"The Congo Railway."[1]

By Léon Trouet.

(Translated and abstracted by Gilbert Richard Redgrave, Assoc. Inst. C.E.)

Though no official connection exists between Belgium and the Congo Free State, which is absolutely autonomous, there are so many intimate ties between the two countries that everything relating to the vast African territories, under the personal sovereignty of King Leopold, cannot fail to possess a powerful interest for the Belgian people. The Author shows that almost the entire Congo basin is comprised within the limits of the Free State, and that the numerous and important tributaries of the Congo distinguish its watershed from that of almost every other great river. The chief confluents and branches discharge into the broad stretch, known as the Stanley Pool, above which the Congo and its tributaries are navigable for upwards of 11,000 miles. Below Stanley Pool, as far down as Matadi, the river ceases to be navigable, owing to the falls and rapids caused by a descent of about 1,000 feet in a distance of about 217 miles. From Matadi to the coast the river is practicable for vessels of large tonnage, and Matadi is, in fact, the destined port of the Congo basin. It was clear that from every point of view it was a matter of urgent necessity for the sake of the future development of the country to provide means of transport between the Upper Congo and the navigable estuary at Matadi, and thus to do away with the interruption to traffic caused by the impassable rapids. From various considerations it is shown that the construction of a railway afforded the only practicable solution of this difficulty, the canalization of the river being out of the question.

As soon as Mr. H. M. Stanley had opened up the country by his explorations in 1878, the idea of the railway had been mooted, and as early as 1885 a syndicate of English capitalists approached the

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Congo Free State with a view to a concession for the construction of a railway from the Lower Congo to Stanley Pool. Affairs were, however, at that time hardly sufficiently advanced for the realization of this project, but shortly afterwards a Belgian Company was formed, with the modest capital of £50,000 (originally £40,000), to prepare the way for a more complete study of the question. This company was definitely launched on the 9th February, 1887, as the "Congo Company for Commerce and Industry," and the first step taken was to despatch two expeditions, the one to seek out and to survey the best route for the proposed railway between Matadi and Leopoldville, and the other to report upon the commercial prospects in the future of the basin of the Upper Congo. The first of these expeditions, the survey party, was in charge of Captain Cambier, who had already, on two previous occasions, travelled in Africa, and the second party was entrusted to the leadership of Mr. Delcommune, who had for 12 years been engaged in commercial pursuits on the Upper Congo. Captain Thys was at the same time appointed to proceed to Africa and to take charge of the two enterprises as the chief representative of the Company.

Some previous proposals, namely, that of Stanley for a railway from Vivi to Isangila, following the north bank of the Congo, and a scheme for a similar line from opposite points south of the river are noticed. Both of these lines would have terminated at Isangila, where a stretch of the Congo is navigable for whale-boats, skilfully managed by native oarsmen, as far up as Manyanga. From this point, a second railway would have carried the traffic to Stanley Pool. There had been also a projected line from Matadi to Stanley Pool direct, without break. The two former schemes, though they would perhaps have been less costly in point of execution, were open to grave objections, owing to the necessity for several transhipments and the great difficulties in the navigation above Isangila. The Company decided, therefore, to attempt to construct a railway direct from Matadi to Stanley Pool. At the period of the inception of the scheme, the country between these two points was wholly unexplored, but for the two caravan routes, the one to the north of the Congo, and the other to the south. The latter seemed to offer the fewest difficulties for the construction of the railway, and the survey party, which started in 1887 and returned in 1889, adopted this route. The conditions laid down for the railway were as follows:—The gauge was to be $29\frac{1}{2}$ inches; the maximum gradients 45 feet per 1,000; minimum radius of curves $2\frac{1}{2}$ chains, while tunnels and all heavy works were to be as far as possible avoided. In order to save time and to reduce the preliminary expenses, the engineers were only called upon to furnish an approximate scheme, showing the possibility of constructing the line and enabling them to estimate the probable outlay. The difficulties encountered were, with three exceptions, readily overcome; these were (1) the section skirting the torrential stream, the M'Poso; (2) scaling the heights of Palaballa, which rise precipitously directly after that river is passed; this proved the most knotty point of the scheme; (3) in attempting to reach the Pool by the most direct route, the surveyors entered the valley of the Lukunga, a tributary of the Congo, the opposite bank of which presented a cliff-wall which was absolutely impassable and which attained in places a height of upwards of 3,000 feet. It was, in fact, an invincible obstacle, which appeared for a time likely to destroy all their hopes of success, since this rock-wall was found to follow the whole course of the river to its junction with the Congo, and thus constituted the separation between the basin of the Lukunga and that of the Congo. The only alternative open to them was to ascend the course of the river Lukunga, without, however, much anticipation of finding an outlet, since the general direction of all the tributaries on the left bank of the Congo was such as to cause them to conclude that it would speedily lead them into Portuguese territory, which was near at hand. By a lucky circumstance it was found, after following up the valley for from 12 miles to 15 miles, that the stream, in lieu of trending due southward, made a sharp bend to the north-east, encircling the precipitous cliffs on the right bank, which are only terminated northwards by the Congo itself. The survey line was, therefore, taken up the valley, and only diverted later to strike off towards the Stanley Pool, which was reached after crossing the Inkissi, the most important river which had to be traversed, and passing over the Tampa Plateau, the highest ridge of the chain of mountains encircling the central Congo basin. By means of a map (*Fig. 1*) of the Congo State, the Author explains the original route proposed and certain modifications, which were introduced during the execution of the work, with a view of shortening the distance and reducing the cost. The length of the line, as originally surveyed, was 285 miles, but the ultimate length is 241 miles. Some of the principal elevations above datum are as follows:—Matadi, at the starting-point, 86·6 feet; ridge of Palaballa, 918·6 feet; ridge of Zolé, 1,574·8 feet; ridge of Sona-Gongo, 2,444·2 feet (summit-level of line); ridge of Tampa, 2,083·3 feet; Plain of Stanley Pool, 1,033·4 feet.

