried out in Upper and Southern India. What is generally known as the Madras system of irrigation, consists in the construction of a dam across the bed of a river to raise the level of the water, which is then diverted into side channels, and thence distributed over the surface of the country. The irrigation system of Northern India is also based on the damming-up of the rivers, but the conditions of the two cases are very different. In Madras the most fertile lands are those adjacent to the coast, which form the deltas of the different rivers, and the use of the water commences in the immediate vicinity of the dam. The fall of the country is here

extremely small, the regime of the river channel has been thoroughly established, and the management of the water is easily under control. Moreover, the difference of level between the river and the country through which it flows is so slight that a very moderate height of dam suffices to lift the water into the irrigating channels. Similar physical conditions would be met with in the delta of the Ganges, and on a much larger scale; but this part of the country is comparatively independent of artificial irrigation, by reason of its abundant rainfall; it is in the upper course of the Ganges and its feeders that the use of their waters is wanted, where they flow through the comparatively dry country of the North West Provinces. And here too the agricultural conditions are very dissimilar from those in Southern India. On the Coromandel coast only one crop is raised in a year, and this is irrigated in the rainy season; so that the system of irrigation deals mainly with the rivers when they are in flood, and comparatively simple works effect the desired object. In Upper India, on the other hand, there are two harvests in the year, and the corn, cotton, and other crops which most require irrigation are grown during the cold season, when the rivers are at their lowest. The Ganges, after it issues from the Himalaya, runs in a valley which it has excavated for itself in the course of ages—five or six miles wide, and from eighty to one hundred feet below the level of the great plain which forms this part of India. The general slope of the country from the Himalaya to the sea is from a foot to eighteen inches in the mile; this, which would be an excessive slope in a great river, is counteracted by the tortuous course of the Ganges, which meanders from one side to the other of the valley within which it runs. To dam up the river at any part of this course, would therefore involve the construction of a weir across the whole width of this valley, as well as very extensive

Canal  
system of  
Northern  
India.



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cuttings to convey the water into the adjacent country ; and the level at which the water would strike the surface of the country could only be reached at a considerable distance lower down the course of the river than the site of the weir, so that the country adjacent to the upper part of the river's course would be unprovided with irrigation. These considerations led to a different plan of operations being undertaken. The waters of the Ganges are intercepted at the point where the river issues from the Lower Himalaya in a firm well-defined channel, whence they are carried to the centre or watershed line of the Doab,<sup>1</sup> down which the canal is conducted nearly to the point of junction of the Ganges and Jumna. The watershed line once reached, the canals in that situation afford highly favourable conditions for effective irrigation. Distributive channels are constructed on each side at intervals of a few miles, whence the water is led to the surface of the country, and from these again smaller channels convey it for distribution over the fields. The excess in the slope of the country, beyond what is required for a moderately swift current—and for this a few inches per mile suffices—has to be overcome by numerous weirs, over which the waters of the canal are discharged. Although the work is spoken of as one canal, it consists in fact of a network of branches, which convey the water, right and left, over the surface of the Doab, the whole system, with its main lines, branch lines and distributory channels, resembling the reticulations at the back of a mulberry leaf. Unlike a river, the canal becomes smaller instead of larger in its course ;<sup>2</sup> and

<sup>1</sup> *Do*, two ; *áb*, water—a country lying between two rivers. The great plain between the Ganges and Jumna, which forms the greater part of the North West provinces, is known *par excellence* as *The Doab*.

<sup>2</sup> This is, however, not true of all Indian rivers. The Cuggur and Sarsatti, which rise in the Lower Himalaya between the Ganges and Jumna, and at certain seasons are considerable streams, both disappear before the Indian desert is reached, partly taken up in irrigation, and partly absorbed by the sandy soil through which they run.

only sufficient water for the purpose of navigation is retained in the main channel, which finally, an attenuated stream, rejoins its parent river at Cawnpur. Unlike a river, also, the canal flows along the highest instead of the lowest line of the country

The foregoing account is generally applicable to the principles of construction adopted for all the canals of Northern India—those taken off from the Ganges and the left bank of the Jumna in the North West Provinces; from the right bank of the Jumna, the Sutlej, the Ravi, and the Chenab in Punjab. The problem in each case is to divert the course of the river from the valley of its natural line to the crest of high land running parallel with it, and to make the force of gravitation take the place of mechanical agents for distribution of the water. Such a mode of irrigation is clearly only adapted for a flat country, where the high crest spoken of is in fact a very gentle undulation, only perceptible to the test of the surveyor's level.

Irrigation works on the large scale (other than the large tanks scattered over the country), and which involve the application of hydraulic engineering in the proper sense, are confined and have attained the greatest development in the three provinces above mentioned (Madras, North West Provinces, and Punjab), as well as in Bengal, where some large canals have been constructed within the last twenty-five years, and in Bombay. Of these it may be said that the works in Madras are of the most critical importance, in the sense that they are absolutely necessary for securing a harvest in all years. This is explained by the physical character of the country. The rainfall of India, generally, takes place during the prevalence of the south-west monsoon, a local trade-wind, which blows with great force from May till September, and is occasioned by the sun's progress to the north in summer, combined with the rotatory motion of the earth. But the supply of

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moisture deposited upon the peninsula generally by this wind, is intercepted from the Coromandel coast by the mountain ranges to the west, and the time of the rainy season in every other part of India is a dry season there. For their supply of rain the districts on that coast are dependent on the north-east monsoon, also a periodical wind occasioned by the return of the sun to the south, which blows from October till the beginning of the succeeding year; but this wind, which rises in the Bay of Bengal, is much less powerful and distinctly marked than the other Indian trade wind, which comes from the Southern Ocean, and it brings only a precarious supply of rain. This coast is therefore almost wholly dependent on artificial irrigation for good harvests. In Northern India, on the other hand—although there is seldom a season in which artificial irrigation, when available, is not made use of, and the demand becomes more extended and sustained as habit teaches the cultivators to insure themselves against the chances of the seasons—artificial irrigation is yet merely an auxiliary to the ordinary course of farming, and a palliative of occasional drought. In favourable seasons good crops can be raised without its aid.

Canals in  
Madras.

The irrigation system in Madras, in addition to the maintenance and development of the great tanks scattered over the country wherever the surface has admitted of their formation, comprises the works of damming up the great rivers which fall into the sea on the east coast by masonry weirs, at the points where their deltas begin, and distributing the waters over the surface of the country by canals. The principal tracts thus dealt with are the deltas of the Godavari at Rajamundri, the Kistna at Bezvada, the Penner at Nellore and Sangam, and the Cauveri at Trichinopoly. There is also a canal system in the interior of the province from the Tungbhadra river with head works near Kurnul, where the river issues from the hilly country.

the westward. These last-named canals were originally constructed by a joint stock company formed under a guarantee of five per cent. on a capital of one million sterling. This sum proved quite insufficient for the purpose, and after making large further advances the Government eventually took over the works which cost altogether over two millions (of ten rupees). They have not as yet paid their working expenses and are the only unprofitable undertaking in the province. A large project is also in course of being carried out for irrigation from the Vaigai river near Madura, on which about half a million has been spent. The total capital outlay on all these undertakings amounts to about five and a half millions (Rs.), and the present revenue from irrigation is about forty lakhs. giving a return from the completed works of  $7\frac{1}{2}$  per cent ; this although the account is loaded with the commercially unprofitable expenditure on the Kurnul Canal system. Altogether about six millions of acres are under irrigation in Madras, of which rather more than half are watered from tanks, old and new, and the rest from the new canal systems.

Artificial irrigation in Bengal is of comparatively modern date. Bengal proper, which is under the full influence of the summer monsoon, receives ordinarily a plentiful supply of rain, but in the south-western province of Orissa which forms part of the administrative province of Bengal, a complete failure of the annual rains occurred about thirty years ago, which in the absence of any sufficient means of communication by land or sea caused a grievous famine. Consequent on this a Joint Stock Company was formed, without a guarantee, for undertaking irrigation works from the river Mahanadi. The capital raised of one million sterling sufficed only to complete a part of the project. No more could be obtained, and the affair was on the point of collapse when the Government came to the rescue of the shareholders and purchased the under-

In Bengal.

