

CHAPTER XI.

PUBLIC WORKS.

The Great Aggregate of these—*Railways*—Principal Lines of the System—Nearly all Constructed during the Present Reign—Their Average Cost—Low Working Cost—Former Abusive Management—The New Administration—The Soudan Line—*Canals*—Their Two Classes—How they Control and Distribute the Irrigation—Great Additions made to the System during the Present Reign—The Barrage—Its Proposed Completion—*Harbour Works*—At Alexandria—At Suez—*Lighthouses*—Details of the Present Service—Its Efficiency—*Telegraphs*—Existing Lines—External Communication—*Bridges*—Kasr-en-Nil—Ghizeh—Others Built during Present Reign.

THE public works of Egypt are so numerous and important that a mere catalogue of those constructed during the present reign would go far to account for the recent great development of both its trade and its debt. The correlation, indeed, of these three chief factors in the situation has been so close that it is not easy to say which among them has been *cause* and which *effect*; for while railways and canals rank for the most part first in order of time, the rapidly reacting growth of trade has forced on the extension of both at a rate which, in its turn, would have been impossible but for the borrowed capital represented by the debt. That some—not to say much—of this last has been wastefully expended, is not to be denied; but the aggregate of railways, irrigating canals, docks, harbours, lighthouses, and telegraphs—nearly the whole of which are already reproductive—still exceeds in value the entire net proceeds of the Egyptian foreign loans. The Suez Canal, usury to loan-mongers,

improvident administration, and blackmail to Constantinople, quite sufficiently explain the large surplus of the present public debt. A brief sketch of the more important of these substantial state assets will illustrate, perhaps better than anything that has yet been said, the material progress made by Egypt within the past score of years. At the head of the list, in respect both of cost and immediate revenue value, stand above 1,100 miles of

RAILWAYS.

These are divided into two categories—the *seaward*, or those running north of Cairo, and the *southern*; but, except only the short line of 15 miles from the capital to the sanitarium of Helwân, the whole are now under the European administration, of which General Marriott was last year appointed chief, with Ismaïl Pasha (educated in England) as assistant director. Subjoined are the principal lines of the present working system.

	Miles.
From Alexandria to Cairo (double)	131
“ Tel-el-Barrûd (on the Alexandria-Cairo line, 54 miles from the former) by the left bank of the Nile to Boulak-el-Dakrou, opposite Cairo	74
“ Boulouk-el-Dakrou to Assiout, the Upper Egypt line	228
“ Benha (on the main line, 29 miles from Cairo) to Zagazig, Ismaïlia, and Suez (double as far as Zagazig)	129½
“ Assouan to Philæ	5
“ Alexandria to Rosetta	43
Branches from Tanta (54 miles from Cairo on the main line)—	
1. To Dessouk, on the Damietta branch	46
2. To Zifteh do. do.	34
3. To Damietta (double as far as Mohallet-Roh)	86
4. To Chibin-el-Kôur	19
From Caliob (below Cairo) to the Barrage	7½

					Miles
From Zagazig to Mansourah	...	...	...	...	47
“ Benha to Mitberah ...	...	...	...	...	8
“ Wasta to the Fayoum	...	...	...	...	41
“ Aboo-Kebir to Salieh	...	...	...	...	22

Including the duplications between Alexandria and Cairo, Benha and Zagazig, and Tanta and Mohallet-Roh, the mileage thus represented amounts to a total of 1,086 miles, to which have to be added the line of 15 miles to Helwân, and about 25 miles in and around Cairo which are used only for Government purposes, raising the whole to about 1,126 miles, exclusive of 90 miles of sidings at the various stations.