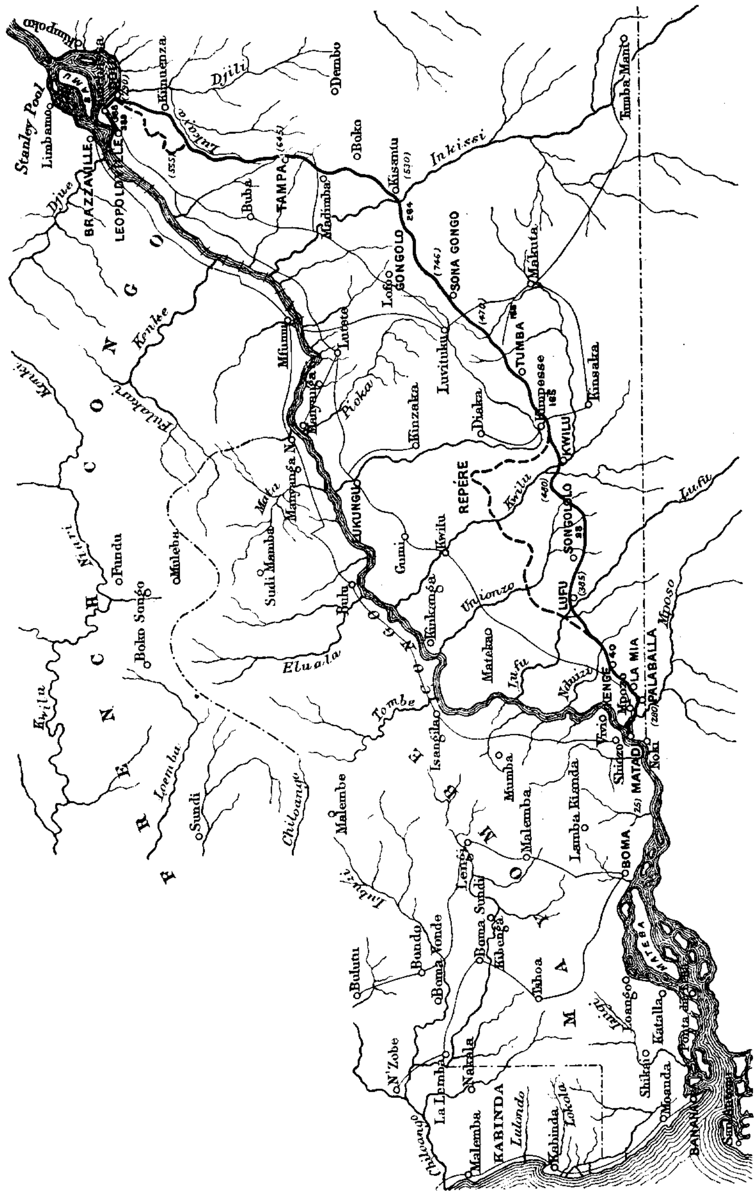

Stanley Pool
Limbamo
BRAZZAVILLE
LEOPOLDVILLE
Kimuenza
Djili
Dembo
Lukaya
TAMPA
Boko
Kisantu
Inkissi
Tumba Mani
Buba
Madimba
GONGOLO
SONA GONGO
Makuta
TUMBA
Kimpesse
Kinsaka
KWILU
REPÈRE
SONGOLOLO
LUFU
Unionzo
Kenke
Fulakari
Fundu
Muleba
Boko Songo
Loembe
Sundi
Chiloango
Malembe
Mfumu
Lutete
Pioka
Kinzaka
Luvituku
Diaka
Manyanga
Sudi Mamba
Gumi
Kinkanga
Eluala
Tombe
Isangila
Mateko
Mumba
Malemba
MATADI
Noki
PALABALLA
BOMA
Bondo
Bulutu
Boma Sundi
Kibanga
Loango
Katalla
N'Zobe
Nakala
La Lemba
KABINDA
Lulondo
Lokola
Kabinda
Moanda
BANANA
MATEBA
Mposo

Fig. 1.

In consequence of the absence of all navigable streams and of every mode of transport except by negro carriers, it was necessary to adopt what is here termed the "Telescopic" system, for the construction of the line; that is to say, that the railway itself had to provide all the materials for its extension, by means of the section already constructed, and all fresh supplies had to be pushed forward from the base. Even the workers themselves had to be recruited and lodged and fed by the Company, in special camps constructed as the works proceeded, for the country in the region of the cataracts is very sparsely inhabited, and it was at all times impossible to advance more than from 7 miles to 9 miles beyond the end of the rails. It may readily be imagined that vast difficulties had to be overcome in thus constructing a railway in an unknown country with wholly unskilled workers, who had never seen a pick or a shovel, under climatic conditions, moreover, of the most unfavourable kind. Still for several years the railway was pushed forward at the rate of from 60 miles to 72 miles annually, and although critics, who were not familiar with the real circumstances of the case, have been disposed to cavil at certain of the details, all those who have studied the railway on the spot have been enthusiastic in their praises of the undertaking.