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taking from them. Joint stock enterprise is altogether inapplicable to irrigation works. The best sites economically have already been taken up, and each new project is likely to be less directly profitable than those undertaken before. The canal system in Madras although very economically constructed, gives a much smaller return on first outlay than the primitive tanks previously constructed. Moreover, the construction of the works is only the beginning of the business. The distribution of the water from day to day—the ultimate duty of those concerned, is by far too delicate a matter to be entrusted to an agency interested only in getting the largest possible return on its capital; it can be properly conducted only by the department of government directly responsible for the welfare of the people or by a body of public servants in immediate communication with, and subordinate for revenue business to that department. Anyone familiar with the extortion sometimes attempted to be practised by the subordinates attached to the government irrigation works, although carefully watched, and although the water-rate is fixed intentionally at a very low figure, will readily understand how great an engine of oppression might be framed out of the management of such a concern. It was accordingly provided in the case of the Orissa Company, that on the construction of the works being completed, the duties of the company's officers should be confined to the maintenance of the works, and that the distribution of the water should be undertaken by the Government. The company, in fact, was to sell the water to the Government, and the Government to sell it to the cultivators. All this complication, with the laborious negotiations that arose with the company extending from first to last over several years, involving great delay in the commencement of work, and ending in an arrangement by which the Government accepted an expenditure over which it had no effective

control: all this had for its object to save the Government from the responsibility of raising and spending directly one million sterling. Eventually the works were completed at a cost of two and a half millions, but they have not yet paid their working expenses. Orissa, except in very exceptional years, happily few and far between, gets as much rain as it needs, and no demand arises for water from the canals. Nevertheless, an undertaking which would be disastrous as a commercial enterprise, may be both proper and profitable for the Government to carry out. The direct return in the form of a water-rate is in fact an altogether secondary consideration. A failure of the crops involves the loss of the land revenue for the season, and the further liability for an enormous outlay to convey food to the famine-stricken districts. These are the direct obligations, apart from the loss involved to the people in addition to their inability to pay revenue, which it must always be the duty of the Government to endeavour to avert. That irrigation works, unlike roads, should in most cases yield a good return on their outlay, is a very satisfactory condition, but their primary object is to be an insurance, primarily against the horrors and losses of famine, and, further, against the resulting loss of land revenue.

The canals in Orissa, therefore, apart from their value as a means of assurance, are mainly useful for purposes of navigation, and in some parts the traffic on them is considerable. But the great province of Behar, very fertile and generally well supplied with rain, is yet liable to occasional drought, and a large canal system has been carried out there by which the waters of the River Sone, an affluent of the Ganges rising in the mountains to the south, are distributed over the country, irrigating about half a million of acres. The works have cost about two and a half millions and give a direct return in tolls and water

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rent of nearly three per cent. Altogether about seven and a half millions (Rs.) has been spent in Bengal on works of this class, in addition to a considerable outlay from year to year, provided from revenue. About one thousand square miles are under irrigation annually. But the actual extent of irrigation, here as elsewhere in ordinary years is a very imperfect index of the amount of benefit that accrues in seasons of drought.

In North  
West  
Provinces.

The Irrigation works carried out in the great plains of the North West Provinces are among the most satisfactory records of British government in India. The first work of the kind was carried out about seventy years ago, a canal taken off the east or left bank of the Jumna, where it issues from the Lower Himalayas, which distributes a part of the waters of the river, till only a small stream remains at the tail or terminus of the canal to fall into the parent stream at Delhi. A second canal of larger size, taken off the right or western bank of the river, runs through the country—the greater part known as the Delhi Territory—which since the Mutiny has been transferred to Punjab. This was at first only the restoration of an older canal constructed under Mahomedan rule, which had fallen into disuse, a rude and imperfect work which has been realigned and practically reconstructed. The Ganges Canal, designed and constructed by Cautley and opened in 1854, is the most striking and original work of the kind yet constructed, from the great capacity of its channel and the magnitude and boldness of the head works, by which the canal has to be carried across the drainage of the sub-Himalayas for twenty miles, through over, and under various affluents of the main river which in rainy weather are raging torrents of great volume. The Ganges Canal, with its branches, has a length of more than 4,000 miles, and conveys the waters of the Ganges to Cawnpur. The dam across the Ganges at Hurdwar, which diverts the water into the canal

in great part a temporary work carried away every year when the river rises in flood, and renewed in the succeeding dry season. This is deemed to be cheaper than the construction of a permanent dam in a position of exceptional difficulty. Although in the times of lowest discharge the whole body of the river appears to be intercepted, a considerable stream issues from its shingle-bed a short distance below the dam, which, increased by the various affluents, soon becomes a large stream, and when a hundred and fifty miles of its course are accomplished, it rolls along a broad river as if it had not parted with any portion of its volume. At about this distance from the head another and permanent dam has within recent years been constructed across the bed, and a second, the 'Lower Ganges' canal, taken off from it, acting as a feeder to the first, and with its branches and subsidiary channels nearly 3,500 miles in length. These two works have together cost about six millions; with the East Jumna canal they form a network of water-channels spreading over the whole Doab, from the Himalayas to the junction of the Ganges and Jumna at Allahabad, driving away famine and insuring plenty. This is especially a country to protect, for the Ganges acts as a great drain to intercept the flow of waters from the Himalaya to the south, and having only a moderate rainfall in ordinary seasons, it is specially liable to drought. One of these great canals, a deep and rapid river, full in the driest season, its banks shaded by thick groves of trees in unbroken lines for hundreds of miles through a country in many parts bare of timber; such a phenomenon in a hot and thirsty land conveys a feeling of charm and refreshment, mental and bodily, which only those who have seen it can fully appreciate.

A second canal, called the Agra canal, of considerable size, finished twenty years ago at a cost of about one million, has been taken off the Jumna at Delhi, to irrigate the country on the right bank or south of the



**CHAP. XVIII.** river as far as Agra. The country north of the Ganges, Oudh and Rohilkhand, is not as yet protected by irrigation works on any extensive scale, but the rainfall over these regions is usually abundant. A considerable part of it comes under the influence of Himalayan moisture.

Altogether about  $8\frac{1}{4}$  millions (of which the Ganges canal accounts for 6 millions) have been spent on capital account for irrigation works in the North West Provinces, which provide for about 3,000 square miles being irrigated every season. The net revenue from the sale of the water is over five per cent. on the capital outlay, but the irrigation on the more recently constructed Lower Ganges canal has not yet become fully developed, and a still higher return may be looked for; it needs hardly be added after what has gone before that this direct revenue is only the smallest part of the resulting benefit. The works would have been directly remunerative to the Government, even did they only cover their working expenses. The advantage to the country and people from them can hardly be over-estimated.

*In Punjab*

The conditions of irrigation in Punjab differ from those obtaining in the North-West Provinces, so far that while here also the fertile districts towards the north, bounded by the Himalayas, need protection from occasional drought, and in all seasons are largely benefited by a plentiful supply of water, as the country extends to the south the average rainfall becomes more and more scanty, till at last the line of cultivation disappears in the Indian desert, where the wells, when found at all, are of a depth too great for use in irrigation, and husbandry is only practicable if water can be brought from a distance. Here then, also, irrigation canals are of inestimable value. Happily the great rivers of Punjab which, rising like the Ganges and Jumna in the perennial snow of the Himalayas, traverse the country from north to south, and flowing into

## IRRIGATION WORKS

the Indus make up the great volume of that river, offer the needful means for a great system of irrigation which has been in course of execution ever since the annexation of that country. The canal taken off from the right bank of the Jumna, transferred to Punjab after the Mutiny with the territory through which it flows, was indeed in full operation for some years before; it has been extended and improved, and pays about nine per cent. on the cost of construction; the accumulated profits on the work, after deducting interest and cost, amount to three millions. The first new work undertaken was the canal from the Ravi, opened in 1859 and completed at a cost of about one and a half millions. It now pays about  $7\frac{1}{2}$  per cent., and irrigates the great plain between the Ravi and Beas, known as the Bari Doab. The next great work undertaken was the canal from the Sutlej, which, at a cost of nearly five millions, irrigates the country between that river and the Jumna, including several Sikh States, which have contributed to the outlay, and is gradually extending agriculture into the thirsty districts to the south. The returns from this canal, as from all other works of the same class, have gone on increasing with the gradual development of irrigation, a process of time in every case. Opened in 1882, the return on the capital five years later was about  $1\frac{1}{2}$  per cent.; at the end of another five years it had risen to  $7\frac{1}{4}$  per cent.