The first line of the system dates from 1852, when Abbas Pasha commissioned Mr. Robert Stephenson to construct a single railway from Alexandria to the capital, in the interest of the then rapidly developing overland traffic.* This line was subsequently doubled, and the floating ferry across the Rosetta branch of the Nile at Kafr-es-Zyat (65 miles from Alexandria), where Achmet Pasha, then heir to the throne, was accidentally drowned in 1856 by the train running into the river while the ferry was not in its place, was replaced by a splendid iron bridge of twelve spans, resting on hollow piles, at a cost of 400,000*l.* Five years later the communication between the two seas was completed by the construction of the

* Long previously, in 1834, Mehemet Ali had surveys and sections of the desert line from Cairo to Suez made by Mr. T. Galloway, and plant for it was even ordered from England; but French influence was exerted to prevent the carrying out of the scheme, which was consequently for the time abandoned. Four years later, however, a short steam tramway—the pioneer railway of Egypt—was constructed for his Highness at Alexandria by Mr. R. H. Galloway, who, with his brothers, erected nearly all the pumping and other machinery set up for the Pasha during these early years of the Egyptian *renaissance*. The same firm also supplied most of the further machinery erected during the two following reigns.

direct desert line of 90 miles from Cairo to Suez. At the accession of the present Khedive these two lines and a branch of 24 miles from Benha to Zagazig formed the whole railway system of Egypt. The importance of largely increasing it was promptly felt by his Highness, and railway extension advanced at a rate which in a few years spread an iron network over most of the Delta, supplied an alternative route (on the left bank of the river) between Cairo and Alexandria, and invaded Upper Egypt and the Fayoum. In 1870 the disadvantages of the old desert line between the capital and Suez—over which water had to be carried daily to feed the locomotives, and which developed nothing along its track—led to its abandonment, and the adoption of a new and longer route, by the extension of the Benha-Zagazig branch for 98 miles along the fresh-water canal to Ismaïlia, and thence nearly due south by the side of the same channel and the maritime Canal to Suez. Of the 245 miles therefore in operation at the death of Saïd Pasha, only 155 form part of the existing network: in other words, including the duplications, the present reign is to be credited with 971 of the whole 1,126 miles which now reticulate the country.*

As the earthworks on nearly the whole of these lines have been constructed by *corvée* labour, it is estimated that their capital cost, including a first supply of rolling stock, averaged about 11,000*l.* a mile. But as this again was all borrowed money obtained at certainly not less than 12 per cent. interest, the ultimate cost of the system came fully up to the average of European railways, and

* Besides these State railways, there is a short line of five miles between Alexandria and its suburb of Ramleh, constructed first as a horse tramway, but subsequently worked by locomotives, and owned by a small private (chiefly English) company.

their revenue returns must in fairness be also estimated accordingly. On the other hand, the moderate rate of speed at which all the trains are driven—except the one daily express between Alexandria and Cairo, and the mail trains between Suez and Alexandria—and the cheapness of native labour, which is now employed in nearly all branches of the service, enable the working expenses to be kept much below the European average, the respective proportions being about 46 to 53 per cent. of the receipts. The highly-waged English and French engine-drivers and mechanics having been nearly all replaced by well-trained Egyptians, fuel and the rolling stock are now almost the only costly working items; but, as against these, the tariff for both passengers and (especially) goods carriage is much higher than in Europe. Some modification has recently been made in this last; but the policy of any considerable reduction is questionable, as water-carriage, though cheaper and still considerable in some districts, nowhere effectively competes with railway transport. A re-adjustment of many of the existing traffic charges might be made with advantage to both the public and the department, as the incidence of not a few of them is anomalous and inequitable; but, collectively regarded, neither trade nor industry is unduly weighted by the present average tariffs. Until the recent transfer of the administration to European hands, it was notorious that great frauds were systematically practised on the service, with the connivance of underpaid or dishonest officials; but it may be expected that these will now cease; and, if so, the gain to revenue from this source alone will tell appreciably on the year's receipts.*

* As an illustration of only one of the many abuses hitherto in costly operation, it may be mentioned that since the appointment of General Marriott to the management of the service an English firm of high standing re-