As soon as the works were actually taken in hand, the preliminary survey was only looked upon as furnishing a general idea of the line to be followed, and any possible improvements which became apparent as the railway proceeded were invariably adopted. From the 56th mile onwards it was decided to reduce the maximum gradients from 45 per 1,000 to 40 per 1,000, and to increase the radius of the curves to a minimum of 3 chains.

The surveying party in advance of the excavators, who went forward to stake out the centre of the line and to drive in posts to mark the levels of the formation, had to see that the grass was cut down, for otherwise this constituted an almost impenetrable jungle, attaining during the rainy season to a height of from 10 feet to even 20 feet. They had also to construct light foot-bridges over the streams and ravines to permit of the passage to and fro of the workpeople, and lastly they had to select and prepare the spots chosen for the camping-grounds. The soil in the regions traversed by the railway is very varied in character, but little hard rock was encountered until Palaballa (10 miles) was passed. Towards the 140th mile there exists some rocky ground of intense hardness, which had to be blasted with dynamite. Though much of the ground was very firm, it yielded readily to the pick, but some beds of tough clay were found which crumbled on exposure to rain and to the atmosphere. Very few of the cuttings were made in vegetable soil, as the line followed for the most part the spurs of the hills, denuded by tropical rains. A photograph of one of the deep cuttings is given, to show the nature of the excavations. Along the banks of the Congo and the M'Poso, that is to say, for the first 5 miles, the construction of the railway on the face of the rocky cliffs was a work of much difficulty and even danger, and the workmen had in some cases to be slung from above by means of ropes. The line in these places follows the bed of the torrent in a species of semi-tunnel formed in the rocks at a height of from 130 feet to 160 feet above the stream, the mere elevation causing giddiness to those unaccustomed to similar scenes. It was necessary also in some instances to build up lofty foundation walls from below to carry the line which projects beyond the face of the cliffs.