Another of the great rivers of Punjab has lately been utilised in the same way. A canal from the Chenab, a river with greater volume than the other three already dealt with, was opened for use in 1892. Over a million has been spent on this canal, which is still incomplete, but already 250,000 acres of waste lands to be irrigated from it have been allotted to colonists, whose migration from the more congested districts of the province will afford a very sensible relief to the agricultural community. The Jhelum and Indus rivers

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still remain to be attacked, if it should be found that they admit of being dealt with in the same way. A canal from the Swat river, which falls into the Indus near Attock, in the extreme north of the province, recently constructed at a cost of 350,000 Rx., completes the list of the great hydraulic works in Punjab. Altogether about seven and a quarter millions have been spent on these, besides the contribution of more than one million to the Sutlej Canal from the native states interested, which already give a return of  $6\frac{1}{2}$  per cent., and with which 8,000 miles of main and distributory branches have been constructed. These are all canals taken off from the rivers as they issue from the gorges of the Himalaya. It would be impossible to give here any account of the various headworks by which the stream of waters are controlled and diverted but their magnitude and solidity, and the boldness, ingenuity, and perseverance which have been applied to the task in each case, here as well as to the east and south, must command the admiration of all who have had the opportunity of seeing these great and original undertakings. Yet but few of their countrymen and practically none of their countrywomen take the trouble to visit them—among the most creditable records of what has been accomplished by Englishmen in India

Inunda-  
tion  
Canals.

In addition to the canals constructed from the upper waters of the Punjab rivers, an extensive system of irrigation has been developed in the southern districts of the province by what are known as the 'Inundation Canals.' These are diversions of the waters in the flood season by cuts made through the high banks. The inundation canals are available therefore during only one season, and give only a single crop, and their operation is necessarily limited to the low country in the vicinity of the river; but the works are of a very simple and inexpensive character, and are extraordinarily beneficial and remunerative. The country round

the city of Multan, where the average annual rainfall is only three inches, is a garden of cultivation carried out in this way. CHAP.  
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The province of Sind, the basin of the Lower Indus, In Sind. is a practically rainless country, is cultivated entirely by artificial irrigation, mainly 'inundation' canals of the kind just mentioned. The conditions of this country closely resemble those of Lower Egypt, as do its products, but the Indus does not overflow its banks in the same way as the Nile, and artificial irrigation is necessary to produce any sort of crops. About one and a quarter millions has been spent on canals in Sind, which give a net revenue on that sum of nearly 12 per cent.

In the province of Bombay the contour of the country, in great part irregular and uneven, and where the rivers are generally found running in valleys, is not favourable for the construction of canals, and the irrigation works generally take the form of tanks, or more properly lakes, to be filled in the rainy season and discharged by irrigating channels in the dry. In Bom-  
bay. A system based on the storage of water must necessarily be more expensive than the diversion of streams which give a constant supply; but in no part of India is artificial irrigation more valuable than in the Dekhan with its moderate rainfall, a slight deficiency in which at once creates a drought. The capital expenditure on irrigation works in Bombay has been about two and a half millions, one-third of this being on works still incomplete, and which have not begun to pay anything; the present return on the whole sum is about 5 per cent.<sup>1</sup>

<sup>1</sup> To those who desire further information on this subject may be recommended *Irrigated India*, by the Hon. Alfred Deakin, formerly Chief Secretary to the Government of Victoria, a book containing a detailed and very interesting account of these great and beneficent works.

## CHAPTER XIX

## RAILWAYS

CHAP. XIX  
Early history of Indian railways.

THE first beginning of railways in India was made in the year 1851 during the administration of Lord Dalhousie, under what is known as the guarantee system. The original scheme provided for the construction of three railways along what were considered the most important lines of communication for commercial, political, and military purposes :—1. The East Indian Railway, from Calcutta northward to the Ganges, thence along the course of that river to Allahabad, crossing the Jumna just above its junction with the Ganges, and so passing along through the Doab to Delhi, about 1,200 miles in length, to which was shortly added a branch of 250 miles from Allahabad to Jabalpur. 2 The Great Indian Peninsula Railway, from Bombay to join the East India Railway at Jabalpur, completing the communication between Bombay to Calcutta, with a branch to Nagpur opening out Central India and the cotton districts; and a southern line from Poona towards Madras, also traversing an important agricultural country. The total length of the whole concession was nearly 1,300 miles. 3. The Madras Railway, from Madras across the south of the Peninsula to the West Coast, to which was subsequently added (1858) a line from Madras to communicate with Bombay and the southern branch of the Great Indian Peninsula Railway. This third line was much less important than the other two,

in fact, as experience has since shown, it had no claim to be selected as one of the initial undertakings; but the distribution was governed by the principle always assumed to be involved in the presidential system, that whatever was done for one Presidency must be done for the other two.

The first completed section of Indian railway—twenty miles of the Great Indian Peninsula—was opened for traffic in 1853; in the following year a section of thirty-seven miles was opened from Calcutta on the East India Railway. Further extension on the former line was at first slow, a difficult ascent having to be accomplished from the sea level of the table land of the Dekhan. On the East Indian, operations were carried on simultaneously in the North West Provinces and in Bengal, materials being transported up the Ganges to the former. Unfortunately no portion of this upper section was ready when the Mutiny broke out, but the line from Allahabad to Cawnpur was opened in the following year. The Ganges was reached from Calcutta in 1860; through communication was established between Calcutta and the North West Provinces in 1864, save for the large bridge over the Jumna; the whole line to Delhi was opened in the same year. The branch to Jabalpur was completed in 1867. Communication between Bombay and Calcutta was established by the connection of the two railways at Jabalpur in 1870. The third of the lines projected at the outset, the line from Madras to the west coast, of over 400 miles, was finished in 1862, and a branch therefrom to the table land of Mysore in 1864. The more important section from Raichur, completing communication with Bombay, about 300 miles, was finished in 1871.

The guage of all these lines was five feet six inches, which was thus established as the standard guage for India. The capital was raised in each case through the agency of a joint stock company, to which a guarantee

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was given of 5 per cent. on the capital outlay, and half of the surplus profits, no repayment being required of this guaranteed interest for the periods during which it might be in excess of the net receipts. To the company was entrusted the appointment of the engineering and other staff to be engaged, and the execution of the works. The Government, in consideration of this guaranteed interest, were to have complete control over the operations of the company, both as to design and expenditure in all branches. Power was taken to purchase the line at certain specified periods of time.

Further  
progress.

Following on these three railways four additional lines were soon afterwards undertaken on similar guarantees: the Eastern Bengal, 160 miles, from Calcutta to the Ganges; the Bombay, Baroda, and Central India, 460 miles; the Oudh and Rohilkund, 700 miles (further extensions were added later on); the Sind, Punjab, and Delhi Railway, from Karachi along the right bank of the Indus to Sukkur; onward by the left bank of the river and its tributaries to Multan; thence to Lahore and Delhi, a total length of 1,150 miles; also a small line in the south of India, begun in 1859, from Negapatam on the east coast to Erode on the Madras Railway.

Merits  
and de-  
fects of  
guaran-  
tee sys-  
tem.

The guarantee system as originally introduced was subject to the great defect that, under the terms of the contracts made, the Government covenanted to pay the guaranteed interest, not only upon all expenditure incurred, but on all the capital called up,<sup>1</sup> thus relieving the railway company from all responsibility for the cost of construction, and all incentive to economy, save that supplied by the prospect of an eventual share of

<sup>1</sup> Both conditions are prescribed in the contract, which was very carelessly drafted; in one clause it is specified that the interest shall be paid on the expenditure incurred, while in another clause the payment is extended to all capital called up with the sanction of government. The wider condition of course governed the adjustment of all the transactions arising.

surplus profits in excess of the guaranteed interest ; but this prospect in the first instance and during construction was remote and contingent. The company had, therefore, a high incentive to make as large an investment as possible. The Government undertook to control the expenditure, but its efforts in this direction were at first very ineffectual. The controlling officers were inexperienced in the business and unacquainted with the proper method of conducting an audit, and their well meant efforts to secure economy were often applied in a way to create a good deal of friction, especially in dealing with the engineers engaged on the work—a body whose training and antecedents rendered somewhat impatient of control and economy, and who also began the undertaking without experience of Indian engineering. The result was that the first cost of these railways largely exceeded what would have been found necessary under a better system. But it is easy to be wise after the event. The guarantee system had these overruling advantages, that it attracted British capital to India, which so far has not been found forthcoming in any other way, save when the State itself is the borrower ; and further, that after the contract was once made with the company, the work went on uninterruptedly to completion, free from all the delays and interruptions due to the vacillation of policy, which so far has appeared to be inseparable from the course of railway construction undertaken by the State, when the grants fluctuate from year to year according to the state of the financial balance-sheet. Under State construction these earlier lines would assuredly have taken a very much longer time to construct than was actually spent, and the enormous addition they have given to the administrative strength of the Government and to the prosperity of the country, would have been to that extent deferred. The advantages of the system have, on the whole,



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tion of  
railways  
by State.Introduc-  
tion of  
narrow  
gauge.

greatly outweighed the disadvantages. Dear railways are far better than none; but in fact the extravagance of early days gave way in time to a better ordered system, and latterly the guarantee system has not been open to any reproach on this head.