But great as has been this extension of railways in Egypt proper within the past twenty years, it pales before a grandiose scheme conceived by the Khedive, soon after his accession, for the peaceful conquest and development of the vast but hitherto profitless provinces on the Upper Nile, by means of the same agency, employed on a still larger scale. The steam communication between Alexandria and Suez had shortened the overland Indian voyage by several days, but his Highness projected a yet further reduction of it by continuing the iron road from Cairo up through the Soudan to Shendy, the converging points for the camel routes from Khartoum and the White Nile, and thence *viâ* Kassala to Massowah, which would save fully three days' time, and nearly the whole Red Sea voyage. In 1865 a preliminary study was made of the country between Assouan and Khartoum; but, although the report on this was favourable to the proposed scheme, nothing further was done till 1871, when a fresh and detailed survey was executed under the direction of Mr. Fowler, his Highness's chief consulting engineer. In the result, the dimensions of the project were reduced to Wády-Halfa, at the bottom of the Second Cataract—below which the Nile is navigable by steamers down to the First Cataract, and thence again to Cairo—being selected as its northern, and Metemmeh, opposite Shendy, as its southern terminus, the distance between these two points as surveyed being only 550 miles, and that from Shendy to Massowah about 500 more. The work was accordingly begun at Wády-Halfa, on the right bank of the river, in 1873; but financial considerations

cently offered to supply similar or even better coal than that hitherto used at 60,000*l.* a year less than the previous contract price. This particular offer was not accepted, but the supply has since been contracted for by tender at rates much below those formerly paid, and with adequate guarantees that the quantities paid for shall be delivered.

have delayed its progress and compelled a modification of the line, which, as now finally projected, will run for 150 miles, partly through a wild and rocky desert, in which engineering difficulties unknown in Egypt proper have to be overcome, till it regains the Nile at Kohé, where an iron bridge, consisting of one central span of 80 metres, two of 30 m., and 26 other openings of 18 m. each, will carry it across to the left bank, which it will then skirt for 50 miles further on to Hannek. Here the river will be again utilised up past Ordeh, the capital of Lower Nubia, to Abou-Goosi, at which much of the caravan traffic from Kordofan and Darfour converges. At this point the iron road will be resumed, and run for a further distance of about 200 miles across the great plain or desert of Bahiuda—not to Shendy, as originally proposed, but to Khartoum, the proper capital of the Soudan, where it will for the present terminate, the proposed extension to Massowah having perforce been abandoned. The original intention of constructing the line within three years has also been necessarily modified, and its progress will now depend on the development of the local revenue, by which the cost of the work is to be defrayed; for the Soudan itself is to bear the whole of this, without any part of it being thrown upon Egypt proper. Mr. Fowler's original estimate for the whole line from Wády-Halfa to Shendy was 4,000,000*l.*—or about 7,250*l.* a mile for a narrow-gauge road of 3 ft. 6 in., with light rails weighing 50 lbs. a yard, and the requisite rolling stock—of which 2,500,000*l.* was apportioned to the European part of the work and materials, and the remainder to native labour, and such wood and stone as the country traversed could supply. The elimination of the section between Hannek and Abou-Goosi will of course reduce this estimate, but not *pro tanto*, as the selection of this latter, instead of Ambakol, as the

point at which the line will strike out from the river to cross the desert of Bahiuda, and of Khartoum instead of Shendy as its southern terminus, will add nearly 40 miles to its length in this direction. About 50 miles of the earthworks, and 40 of the permanent way, are already made south of Wády-Halfa, and by the time the Upper Egypt line has been completed from its present terminus at Assiout to Assouan—where a short steam tramway already *turns* the First Cataract to Philæ—Hannek will probably have been reached, and steam communication thus established by rail and river between Alexandria and the heart of the Soudan. Beyond Khartoum the country has also been surveyed by Mr. Fowler's staff, for a still remoter line to Darfour; but this is as yet *in futuro*, and need not therefore at present engage remark.

CANALS.