The picks and shovels used by the negro workers were of the usual make, but somewhat smaller in size than those generally employed. Small barrows with cast steel wheels were made use of in the cuttings, and in certain of the deeper and longer excavations and embankments iron tip-wagons, holding about 9 cubic feet and running on a portable rail with a gauge of 16 inches, were introduced with success. The individual work done by the negro excavators was at first very small, but it improved ultimately up to 3½ cubic yards per diem, mainly under a system of premium payments founded on piece-work. The Author recommends this system for all work of a similar character, whatever may be the race of workpeople employed. In connection with the excavators' work two special gangs were employed, the one charged with the preparations for the bridges over the ravines and rivers, and the other having to deal with the construction of the metallic culverts and the trimming of the embankments. Rough timber trestle-bridges of given dimensions were in the first instance erected, and it may seem strange that, in a country which abounded with forests, it was found cheaper to employ imported European wood than to prepare squared timber on the spot. A photograph shows the character of the trestle-bridges adopted. With respect to the metallic culverts, it is stated that these no doubt constituted one of the chief factors in the possibility of speedily constructing the railway. As a matter of fact, though the bridges are fairly plentiful on this line, the small watercourses and channels may be said to be innumerable, and as in every case it was necessary to confine and train the waterways, the use of a multitude of small culverts (aqueducts) under the line was unavoidable. Masonry in

Africa is very dear, and the negroes are very slow in constructing arches and vaults. If all the culverts under the line had been built in stonework, it would have been impossible to attain to any great rapidity in completing the railway. It was originally proposed to carry out these culverts in compressed concrete, but the cost for freight was excessive. It was found also after a short trial that concrete castings were not strong enough to stand the rough handling during the voyage from Europe, and that a very small fraction of the consignment arrived at the works intact. Under these circumstances it was resolved to make use of steel tubes, which were supplied in two dimensions, the smaller 19·7 inches in diameter, in lengths of 23·6 inches, and the larger 39·3 inches in diameter, in lengths of 31·5 inches. These tubes were formed of mild sheet-steel, varying in thickness from 0·15 inch to 0·35 inch. They were riveted together and made to taper slightly, and the sizes were so adjusted that three lengths always fitted one within the other, for the sake of saving in freight. Each end is fitted with a hoop, to ensure a good joint, and at first the tubes were jointed with Portland cement; subsequently joints of tow and red lead were used instead, but latterly all jointing has been dispensed with, as the earth soon washes into the interstices between the tubes and becomes consolidated. The Author shows that the objections as to want of durability urged against this mode of forming the culverts have not been established in practice.

Although the gauge was first fixed at 29·5 inches, the rails as actually laid have a gauge of 30·1 inches. This small widening was decided upon as being that required for the maximum curvature. The line abounds with sharp curves, involving constant slight changes of gauge, and as it would have been difficult to avoid errors in the dimensions, it was ultimately decided to adopt the above extended standard gauge throughout. The rails weigh 43·4 lbs. per yard, and were supplied in lengths of 23 feet to suit the trucks. Some shorter lengths were furnished to serve for the inner rails on curves of 2½ chains. A Table is given of the elevation of the outer rail for curves of various radii, calculated for a normal speed of 18·6 miles per hour, these elevations varying from 2 inches on a curve of 2½ chains down to 0·2 inch on a curve of 25 chains.

Two descriptions of fish-plates were at first used, flat-plates and angle-plates, but the former were soon given up, because they were found unfitted to stand the heavy strain on the curves. All but the first few miles of rails are therefore jointed by means of double angle-fish-plates. The rails are of semi-mild steel, the fish-plates of mild steel, and the bolts of iron. The sleepers are of the "Ponsard" type, of rolled mild steel, weighing 71½ lbs. each, and they receive while hot a coating of tar. They can be handled by one man, and can be laid very rapidly. The rails are fixed to the sleepers by two tee-headed bolts, screwed into a binding-plate beneath. They rest on wedge-shaped bearing-plates, riveted to the sleepers, giving the rails an inward cant.