It was, however, in view to the cheaper construction of railways that the Government of India undertook the construction of them by its own agency. The first State enterprise was the Rajputana-Malwa Railway, the first section of which, from Delli and Agra through Rajputana to a junction with the Bombay-Baroda Railway at Ahmadabad, a length of over 700 miles, was begun in 1873 and completed in 1879. To this was added the Malwa branch, from Ajmir on the main line through Indore in Central India, descending into the Narbada valley to join the G I Peninsular at Kundwa, about 400 miles, making about 1,100 miles in all. Other extensions have been added, and the whole system now comprises nearly 1,700 miles. The Rajputana-Malwa Railway was the first constructed on the narrow or metre gauge.

Railway construction continued for some years to make fair progress, partly by State agency, partly by guaranteed companies, some of the lines being on the standard gauge and some on the metre gauge. The lines constructed in Punjab (after the completion of the Sind, Punjab, and Delhi line), west of the Sutlej, have been made by State agency on the broad or standard gauge. A beginning was made westward of Lahore on the metre gauge, but the break was found so extraordinarily inconvenient during the Afghan war of 1878, that the line, so far as it had been completed, was converted to the standard gauge, and no metre gauge has been carried permanently beyond the Sutlej. The Punjab railways, of which the portions on the frontier are military lines made for strategic purposes, and from which no appreciable revenue is to be ex-

pected for a long time to come, have lately been extended through the passes of the Suleiman Mountains to Baluchistan and the table lands of Central Asia, under great engineering difficulties. CHAP.  
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The great plain north of the Ganges, from the borders of Assam to the Jumna, has been occupied mainly by the narrow gauge; the different lines have been made, partly by the Government, partly by companies.

The Dekhan and the part of India to the south of it have also been occupied by narrow gauge lines—the Madras Railway excepted—constructed by the two agencies. The Southern of India Railway referred to above as one of the earlier undertakings, has been converted to the narrow gauge.

Two considerable systems, the Indian Midland and the Bengal-Nagpur with its branches, have lately been constructed by companies under a guarantee, both happily on the standard gauge. The line from Delhi to Kalka, at the foot of the Himalaya, where the road to Simla begins, was made by a company under guarantee. A new line of 750 miles from Chittagong to Assam, inappropriately called the Assam-Bengal Railway since no part of it lies in Bengal proper, is now in course of construction by a company, the capital being supplied partly by the company on a guarantee, partly by the Government; this is on the metre gauge. On the east coast of the Bay of Bengal, a line of 450 miles is in the course of construction from the Kistna to Kuttack, which was originally undertaken as a famine work; this is on the standard gauge. It will eventually, if completed, give direct communication between Bengal and the east coast, but some large rivers have to be crossed involving great outlay for bridging. Recent  
additions.

The railways in Burma are all State lines, and all on the metre gauge; they comprise at present, the main line from Rangoon to Mandalay; a line from Rangoon to Prome at the head of the delta of the Irawadi river; Railways  
in Burma.

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and an extension of the main line from opposite Mandalay, along the right or west bank of the Irawadi to the frontier of Burma at Mogaung; about 750 miles have been opened; 150 more are in progress

The foregoing comprise all the principal Indian lines. Altogether up to the spring of 1893, about 18,000 miles of railway have been completed, of which there are—

On the standard guage	10,346 miles
On the metre guage	7,451 „
On special guages	245 „

Almost the whole of these are single lines only. Portions of line only, mainly on the East Indian and the G I Peninsula, to an extent in all of about 1,050 miles, have as yet been doubled.

Evils of  
break of  
guage

Two of the most obviously noticable points brought out by any view of Indian railways, are the break of guage, and the diversity of agency employed in the construction of the different lines, both plain indications of the vacillation and want of definite principles of action which have marked the railway policy of the Indian Government. The metre guage was introduced with excellent intentions, to promote economy in construction, to make a given sum produce a greater mileage by laying light rails and permanent way to carry light rolling stock at a low speed. The same end might have been reached while yet maintaining the standard guage. The saving of cost in the narrow guage line due to a narrower permanent way, is a quite inconsiderable item in the whole saving. In a flat country, and where the cost of land is trifling, the saving does not arise from placing the lines of rail closer to each other but in using a light permanent way and a light rolling stock; these could have been provided equally in one case as in the other, while on the broad guage the stock is much easier to handle than on the narrow one, because it covers less ground for a given load.

admitting of shorter platforms and goods yards. It may be objected, and probably was argued at the time, that if these lighter lines had been laid down on the wider guage, it would have been practically impossible to prevent heavy stock from being run over them; or that if the two kinds of stock had been kept separate, the stock of each part, heavy or light, being reserved for itself, there would have been equally in effect a break of traffic with all its inconveniences, just as much as if there had been a break of guage. Admitting this, still a great deal of the traffic might have been continuous and carried over the lighter road, the condition involved being a mere question of reducing speed, which surely could have been kept under regulation. With a uniform guage and permanent way, the lighter stock and permanent way could have been gradually replaced by stronger materials with the development of traffic. In Burma, indeed, where the railways are completely isolated from those of all other countries, the objection to the narrow guage does not hold good in this respect. The same thing may be said of the new Assam-Bengal railway, but as to both cases it may be asserted that in a level country there is no virtue in the metre guage, and that a wider guage (even if less than the standard) would have been as cheap and more convenient. In India itself, the Ganges, except in its upper parts, cannot be bridged within any measurable space of time; here then, also, the objection to a break of guage did not present itself at the outset, and the lines north of that river might have been laid down on the narrow guage, as a system separate from that established on the south of the river. But the ruling principle to be observed was violated by the construction of the Oudh and Rohilkund Railway on the broad guage. Moreover, the lines in upper Bengal are now in course of being connected with those to the westward, when there will be an extensive metre guage sys-

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tem north of the Ganges, joining the extension of the Rajputana line, so that the metre and standard guage lines will be crossing each other at numerous points in North Western India, and all the evils of a break of guage will be manifested in an extreme form. The same intersection of broad and narrow guage lines already obtains in Southern India, but the broken surface of the Dekhan is especially suitable for the metre guage if it can be justified anywhere. It is remarkable that the mistake of first introducing that guage should have been perpetrated on the Rajputana Railway, one of the main lines of communication between Upper India and the seaboard, and over a section terminated at each end by a broad guage line. It is indeed a singular instance of mistaken judgment that India should be committed to all the irreparable evils of a break of guage by a government which had a perfectly free hand and a new country to deal with.

Vacilla-  
tion of  
railway  
policy of  
Indian  
Government

To appreciate fully the vacillation of policy which has marked the course of Indian railway administration, the various subsequent arrangements must be understood which have been made for working the different lines upon their completion. All the contracts with the guaranteed companies provided for the Government having the option of purchase at stated periods. This option was not availed of in the case of the G. I. Peninsula and Madras Railways, which on the expiry of the first period of twenty-five years, obtained a renewal of their contracts. In thus losing the opportunity of reducing the high and now unnecessary rate of guaranteed interest, 5 per cent, an opportunity which will not recur until 1899 and 1907 respectively, a fault of omission was committed which it is difficult to estimate.

Extension  
of con-  
tracts  
granted  
in some  
cases

railway-  
purchased  
in other  
cases

While extensions of their contracts were given to these two lines, the contracts with several others were determined. The Eastern Bengal Railway was acquired

In 1884, and added as a working system to the narrow gauge state line of that name, north of the Ganges. The Government has also undertaken the working of the Bengal Central Railway (125 miles), one of the few lines undertaken without a guarantee, but on which a guarantee was eventually granted; this line now forms part of the same system. The Sind, Punjab, and Delhi Railway was purchased in 1886, and incorporated with the Government North West system under the title of the North Western Railway, now comprising over 2,400 miles owned and worked directly by the Government, the most extensive system in India. The Oudh and Rohilcund Railway was purchased in 1889, and its management assumed by the Government.

To the Bombay, Baroda, and Central India Company, on the other hand, an extension of its contract was given on the old guarantee of 5 per cent. until 1905, and it has further been given a lease of the working of the Rajputana-Malwa State line, which had been worked as well as constructed by State agency. The combined system, broad and narrow gauge, comprises about 2,350 miles, extending from Bombay to Cawnpur.

The East Indian Railway was purchased in 1880, and made over to a company to be worked under special arrangements which will be presently referred to. This company has also been given a lease of the new Delhi-Kalka line.

The Great Southern of India has been amalgamated with another company, the whole forming a concern called the South Indian Railway Limited, with a guarantee of 3 per cent. on the new capital, and  $4\frac{1}{2}$  on the stock of the old company, and a share of surplus profits when realised. The whole system covers about 1,100 miles, a considerable part of which consists of line, originally built on the standard gauge, since converted to the narrow.