Egyptian agriculture being wholly dependent on artificial irrigation, the system of canals by which the yearly overflow of the Nile is caught, stored, and distributed, has at all times ranked foremost among the industrial public works of the country. From the Pharaohs to the Khedive its maintenance in thorough repair has always been the special and anxious care of the Government, since on this, next after the inundation itself, hangs the success or failure of the year's crops, on which in turn depends more than half the year's revenue. Here again, the energy of the present ruler has been conspicuous in improving and extending the network as Mehemet Ali left it*—for few or no additions were made to it by either Abbas or Saïd—with the result that the whole now

* Mr. Fowler estimates that the extension of the irrigation canals alone during the present reign has involved the excavation of 65 per cent. more *matériel* than the whole of the Suez Canal.

lineally measures more than 8,400 miles, with a water surface of nearly 100,000 square acres. The system comprises two classes of channels, the larger of which (called *séfi*, or summer, canals) are used for both navigation and irrigation, while the smaller ones (called *nili*, or high Nile, canals) serve the latter purpose only. Until the introduction of railways nearly the whole transport of the middle and lower provinces was done by water, and even now the greater cheapness of the old method still secures for it a considerable share in the carriage of native produce to the coast and the chief inland markets. But with two or three exceptions the primary object of the whole 870 odd canals which now reticulate the country is to receive and distribute the precious fluid on which everything depends. Distinguishing the two classes, we find in all 113 navigable canals, 62 of which run through Upper and Middle Egypt, and 51 through the lower provinces. Of the former, the Bahr-Yousuf generally, but inaccurately, gives its name to the long chain of channels that winds down for about 350 miles on the western side of the Nile, nearly midway between the river and the Libyan hills, from Farshoot to a few miles above Cairo. The first action of this great watercourse is, however, more properly called the Moie-t-Sohág, from the provincial capital of Girgeh, whence it takes its name, and past which it runs in a channel nearly forty miles long by more than 300 feet wide, watering the country as far down as the southern districts of Assiout. It is the only canal in Upper Egypt whose annual opening about the middle of August, to admit the swollen Nile, is the occasion of an officio-religious ceremony similar to that which takes place at the cutting of the Khaleeg at Cairo in the same month. The Bahr-Yousuf proper (Joseph's river) taps the Nile above Mellawee, and runs for more than 150 miles, with a width

similar to that of the Soohághieh, through the provinces of Assiout, Minieh, and Benisouef, and then, turning westwards through the opening in the Libyan range behind the latter town, enters the valley of the Fayoum, which it abundantly waters through a great network of branches, one of which empties into the Birket-el-Korn, and another, re-issuing from the valley, joins the Nile again above Rigga. Popular tradition ascribes the construction of this great channel to the patriarch whose name it bears, but some geographers regard it as an old branch of the Nile, which, after watering the Fayoum, ran on into the Bahr-bela-ma already mentioned, and so into the Mediterranean westwards of Alexandria. It is only navigable throughout its whole course during the inundation, being nearly dry in several parts during the rest of the year. The Ibrahimieh, which is a work of the present Khedive, and the next greatest channel on the western side of the river, begins near the town of Assiout, and with a width of about 200 feet for one-third of its course and of fifty for the remainder, runs nearly parallel with the Bahr-Yousuf, for more than ninety miles, further watering, with many branches, Assiout, Minieh, and the wide extent of fertile land which the sweep of the river to the Arabian hills, below Behnesa, leaves on its Libyan side. In connection with these canals in Upper Egypt is a chain of vast reservoirs, chiefly the work of Mehemet Ali, which, filled from the river during the inundation, subsequently distribute their contents into smaller basins at a lower level, and so furnish water to the neighbouring land, as needed throughout the greater part of the year.

Of the fifty or more navigable canals below Cairo, the most important are—(1) the Ismaïlieh, a work of the present reign, which, starting from the river near Boulak, runs in a fine broad navigable channel for nearly fifty-five