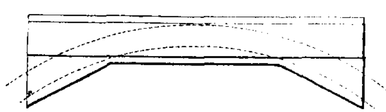
The stores sent up on trucks from Matadi were unloaded at temporary depot-wharves near the rail-end, and moved forward from time to time as the work advanced. The locomotives employed while the line was being constructed were of the type known as "works engines," of the same description as those used for haulage before the ballast was laid. Special patterns of points, crossings, and switches were employed, which were made in three pieces in Europe, and were very rapidly put together where required in less than an hour each. All crossings are of one uniform angle, 7° 45′, and the points are 8 feet 2 inches in length. The sidings signals are simple disks of the usual pattern, placed at from 220 yards to 330 yards from the sidings, and controlled by levers of the ordinary type. The water-towers, of a capacity of 2,200 gallons, are situated at convenient distances apart, and possess in each case a water-crane attached to them. The supply to the towers is by means of hand-pumps of the "Californian" type. Attempts are being made to provide for water in larger quantities, and the use of windmill pumps is proposed. Over parts of the line in certain seasons it was difficult to obtain water, and to overcome this drawback three tenders were constructed, each capable of carrying 660 gallons. They were made of a special pattern, so as to serve at the same time as wagons, but so far they have not been used.

All the masonry employed was of the nature of rubble-work, squared stone not being available. Slaked Tournai lime and cement were brought from Europe, and the sand was procured from the beds of the torrents. The mortar consisted of two parts of lime, one part of cement, and three parts of sand. This mixture was very rich, but the importance of strength was permitted to outweigh the question of economy.

Whatever might be the span of the bridges, the chief consideration was the need of avoiding intermediate piers, owing to the torrential character of the streams. Only two of the bridges contain more than one span, the one having a clear width of 229·6 feet, and the other of 196·8 feet. In these cases no other course was open, because it was found after the ironwork had been constructed that the waterway was insufficient, and that in both cases an extra span of 65·6 feet was needed.

Very few difficulties were encountered in the construction of the masonry for the abutments, as this work could generally be executed in dry ravines. In crossing certain rivers and marshes, however, the water present involved rather heavy hand-pumping. The breast-walls of the metallic culverts were constructed in 18-inch rubble masonry, built up flush with the ends of the tubes. In some instances, when the volume of water to be dealt with was large, three or more of the metal tubes were laid side by side and even one above the other, so as to give a sufficient area of outlet, both in width and depth. In these cases the breast-wall was of course made to enclose the ends of the entire group of culverts. In order to provide means for building the abutments of the bridges the rows of piles were so arranged as not to interfere with the work, and the temporary bridges were so constructed as to leave a free space between the piling for the stonework. As soon as the abutments were finished all that remained was to bring forward and fix the iron superstructure. Only cast steel and mild steel were employed in the bridge-work. In the first 180·8 miles, there are in all 110 bridges, which vary in span from 328 feet down to 13·1 feet. The bridges first erected were riveted together in the usual way, but this process proved so defective, so costly and so exceedingly slow, when executed by negro riveters, who were novices at the work, that in all the later ironwork recourse was had to turned bolts, which succeeded extremely well. The bolts were made in a special way by machine, and the Author states that the results in actual practice by the use of bolts were better than those obtained by means of riveting.

Fig. 2.



Many of the bridges are on very steep gradients, and in one case not only was the gradient 1 in 35½, but the line was on a curve of 2½ chains radius. The span of this bridge was 131·23 feet. The Author describes and illustrates by means of a diagram, *Fig. 2,* the special method of construction adopted in the case of this unusual bridge. The lattice-work on the outer side of the curve is straight, but on the concave face the girder is spread out at an angle towards each end and thus bears on to the abutments obliquely, the centre part of the lattice-work remaining parallel to the outer girder. In order to secure the gradient of 1 in 35½, the top flange, or roadway, finishes at this inclination, while the bottom of the girder is made level to avoid the danger of shifting downwards on the abutments—the girder is thus trapezoid in form. Certain special features in the construction of other bridges are described in detail by the Author. In all cases the design of the ironwork was made as graceful as was possible without entailing any pecuniary sacrifices. Certain of the cast-steel bed-plates for the bridges were too large to be made in one single piece, and had to be joined together *in sitû* by key-pieces bolted on. All the superstructures of the bridges up to 40 feet in length were put together in Matadi and loaded there on trucks. The larger bridges were erected in close proximity to the line, and were rolled into position on to the abutments on Sunday mornings when the traffic was stopped for the purpose. Some of the largest spans were put together on their own abutments, the traffic being only interrupted during the time needed to place the transverse joists and rails. Special precautions were taken to guard against the expansion due to the high temperatures encountered, both in the case of the bridge-work and in the method of jointing the rails.