The Southern Maratha Railway, of 1,550 miles, is a

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Amalgamations  
of different  
systems

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system made up of various lines constructed by the company of that name, and various State-constructed lines made over to it for working, with a guarantee on the capital of  $3\frac{1}{2}$  per cent., and a charge on surplus profits.

The Bengal and North Western Railway, about 750 miles, similarly consists partly of lines constructed by the company of that name and partly of lines constructed by the Government, made over to the former for working. In Northern India also a comparatively small concern, the Rohilkhand and Kumaon Railway, of less than 60 miles, works a system of 300 miles of narrow guage line, the greater part of which were originally made by the State.

The Bengal-Nagpur Railway, about 850 miles, is the property of the Government, in consideration of a contribution of nearly half of the capital, and a guarantee of 4 per cent. on the remainder. This is worked by the company by whose agency it was constructed. The Indian Midland, 750 miles, is on the same footing as the Bengal-Nagpur.

Diversity  
of system  
now ob-  
taining.

Thus it will be seen that while the Government has bought several of the lines built by guaranteed companies, under the terms of the contracts, it has failed to take advantage of this option in the case of others; no reasonable explanation is forthcoming for this difference of treatment. Further, while the Government on the one hand has assumed the direct management of several lines originally constructed by companies, on the other hand it has made over to companies for working a considerable number of lines constructed by its own agency, the result being an extraordinarily complicated variety of agencies and conditions. The Indian railway system now comprises:—

1. Lines constructed and worked by the State
2. Lines constructed by companies and worked by companies.

3. Lines constructed by companies but purchased and worked by the Government.
4. Lines constructed by the Government but made over to be worked by companies.
5. Lines constructed with State funds through the agency of companies and worked by them
6. Lines constructed by one company but worked by another.
7. Lines constructed by native States and worked by those States.
8. Lines constructed by native States and worked by companies.

To sell a railway one day and buy another the next ; to build a railway and then lease it to a company, and at the same time to take over another line on lease ; these inconsequential proceedings are sufficient indication of the total want of systematic policy and good judgment which has characterised the railway administration of the Indian Government. But even more serious and harmful than past mistakes, is the lamentable want of progress exhibited at present in railway making. Less than 500 miles of new line were opened in 1892-3, and the additional work sanctioned for construction covers only 136 miles. This is as if railway making in India was regarded as having come to an end. It would be perhaps too much to say that railway construction is just beginning, but the total of only 18,000 miles completed in that great country is a figure which speaks for itself ; there are still large tracts, highly cultivated and thickly populated, for which railways are practically non-existent, and which without railways can find no market for their produce. But everybody is agreed about the necessity of largely extending railway construction, and the Government professes itself to be most eager on the point ; the difficulty is that it cannot make up its mind to a definitive policy which will

Stoppage  
in railway  
progress



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fall of  
silver on  
guaran-  
tee sys-  
tem.

ensure a steady yet rapid progress without needless extravagance or foolish bargains. Not indeed that the bargains in the past can be so characterised. The guarantee of five per cent. was a not unreasonably high attraction to offer to the investor nearly fifty years ago, when the conditions of India and its trade were little known or understood. And if the rupee had maintained its gold value, the bargain would have proved to be a very good one for the Government, to which most of the earlier lines would now be returning handsome profits. As it is the present financial situation of the Government, as affected by its railway operations, is one of the most striking illustrations of the dislocation wrought in trade by the fluctuations in the value of gold and silver. The rupee being now worth only a little more than one half its value at the time when the capital raised was sent to India to make the railways, a return of nearly ten per cent. is now required to cover the guaranteed gold interest of five per cent. The loss thus incurred, as on every bargain struck before the depreciation of silver set in, is irrecoverable, unless the value of silver should be restored. But the same cause of loss cannot arise upon further transactions of the kind except in the improbable contingency of a still further fall of silver, which there is reason to hope has now touched nearly its lowest point, while of course there is no longer any question of a five per cent. guarantee; the latest contracts have been made at three per cent. on the capital outlay.

Satis-  
factory  
position  
of railway  
finance.

The financial aspect of the Indian railways is highly satisfactory and encouraging. The annual account of receipt and expenditure for 1893-4 shows indeed a balance of a million and a half on the debtor side,<sup>1</sup> still further increased in the present year by the greater loss on exchange in payment of guaranteed interest. But

<sup>1</sup> A small part of this is due to substitution of terminable annuities for permanent interest, and is therefore in the nature of an investment.

the account is in the initial stage, burdened with charges on new lines which have not had time to pay. The frontier railways apart, which must always be worked at a loss, the average return on the capital outlay already exceeds  $4\frac{1}{2}$  per cent., although on several lines lately opened the traffic is still in a quite undeveloped state. The heaviest charge on the account, however, arises from the high rate of interest still paid to the Great Indian Peninsula, the Bombay-Baroda, and the Madras Railways, which will eventually be susceptible of large reduction. The burden arising out of the guarantee on the older lines from the depreciation of the rupee is one which it would be irrational to suppose will recur on any new engagements made, and in the development of railways is to be found the best prospect of strengthening the financial position of the government. In no other way can the exchange difficulty be so effectually met as by the stimulus thus given to the export trade. The benefit to India itself from railway extension will be incalculable. Every consideration therefore points to the urgency for replacing the present condition of hesitation and inaction by a policy of sustained and vigorous progress. The first condition required for securing this result is that the government should arrive at a speedy decision as to the machinery to be employed for carrying out the business in this way. At present, halting between a half-hearted desire to execute the work by its own agency and a disinclination to continue the guarantee system, it has brought the business almost to a standstill, for the annual grant made to State railways, besides that it cannot be certainly counted on, is utterly inadequate for the wants of the case.

At first sight there might appear much to be said in favour of railway construction being carried out in future by Government agency. The Government can certainly borrow more cheaply direct than through the agency of a company under guarantee; it commands

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State construction.

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the services of a staff of very able engineers, whose work is as economical as it is good. But while India and its people are highly prosperous, the Government itself is in a state of great financial embarrassment; the inevitable tendency to regulate railway expenditure with reference to the ways and means of the year would be fatal to the prospect of carrying out construction in this way with vigour and regularity. Every change in the state of the Treasury will be reflected in its railway policy; hesitation and vacillation—fits of energy succeeded by suspension of work, variation in the grants of work varying from year to year, almost from month to month; this has been the condition exhibited in the past and will certainly be maintained in the future. Nor is it desirable that a Government already overworked, should load itself with the burden of undertaking directly a laborious business of this kind. There is further great objection to the creation and maintenance of any more public establishments than are absolutely necessary. In most self-governing countries, indeed, the growth of these establishments is becoming a serious political danger. In India the danger assumes another phase of the same kind—that in a country where there is little public opinion and where amongst the English community the official element largely preponderates over the unofficial, the services should become too strong for the Government. But the first objection is the greatest of all, and it is conclusive. The best and only satisfactory method for ensuring regular and sustained railway progress is by the employment of a separate agency, that is, to entrust the business to joint stock companies.

Compared  
with joint  
stock  
agency

Terms to  
be given

If this decision is arrived at, there remains to act upon it by fixing terms which shall be sufficient, but not more than sufficient, to attract English capital to the business. The Government have lately after much delay announced the terms on which they are pre-

pared to entertain proposals for the construction of new lines. These terms, formulated as being those which must in future take the place of a guarantee, are: that the preliminary survey for a railway shall be undertaken at the cost of the State; that the land to be taken up shall be acquired by the Government, and given free of cost to the company; and that a rebate or discount shall be allowed to the new line for all traffic receipts brought by it on to, or received by it from the old line; this assumes that the new line will be an extension of an old one, as in fact almost every new railway must be. This rebate is obviously another form of guarantee. But it is one thing to lay down conditions, and another that they shall serve the desired purpose of stimulating railway progress, and it seems doubtful whether a guarantee simple in form and readily understood, would not be more attractive to the investor, while not involving any greater liability to the State than these somewhat complicated terms. The present state of the silver market is distinctly favourable to a guarantee, even in gold, because the fall which has occurred cannot in reasonable probability go further. If, however, the needful capital can be obtained without a guarantee other than the disguised one now proposed, by all means let the guarantee be dropped. How far the proposal will serve its purpose has yet to be seen. But in any case, if English capital is to be freely obtained for Indian railways, two conditions at least must be satisfied. The curious notion seems to pervade the official mind that the inducement which leads to the formation of companies is the prospect of a dividend on the part of the shareholders. Even if this were the cause, it is certain that the ordinary investor cannot afford to wait while the process of return is in course of development. This difficulty has been got over by an Act lately passed,<sup>1</sup>

<sup>1</sup> 57 & 58 Vict., Cap. xii.

