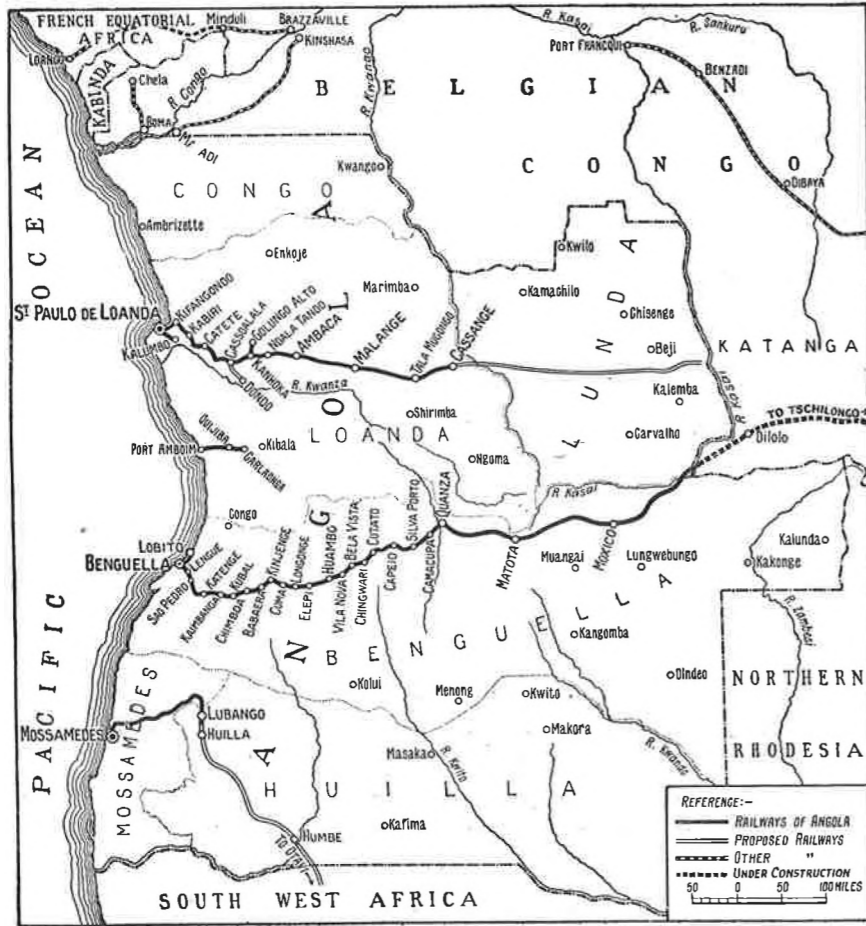


Railway Developments in Central Africa

By our London Representative—W. Cyril Williams

THE slow but sure penetration of the Steel Highway—the greatest civilising force in the world—into “Darkest” Africa

hinterland. Thousands of square miles of jungle, mighty rivers, huge inland seas, great mountain ranges, arid plains, severe



is as fascinating as it is marvellous. No country in the world is so fortified by nature against the inroads of the white man and his mechanism and no country in the world has presented transport difficulties more immense or has demanded, and still demands, such vision, indomitable courage and dogged perseverance in the opening up of its

climatic conditions, millions of unskilled natives speaking unknown languages, wild animal life and deadly diseases are the fortifications. Yet, although it was only in 1855 that Livingstone, whose name is indelibly written across the continent of Africa, discovered the Victoria Falls, to-day we find the opening up of Central Africa



“Garratt” Locomotive—Benguela Railway.

well in hand, and the hidden mineral and agricultural wealth of this colossal territory being revealed and utilised to the world’s advantage.

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It was in 1862 that the first section of railway from Cape Town northwards was opened, and no one at that time could have visualised its ultimate destination and ramifications. In later years Cecil Rhodes dreamed of a great arterial route from the Cape to Cairo from which would radiate

numerous branches to the East and Western coasts and, despite the ridicule of Governments, his dream is now nearer realisation than ever. He not only dreamed, but was responsible for pushing the rail-head

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Bridge over the Catumbela River, Benguela Railway.

Mr. G. A. Hobson, of the firm of Sir Douglas Fox and Partners—the total length of which is 650 feet, is the highest in the world, being 420 feet above the river. It was constructed in the short period of 19 weeks, work being

simultaneously carried out from both sides of the gorge. When the two ends of the bridge were coupled up the rivet holes were but an $\frac{1}{8}$ " out of centre.

The Zambesi crossed, construction was then continued through Northern Rhodesia until, in 1909, the rails entered the Belgian Congo, 2,137 miles from Cape Town. The line, which below Bulawayo is administered by the South African Railways, and from Bulawayo to the Congo border comprises the Northern main line of the Rhodesia Railways, was then pushed forward by the Chemin de Fer du Katanga, through the mineral province of Katanga—now one of



Workshop Staff, Lobito Bay, Benguela Railway.

the greatest copper producing districts in the world—to Bukama, which was opened for traffic—after delays in obtaining material due to the War—in 1918. By this time railways had been completed from Mombasa on the Indian Ocean to Kisumu on Lake Victoria Nyanza, from Dar-es-Salaam to Kigoma (Ujiji) on Lake Tanganyika, and many other small lines had been opened or were under construction.