The placing of the ballast was executed as speedily as possible after the rails were laid, though this work was generally 15 to 18 miles behind the rail-head. Materials suitable for ballast wêre found in more or less abundance all along the line. White quartz pebbles, which are plentiful in the upper layers of the soil in certain districts traversed, were chiefly used. It was found unnecessary to sift the soil containing the pebbles, as it was soon cleansed by the first heavy rains. Beyond the Inkissi the soil is mainly sandy and it was thought unsuited for metalling, but on trial the sand as used for ballast has turned out very well. It is found to be fairly cohesive, it is not washed away nor blown away by the wind and by passing trains, and it keeps well to the trimmed surface.

Having so far described the construction of the line, the Author proceeds to deal with the proposed mode of working the traffic and with the accessory details. First as to the means of transport, which vary in accordance with the particular phase reached in the progress of the work. In the section of the line actually completed for traffic, as far, namely, as the Inkissi, or 164 miles, as also in the section which is completely ballasted, the transport is provided for by the management staff (*service de l'exploitation*). Beyond the section where the ballast ends and where the metals only are laid, the traffic is still under the charge of the ballasting department. The trucks, laden with the materials and with the food for the workpeople, are all conveyed to the temporary depôt in the proximity of the rail-head. From this depôt all the stores, tools, materials used in the camps, &c., have to be carried forward by the ballasting department. They are consigned to a special agent to whom they are entrusted, and who causes them to be transported to the temporary stores situated where they are actually required for use. Small boxes, cases of dried fish, sacks of rice, &c., not exceeding 66 lbs. in weight are carried by porters; barrels, and iron tubes for aqueducts, are rolled along the temporary way. The depôt stores are very lightly constructed in galvanized corrugated iron. They are each of them 39 feet long by 13 feet wide.

For purposes of communication along the line and in order to regulate the despatch of trains, the company has established a telephone service, the terminus of which is the most advanced point reached by the earthworks. The telephone wire is of oxydized phosphor-bronze, in order not to excite the cupidity of the natives, who have a great admiration for copper. This wire is supported by means of metal standards 16·4 feet in height, with a spiked end from 2 to 3 feet deep in the ground. The posts at first used were of drawn barrel-tubing; but subsequently T-section posts in soft steel, of a weight of 22 lbs. per yard, have been substituted for them with advantage. These posts are fixed from 110 to 165 yards apart. The telephone stations are usually from 12 to 15 miles apart. Some curious interruptions in the service, supposed to be due to the induction of momentary terrestrial currents, which occur during the hottest part of the rainy season, are noticed. The telephone posts are also used to carry a telegraph wire joining Boma and Matadi with the furthest point reached by the railway.

Passing on to the question of the method in which the traffic of the line will be dealt with when the works are finally completed, the Author states that it is proposed to divide the entire length into three sections about equal in length, say each of 80 miles. These will be worked separately, and at the end of each section there will be a change of engines. Stores and workshops will be constructed at each stopping place. As long as no night trains are run the goods trains will cover only one section in the day and the entire journey will thus need three days. Certain passenger trains will complete the journey in two days, and for these there will be a change of engines midway, where engine-sheds and workshops have also been constructed. The stoppage for the night is arranged for at Tumba, at the 116th mile, and here hotel accommodation has been provided by private enterprise. The traffic will be worked on the block system. A train on reaching a siding will have to await a telephonic message from the signal station beyond giving "line clear." In order to avoid as far as possible the danger caused by the fact that telephonic communication leaves no trace in case of accidents, and with the view to fix responsibility, a very perfect system of booking all the messages has been devised.

Since the railway was projected the progress of trade has been far beyond expectation. In the first instance the tariff rates were fixed very high. All merchandise carried upwards was charged for at the rate of 3*s*. per ton per mile. The only exception made was in the case of salt, which was to be conveyed at half rates. Since these rates were fixed the company has agreed to carry all vessels, steam-engines, mechanical appliances used in agriculture or in industry, as also all electrical and telephonic apparatus, at a reduction of 40 per cent. By a still later arrangement it has been agreed to convey all railway plant for new lines communicating with the Upper Congo above Stanley Pool at half rates.