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under which it becomes lawful to pay dividends out of capital during the process of construction, which is in fact equivalent to loading the enterprise with a certain extra dead weight of expenditure, unproductive, but necessary under the circumstances. But investors alone do not get up railway schemes. The authorities in India and at the India Office have not apparently got to the points of understanding that, for this class of business as for any other, a special agency is needed, which must be paid for its services—the promoters who have to be responsible for raising the capital, and who, in order that subscriptions shall be forthcoming, have to underwrite or procure underwriters for the amount, and that they will not undertake this, with the risk or discredit of failure, without adequate return. There must in short be a lump sum provided at the outset for commission, under whatever name it be called, in addition to the actual cost of constructing the line. This consideration explains how it is that while in every mushroom South American Republic foreign capital is forthcoming for its railways, India fails to get any without a guarantee. But surely there is a mean between the state of things where every one from the Prime Minister or President downwards has to be squared—where the interests of the promoters are made the first, and those of the shareholders the last consideration, and the condition which those who conduct affairs in India appear to think reasonable and sufficient, that railway projects should be got up by the investing public themselves, simply with the prospect of ultimately getting a moderate interest for their money. The present state of Indian traffic returns shows that any well planned line, with the economical modes of construction now in force, can bear this loading of a reasonable profit to the promoters and underwriters who raise the loan, and of interest during construction to the shareholders, and yet return a good profit.

But while new companies may be usefully established for raising capital and constructing new lines in various localities, the agency of existing companies may be employed to still greater advantage for carrying out the extensions required to the lines under their management. Hitherto the procedure in this respect has been in the last degree cumbrous and unnecessary. In the case of the Delhi-Kalka line, for example, which is obviously an extension of the East Indian, a company was got up to raise the capital and construct the line, which on completion was made over to the latter company on lease to work, the staff which had been got together for making the line being thereon dismissed, while the London board of the new Company is retained solely for the purpose of distributing the dividend to shareholders. Obviously this extension could have been carried out with greater economy and without this roundabout process by the existing company. A very pressing requirement at the present time is that the contracts between all the old companies and the Secretary of State should be so modified as to admit of his giving them borrowing powers for such extensions and the other approved works necessarily arising out of the development of their traffic.

But while railway construction should be entrusted to companies, the advantage to the Government from the possession of the railways is so great that the condition of the right of eventual purchase will no doubt be provided in all future, as it has been in all past contracts. If to the condition of purchase be added a firm adherence to the wise policy now being pursued of paying off the purchase-money by terminable annuities, the State will eventually become the owner of this great and lucrative property free of encumbrance, a source of financial strength such as is presented by no possible mode of taxation.

On the other hand, if while State ownership of the

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Railways  
should be  
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Govern-  
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quiring  
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but not  
working  
the lines  
directly.

railways should be a cardinal point of policy, the first construction of the railways should not be undertaken by the State, still more desirable is it that the Government should divest itself of the working of completed lines. Over and above the disadvantages already stated as regards the first case, are those involved in the great and increasing burden of conducting a great railway traffic. Government management of a railway is shrouded in mystery. In the case of a private company the responsibility rests with the visible head; in the working of State lines it can never be known how far the blame for mismanagement and omission to make improvements is shared between the ostensible management and an obstructive controlling department at headquarters; the Government of India should not place itself in a position to appear responsible for bad administration in any branch. Moreover, an incurable defect attaches to government management in the constant movement of the executive officials from post to post, a condition incompatible with good administration.

All future contracts, then, should provide for the line being leased to the company which makes it, and the government may with great advantage also divest itself of the working of the lines which it still retains. The case of the East Indian Railway offers a valuable precedent on this head. The company, as reconstituted in 1880, has a working lease of the line with a capital of about one-fifth that of the original company, to cover the value of the stock taken over<sup>1</sup>. The profits on the working of the line are charged with the payments of the annuities due to the shareholders on the old stock, and with 4 per cent. guaranteed to the shareholders on

<sup>1</sup> The reconstitution of the East Indian Railway Company on its present basis, was practically the act of General Strachey, then a Member of the Indian Council and now Chairman of the Company; one of the many remarkable and beneficial measures due to the labours and genius of this distinguished man.

the new—or to be more accurate, with a rate of annuity equivalent to that interest; of the surplus, four-fifths goes to the government and one-fifth to the company. The working of this line is remarkable both for the large increase of traffic which takes place from year to year, and the extraordinary economy with which it is administered—the working expenses being less than 30 per cent. of the gross receipts, a result, it is believed, not attained by any other railway company anywhere. What that company now needs is the power to make the extensions which could be profitably carried out in various directions, and which are urgently required in the interests of the country. But the company has no borrowing powers; it is dependent on the government for the supply of increased capital for this purpose, being in this respect on the footing of a government line, and suffering equally with the government railways both in limitation of the supply of funds, and in the vacillation and uncertainty which attend the allotment of them. This allotment of late has been insufficient even for the purchase of the necessary additional rolling stock required to carry the increased traffic, while the work of extension is practically standing still. Great is the need that, as has been proposed, borrowing powers should be given both to this company and to all other guaranteed lines to enable them to carry out their needful developments when these are approved by the government, in the methodical and systematic way which alone is compatible with economy in construction, instead of with petty instalments of additional capital, doled out in varying sums and at uncertain intervals.

Whatever reforms of system be introduced, and however much the government may divest itself of the burden of direct construction and management, the operations of the railways are so intimately connected with the financial interests of the State, that the government must continue to maintain an effective control

Reform  
necessary  
in railway  
adminis-  
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At India  
Office



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over them. An administrative agency of some kind will always be necessary; and in this respect also reform is urgently demanded. The existing procedure for dealing with this branch of public affairs sufficiently accounts for the blunders and vacillations of the past, and offers a conspicuous warning for the future.

The railway business of the Indian Government is naturally of a kind to be largely dealt with at home as well as in India itself, and the machinery of the India Office is singularly ill adapted for the purpose. The Secretary of State, coming with everything to learn to the charge of a department which is concerned with every branch of affairs, and unable to give more than a mere fragment of his time to the task, especially in these days of the interminable sittings of Parliament, can deal with the business in any one department only in the most perfunctory manner. The effective conduct of the business must perforce be left to the permanent staff, the head of which, as regards each department, is a Committee of the Council. Such a body, if suitable for reviewing the proceedings of others, is a bad form of agency for almost any kind of executive business; and especially inappropriate for the prosecution of railway business is a committee of old soldiers and civilians who come to it late in life, without any previous experience of the conditions with which they have to deal, and whose responsibility is nullified by the circumstance that their action ends with a recommendation to take action which is liable to be set aside by the collective Council. In a later part of this work a reorganisation of the India Office is suggested, which would furnish one responsible permanent head for this, as well as for the other departments into which it is divided, and with such a change there might be a reform in the mode of transacting business at the India Office, which now drives everyone who comes in contact with it to despair. But after all, Indian railway affairs

in all their details must be transacted in India, and there the defect of procedure is even more glaring. Thirty years ago, when the departmental or cabinet system of Government was first introduced into the Governor General's Council, the Governor General himself took charge of the Public Works Department. With the rapid increase of business in all its details which took place after the Mutiny, the head of the Government soon found it impossible to superintend directly the Public Works as well as the Foreign Office, and the former was made over to one of the two civilian Members of the Council to hold in addition to one of the civil departments. In every other branch of the Government, law, army, revenue, finance, the Member of Council in charge was an expert in that particular line. In this case he was practically entirely ignorant of the business he was called on to administer, and grievously have public works interests suffered in consequence. It may be said that the same condition obtains in England, where all the ministers of departments are frequently changed, and always come and often remain from first to last quite ignorant of the business which they are nominally supposed to transact. But then in England the minister works in the light of day and under the constant criticism of Parliament; at any rate he has to assume a knowledge if he has it not, and in most cases to come to a decision; and he is aided by a permanent staff who spend their lifetime in the office. But in India, where it is the custom for business to be dealt with directly by the members of the government, singly or collectively, in a much more minute degree than obtains in England; that a minister should be entirely unversed in the business he is called on to deal with, is a condition unknown in any other branch of affairs. The head of the War Department is always a soldier; of the Finance Department a trained financier; of the Legislative Department a lawyer;

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and in  
India.

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the revenue business of the Government, is transacted by a civilian thoroughly trained and of long experience in that branch of affairs. It would be thought a monstrous thing to shift these ministers about among the different departments, but it is not more absurd to place an entirely untrained man at the head of so complex and extensive a Department as that of Public Works, which requires special knowledge and training just as much as any other. Moreover, under the traditional rule always acted upon, that one of the two Civilian Members of the Council should be taken alternately from Madras and Bombay, the charge of the Public Works Department has usually fallen to the Councillor chosen from these provinces, apparently by seniority, who has possibly passed his life in the blameless discharge of duties connected with the law of revenue courts, who knows nothing of Indian affairs outside his own province, to whom the great problems of railway construction and administration have never presented themselves in any form, and who is unacquainted with the qualifications of the members of the large service at the head of which he is placed, and from which he has to make the selections for all the higher posts. The Indian Government have been fortunate in securing a succession of very able and experienced men for the post of Secretary to the department,<sup>1</sup> but ability and experience do not get full play in a subordinate position, and the Indian system suffers under the further defect that these officials are constantly changed. In England, the permanent under secretary of a department will often hold that position for a great number of years, and so become the depository of great knowledge and experience; in India the secretary and other superior officers succeed each other every few months, the rule which superannuates them at the age of 55 years carrying a man off into

<sup>1</sup> It may be again mentioned that the secretary to a department in India holds a position corresponding with the permanent under secretary of a department at home.

retirement just as he has worked his way to the top of the service.<sup>1</sup> The present mode of administering the Indian Public Works is indefensible. It is at the root of almost all the mistakes, blunders, and objectless changes of purpose, and especially the lamentable delays which have occurred to discredit the Indian Government.

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An Act of Parliament passed in 1876<sup>2</sup> provided for the appointment of an additional member of the Governor General's Council for Public Works purposes; but the sanction given by this Act was only once made use of; the appointment first made under the Act was not renewed, and save during the exceptional period when a distinguished civilian, Sir Theodore Hope, had charge of the Public Works Department, the Public Works administration has been the least satisfactory feature of the Indian Government; with the increasing complexity and magnitude of the business to be dealt with, the need for reform becomes every year more urgent. The first condition for securing this is that a minister with the needful special knowledge and experience should be placed in charge of it. The objection to increasing the number of the Governor General's Council may be admitted. Even seven members are almost too many for prompt executive government. But if it be deemed inexpedient to prevent this increase by discontinuing to fill up one of the two seats reserved for members of the Civil Service, the same end might be secured by declaring the public works member eligible to sit and vote only when public works business was under discussion.<sup>3</sup> This would be

A public  
works  
minister  
required,

<sup>1</sup> It is a curious inconsistency in the Indian system, that the civilian in every branch is superannuated at a much earlier age than the military officer. If a major-general is considered as being physically fit for his post up to the age of sixty-two, it might be thought that a civilian could be kept to his work till at least the same age. A still greater age is not thought excessive for a Viceroy, the hardest worked man in the country.

<sup>2</sup> The addition of one word to the Act of 1876 would apparently effect what is desired; creating, instead of a member of the Governor General's Council 'for Public Works purposes,' a member 'for Public Works purposes only.'

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in harmony with the English system, under which all the ministers have not equal rank as members of the Cabinet, and it would be appropriate to the requirements of the case, the qualifications to be sought for in a public works minister being not necessarily of a kind to make his opinions of value on the other matters with which the Government of India has to deal. The essential point, however, is that there should be a minister qualified by his antecedents for the post, specifically responsible for the conduct of public works, able to speak and act with authority, and not compelled, as the virtual head of the department—the secretary, has hitherto been, to work through a more or less ignorant and incompetent superior, who signs the papers put before him and has no opinions, or only worthless ones, of his own.

and a  
public  
works  
board.

But this reform alone would not be sufficient. To secure the continuity of policy and progress which hitherto has been lacking in such a lamentable degree, some more durable governing body than a single man is necessary. In a general way, no doubt, and especially for vigorous executive action, government by one man is better than government by a Board; but in this case, where the interests to be dealt with are so various and complex, and in India especially where men come and go so quickly, the continuity of policy which above everything has to be aimed at can only be got by such an agency. Moreover, it is very desirable that the higher officers of the department should all be able to speak and act with authority. A Board, therefore, of which the minister should be chairman, and the three principal officers of the department, the Secretary to Government, the Director-General of Railways, and the head of the Irrigation Service, members, may be suggested as the machinery which should satisfy the needful conditions.

With the creation of a body of this sort, it would be

possible to deal with the finance of railways and irrigation in a more satisfactory way than is possible at present. The railway transactions are now all brought into the general accounts of the country, and in a very unsystematic and confusing fashion. The fact is that the Indian Finance Department is attempting to combine two incompatible things—the English system of accounts and finance based upon annual grants and appropriation; and the accounts and finance involved in the working of a great property like the Indian railways and irrigation works. The system of yearly grants has been found highly inconvenient and impolitic applied to even the comparatively small expenditure involved in the naval defences of this country. To deal in this way with progressive expenditure already amounting to hundreds of millions is impracticable: the attempt must sooner or later be given up, and the sooner the better. Railway accounts and finance, at any rate, if not those of irrigation also, should be entirely separated from the general accounts of the country and dealt with, as they only can be properly, on commercial principles; and for this purpose alone a Railway Trust appears indispensable. The proposed Board would serve this purpose. Under this reform the net revenue receipts or expenditure, as the case may be, of the railways would be shown by one final entry in the general finance accounts of the year, as so much revenue or outlay. The capital raised for railway purposes should also be kept separate from the other loans of the Government, and grants made therefrom should not as at present be revocable. Only by separating railway finance in this way, from that of the general treasury, conjoined with the other reforms indicated, can fixity of purpose and methodical and economical progress be secured.

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Railway  
accounts  
to be separated from  
general  
financial  
accounts.

## CHAPTER XX

## FINANCE

[The unit used here, ten rupees (Rx), is that which is now adopted in the public accounts of India, a unit which twenty years ago was nearly equal in value to the pound sterling, and used to be treated in those accounts as actually representing that sum.]

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Finance  
accounts  
inflated  
by entry  
of gross  
receipts  
and  
charges.

THE gross revenue of India, as shown in the public accounts, is about 90 millions; the gross expenditure for the last two years has been still larger. Thirty years ago, when financial equilibrium had been restored after the losses and special outlay caused by the Mutiny, the revenue and expenditure were about 40 millions; twenty years ago they were about 57 millions. It would thus appear on a superficial view as if the public expenditure and revenue of India had increased during the last twenty years by more than 30 millions, and this has been assumed to be the case by some writers whose knowledge of the subject is not always on a level with the confident tone of the opinions they express upon it. This increase in the figures is in fact due to a large extent to the exhibition in a greater degree than formerly of all receipts in the gross on one side of the account as revenue, and all charges for collection and so forth as expenditure. But it is still more largely due to the inclusion, on both sides, of the State transactions connected with the Indian railways, which are practically a new item in the public accounts. The inflation of the financial accounts due to this cause will go on increasing largely from year to year with the

development of these railways to such an extent as ultimately to render the other entries apparently insignificant—a distortion dearly purchased by the result. For even as a statement of the transactions which the figures profess to represent, they are misleading. In the accounts of 1893-4, the entry on the revenue side—about 20 millions in all—is made up of two items, 16½ millions of gross traffic receipts on the railways worked directly by State agency, the working expenses of these, 8¼ millions, being shown on the other side as expenditure; and 3½ millions, the net traffic receipts of the railways worked by companies. The propriety of showing even the net traffic receipts as revenue is questionable, because at present there is a loss on the whole account, the guaranteed interest being in excess of the receipts. But at any rate the circumstance that the receipts of one railway are collected directly by the Government, and those of another through the agency of a company, is no reason for dealing with the items in a different way, the less so that the management of the railways is frequently changing hands. One year the Government buys a line and undertakes the working of it; another year it makes over one of its lines to be worked by a company. Clearly either the gross traffic receipts should be shown in all cases, or only the net traffic receipts. From the figures given nothing definite can be predicated until adjustments of the kind thus indicated as necessary are first made. As has just been pointed out, a new method is required for dealing with the financial transactions of the Government in regard to railways, in combination with the system of annual budgets. Apart from the financial distortion produced by the present mode of exhibiting the railway transactions, it seems misleading also to show miscellaneous receipts of the army and other public departments as revenue; they are merely recoveries of over payments made, and not revenue in the proper sense.



## INDIAN POLITY

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This inflation of the finance accounts—the outcome of official purism—does not even satisfy the canon of accuracy, as representing the whole transactions of the Government, and is hardly more appropriate than would be the insertion in the accounts of a bank of all the cheques handed over the counter.

Net reve-  
nues and  
receipts  
compared.