In the case of the downward traffic differential rates dependent upon the value of the products have been agreed upon, with a view of promoting the export trade. Palm-kernels, ground-nuts and timber pay the lowest rates, about 4*d*. per ton per mile, and ivory the highest, 3*s*. per ton per mile. White travellers pay 1*s*. 6*d*. per mile, and negroes travel at one-tenth this rate. Return fares are calculated at one and a half times the rate for a single journey. First-class passengers are allowed 220 lbs. of luggage free, and second-class passengers, 44 lbs. Thirty or more negroes travelling together in parties, in the service of a white employer, are carried at half fares.

During the construction of the line the maintenance and repairs of the finished section are entrusted to the service which corresponds to the permanent-way department (*voies et travaux*) on European lines; but the section still incomplete is in charge of the construction department. The whole line is divided into sections and sub-sections for the purpose of repairs, each of which is entrusted to a group of native workmen under a black foreman. Each section of about 62 miles has a works engine and a stock of trucks for ballasting purposes. There will eventually be four sets of repairing-sheds, the two chief ones at either end of the line, and two smaller ones at the sectional stations where the engines are changed.

A detailed account is given of the repairing shops at Matadi,

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and of the supply of machine-tools, &c. Two types of goods-engines are in use, and after careful study by experts in Belgium a locomotive was specially designed to meet all the exigencies of the case, and adapted for the sharp curves and heavy gradients. The engine in question has eight wheels, the three front pairs coupled with a wheel-base of 7·32 feet, and the axle of the trailing-wheels placed far back, 6·56 feet behind the front group. The total wheel-base of 13·94 feet being quite out of the question on curves of 2½ chains, the trailing-axle is given a transverse movement by the employment of radial axle-boxes, and in addition to this provision is made for a slight amount of play in the leading-axle. This locomotive, like all the later ones, was furnished with a tender. The total weight when empty is 24 tons, and 31 tons when in running order. The boiler is in mild steel, tested to 180 lbs. per square inch; it has a copper fire-box and brass tubes. This engine can propel three 10-ton trucks on rising gradients of 1 in 22. It has great stability, but has not proved well adapted for the sharp curves. This type has, therefore, been given up in favour of a locomotive having six coupled wheels on a wheel-base of 11·8 feet. This engine weighs 21½ tons empty, and 26½ tons in running order, and can take four 10-ton trucks up the steepest gradients on the line. A much lighter engine has been designed for the passenger traffic, having only four wheels coupled on a wheel-base of 6·56 feet, and capable of drawing two carriages, or a carriage and a goods-truck. The passenger engine weighs 16 tons when empty, or 18½ tons in running order. A still smaller engine is used for works purposes. Illustrations are given of each form of engine, as also of the 10-ton trucks on bogies. Some account follows of the coaches and rolling-stock and of the staff in charge of the trains.

Mention has from time to time been made of the rivers and torrents traversed, and it will naturally appear probable that some attempt should be made to utilize the water-power for the generation of electricity. The river Congo at Matadi could easily be made to furnish 250,000 HP., and if three trains were despatched daily over the whole line each way, it would only involve the expenditure of about 2,000 HP. No doubt the practical difficulties in the way of obtaining the power from the Congo would be enormous. It is shown, however, that even if the power could only be utilized within a radius of, say, 37 to 43 miles, the rivers M'Poso, Lufu, Kwilu, Inkissi, and Lukaya would furnish ample power for the sections of the line in their vicinity. For this purpose the rivers in question would have to be dammed, and expensive works would be needed; but the Author states that none of them would present any special features of difficulty in point of construction, and this question will ere long be seriously considered. In conclusion, the following matters, not strictly relating to the railway, are discussed—the Ports of Matadi and Stanley Pool, the staff of the company, and the financial considerations, together with the mode in which the capital needed for the enterprise has been obtained. The actual capital is £1,200,000, but in addition to this there is a debenture debt of £1,400,000.

Numerous photographs are given of the country traversed and of different parts of the line, and maps are appended of the Congo basin and of the route selected for the railway. One of the maps has been reproduced in the present abstract.