In order to appreciate the relative improvement which has taken place in the finances, the net and not the gross revenue and expenditure for successive years must be compared. The following figures furnish this comparison for 1873-4 and 1893-4. It is not quite exact, because in the figures available for the earlier year, the loss by exchange (to be presently referred to) is shown in the lump sum, whereas in the later account it is distributed over the different heads under which the loss occurs. The comparison is, however, sufficiently complete for the purpose in view. It will be seen that the net revenue has increased from  $39\frac{1}{4}$  millions in 1873-74 to  $50\frac{1}{4}$  millions in 1893-94. This increase of  $12\frac{1}{2}$  millions has accrued at a fairly uniform rate of rather more than half a million a year. The land revenue has furnished a proportionate share of the total increase, while generally the increase in the different branches of revenue indicates a gradual and steady, but moderate, advance from year to year in the general prosperity of the country, a condition entirely borne out by the expansion of railway traffic and the statistics of the Indian trade. The increase in the salt revenue is accounted for partly by an increase in the duty, partly by increased consumption. It is practically the only obligatory tax in India, while from the facility of collection as an excise duty levied at the localities where the article is produced, or at the ports of entry, it is probably the least irksome form of taxation that could be devised. The most satisfactory item of revenue, however, as regards the people of India, is that derived from opium, it being not an impost upon them but an

Increase  
of reve-  
nue.

# INDIAN FINANCES

Net Revenue			Net Expenditure		
	1873-4	1893-4		1873-4	1893-4
	Rx	Rx		Rx	Rx.
Land . . . . .	18,138,300	21,381,500	Interest . . . . .	4,914,500	8,557,600
Opium . . . . .	6,323,400	4,809,500	Post, Telegraph, and Mint . . . . .	367,100	180,400
Salt . . . . .	5,647,000	7,840,600	Civil Departments . . . . .	8,463,500	12,923,500
Stamps . . . . .	2,575,600	4,337,700	Miscellaneous Civil charges . . . . .	2,322,400	4,658,200
Excise . . . . .	2,187,400	5,124,900	Famine Relief and Insurance . . . . .	3,864,700	1,138,800
Provincial Rates . . . . .	1,765,200	5,324,600	Construction of Railways charged against Revenue . . . . .	32,800	77,100
Customs . . . . .	2,378,600	1,467,800	Railway Revenue Account . . . . .	1,414,700	1,597,000
Assessed Taxes . . . . .	28,500	1,677,500	Irrigation . . . . .	610,600	586,700
Forest . . . . .	231,300	752,600	Buildings and Roads . . . . .	4,409,100	5,236,300
Registration . . . . .	60,100	203,700	Army and Marine . . . . .	14,217,400	22,588,400
Tributes Native States . . . . .	768,500	792,000	Special Defence Works . . . . .	—	342,000
			Exchange . . . . .	879,400	—
Assignments and Compensations . . . . .	40,103,900 870,800	51,812,400 1,559,300		41,506,200 465,300	52,524,700 478,800
			Provincial and Local Deficits . . . . .		
				41,040,800 1,807,700	52,045,900 1,792,800
			Deficit . . . . .		
Total . . . . .	39,233,100	50,253,100	Total . . . . .	39,233,100	50,253,100

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1893-4

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article of export paid for in cash. Unfortunately, from a merely fiscal point of view, the opium revenue shows great falling off; recovery is more than doubtful, and the loss accruing under this head will necessarily have to be made good by other imposts, direct or indirect.

Next to opium comes the revenue from stamps,  $4\frac{1}{2}$  millions. The considerable 'provincial rates,' nearly  $3\frac{1}{2}$  millions, are made up of various local cesses, among them a small percentage on the land revenue appropriated locally, tolls on roads and ferries, and other receipts realised locally and for the most part applied in the same way, but which are brought in the first instance to the credit of the imperial revenues. Provincial taxation must not be confounded with provincial finance, which will be referred to later on.

A long way behind the foregoing in amount come the assessed taxes, little more, and the customs a little less, than  $1\frac{1}{2}$  millions. The falling off in the latter as compared with the receipts of 1873-74 is due to the abolition in 1883 of the cotton and other duties. The forests, under the care and good management bestowed upon them in past years, have begun to furnish a substantial and increasing addition to the general revenue, now amounting to  $\frac{3}{4}$  of a million. The tributes from Native States, about as much, furnished under treaties made with them at different times, vary little from year to year. The fees derived from the registration of deeds, less than a quarter of a million, completes the list of revenue.

The 'assignments and compensations,'  $1\frac{1}{2}$  millions, to be deducted from the total revenue, represent among other items the drawback allowed to certain native states for their share of duties levied, mainly salt, but principally assignments made in lieu of land revenue received.

These figures of the revenue of India tell their own story, and if we did not know the facts from other

sources, would furnish an immediate indication of some of the most marked conditions of that country. Just as from the English Budget may be inferred some of the primary characteristics of the English as a people largely given to strong drink, great consumers and great producers of various commodities themselves, comprising also a very large wealthy class, so the Indian Budget is unmistakably concerned with the circumstances of a frugal people of simple habits, of whom very few are otherwise than poor and almost all are engaged in agriculture. The assessed taxes—the un-failing and almost boundless resource of the English financier—yield only about  $1\frac{1}{2}$  millions from 220 millions of people, indicating the almost entire absence of a middle class. The stamp duties tell the same tale, while generally the increase in the different branches of the revenue indicate a gradual and steady, but moderate advance from year to year in the general prosperity of the country.

The land revenue, the mainstay of Indian finance, is revenue only in a special and technical sense; it is really the rent of land, paid in most cases direct by the cultivator to the landlord, and the only rent paid by the former. Succeeding to the system under which, from time immemorial, the ruler of the country has been recognised as the owner of the soil, and the occupier as his tenant, the East India Company gradually substituted a money rent for the payment in kind obtaining under native rule, and rents fixed for a term of years in lieu of a certain proportion of each harvest from year to year. Unfortunately, through ignorance of the conditions subsisting on their first succeeding to the government, they went still further in the direction of fixity, and in the wrong direction. On the assumption of the government of Bengal by English officials, the mistake was made of taking the zemindars or farmers of the land revenue, whom they found in that

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position, to be the proprietors of the soil. Going to India with the aristocratic notions derived from English tenures, that the land must be held everywhere by the squire or great proprietor, the first English rulers of India took it for granted that the officials of the Mohamedan rulers whom they succeeded, to whom the land revenues had been farmed out, were the owners of the estates of which, at that time, they had charge, and these zemindars were declared to be the landlords of these estates in perpetuity, subject to the payment of the rents for which they were at the time responsible. This is what is known as the Perpetual Settlement of Bengal. Moreover while conferring these rights upon the zemindars, no action was taken to secure the rights of their under tenants; the profits from the rise in rents which took place with the advance in prosperity resulting from the establishment of peace, and its consequent increase of cultivation, were left to the zemindars, free to enrich themselves by rack-renting the peasantry; and it is only within recent years that the claims of the latter to a similar fixity of tenure have been recognised, and a system of tenant right established in the province of Bengal. In that part of India, therefore, which from the long period of settled government enjoyed by it, accompanied by the consequent influx of British capital, has attained to a greater advance in prosperity than any other part, the land revenue yields practically no increase; the land owners, with enormously increased incomes, contribute nothing of that increase to the finances. The advance in the land revenue during the last twenty years from seventeen millions to twenty millions<sup>1</sup> has accrued in other provinces. Fortunately, by the time fresh accessions of territory were acquired, a more accurate knowledge of the actual conditions of

<sup>1</sup> After deducting from 21½ millions shown in the table, page 329, the proportion of the assignments and compensations entered at foot thereof.

land tenure throughout the land had been arrived at. It had been discovered that the state was the owner of the soil, and the zemindar only the publican or rent collector; and the settlement of the land revenue was henceforth made directly with the cultivator—either collectively with the village for the land held by it, or with the individual peasant proprietor. The increase of revenue during the twenty years under review, is due mainly to the greater breadth of land brought under cultivation in the older provinces, and partly to accessions of fresh territory. But on the whole the assessment has actually become lighter, the proportion of the produce of the soil claimed as revenue or rent having been reduced from time to time. It should be added that the annual rate of increase hitherto accruing has for the present come almost to an end, the settlement over the great part of Northern India having lately been revised and fixed for a further term of thirty years.

Turning now to the expenditure side of the account, the first item, interest, shows the satisfactory result that, wars and famines notwithstanding, the annual charge for the public debt has been reduced during the twenty years under review by nearly 2,000,000*l.*; partly by the reduction of debt, partly by reduction in the rate of interest as the financial credit of the Government has rendered the conversion practicable. On the other hand, the account tells the same tale which is repeated in every country, of the greatly increased cost from year to year of both the civil administration and the army. But it should be explained that a large part of the increase is here apparent only, and is due to the ever growing burden of the loss by exchange. When the rupee was worth ten shillings, the Indian accounts were exhibited for financial purposes in sterling, the expenditure in India being taken at ten rupees to the pound. But when silver began to fall in value

Increase  
of expen-  
diture.