From then onwards great activity in railway construction has been maintained and the present year is witnessing three epoch-making events to which brief reference will be made:—the completion of the Benguela Railway to the Belgian Congo border, the completion of the extension of

the Chemin de Fer du Bas Congo-Katanga line from Bukama to Port Francqui, and the opening of the Uganda extension of the Uasin Gishu line connecting up with the Busoga Railway, and thus establishing rail communication between Mombasa and the source of the Nile.

The discovery of the great copper belt in Katanga has greatly influenced railway development in Central Africa and, although the linking up of Katanga with Beira was indispensable, it gradually became obvious that a shorter route to the sea was imperative in the interests of the economic future of this great mineral province. Accordingly,

under concession from the Portuguese Government, the Benguela Railway (Caminho de Ferro de Benguela), an enterprise of the Tanganyika Concessions, was commenced and has this year been opened to the old border line of the Congo, a distance of 772 miles from Lobito Bay. As a result of recent negotiations between the Belgian and Portuguese Governments, the south-east corner of the Congo, known as the Dilolo Boot, has been handed over to Angola in exchange for certain land in the north which will enable a more economic reconstruction of the Chemin de Fer du Congo between Matadi and Leopoldville.

The Congo border is thus moved eastwards and the Benguela Railway will,



Mail Train at Huambo Station, Benguela Railway.

therefore, extend a further 62 miles. This section is now under construction and is expected to be completed about the middle of this year. The Benguela Railway from Lobito Bay to the Congo border will, accordingly, be about 834 miles in length. On reaching the frontier the Chemin de Fer du Bas Congo will immediately continue the remaining portion, linking up with the line from the south at Tschilongo about 25 miles from Bukama, the Belgian section being 338 miles long instead of 400 as originally surveyed.

From this it will be seen that in about 1930, when it is expected that junction with Tschilongo will be made, the Benguela Railway is destined, in addition to becoming part of a great trans-continental goods and passenger route, also to have a far reaching effect on the relationship of Katanga to



Between San Pedro and Catengue on the Benguela Railway.

its European markets. This is easily appreciated by comparing the distances of Elizabethville, the commercial centre of the province of Katanga, to London, which via Cape Town is 8,488 miles, via Beira 9,398 miles, but via the Benguela Railway and Lobito Bay only 6,350 miles!

The Benguela Railway, built to the standard gauge of South Africa, namely 3' 6", has, with the exception of the first 200 kilometres, been constructed by Pauling and Company Ltd., the famous builders of

the majority of African Railways, the Consulting Engineers being Sir Douglas Fox and Partners.

In common with many South African lines from the coast to the interior its construction has presented many engineering difficulties, the climb to the Central Plateau, which has an elevation of about 6,000 feet, covering 239 miles. Nevertheless, except

for a very short section of rack, the ruling gradient of 1 in 40 has not been exceeded to Cubal (Km. 197) while, from Cubal to Huambo (Km. 426), the ruling gradient is improved to 1 in 50, and beyond to 1 in 80. From Lobito Bay to Huambo the grades are uncompensated for curvature but the remainder of the line is compensated throughout. The radius of the sharpest



Low sided bogie wagon, Benguella Railway.
(Built by the Metropolitan Carriage, Wagon & Finance Coy. Ltd.)

curve is 396 feet and the permanent way is laid with 60lb. flat bottomed rails 33 feet long on steel sleepers. The rack system which is on the Abt system two bar type extends from Lengue (Km. 50) to S. Pedro (Km. 54), the gradient being 1 in 16.

The Port of Lobito Bay which is being provided with modern terminal facilities is one of the finest natural harbours in Africa. At first the line passes through an inhospitable waterless scrub country, but at Cubal cultivation commences which more or less continues throughout—sugar, cotton, maize and rice being plentifully cultivated by the natives.

At Longonje (Km. 342) the ascent of the Lepi mountains commences and at Km. 385 the line reaches an altitude of over 6,000 feet. At Huambo, which is fast becoming an important administrative,



On construction, Benguella Railway.

trading and railway centre, the main locomotive, carriage and wagon repair shops of the Benguella Railway are being erected. These workshops will be thoroughly up-to-date in every respect, equalling, if not surpassing, in efficiency and lay-out anything in the Sub-continent. The remainder of the route presents few engineering difficulties, the line continuing across a plateau to the frontier where, as stated, it will link up with the Congolese line. The copper belt will be entered at Musonui, some 60 miles to the west of Tschilongo.

In addition to the first-class railway workshops already referred to it is to the credit of those responsible for the equipment of this new line that modern types of rolling stock have been adopted and one finds comfortable restaurant cars and sleeping coaches in operation. The goods stock is also of high capacity and is fitted with the automatic vacuum brake, thus enabling heavy loads to be hauled at speed. The locomotives of the Benguella Railway, of which there is a total of 45, consist



Cutting at Kilom 858, Benguella Railway.

of shunting locomotives, four rack engines, and several 7th and 9th class, having 4-8-0 wheel arrangements very similar to those employed on the Rhodesia and South African Railways. Their latest acquisition is a number of exceptionally large "Garratt" locomotives which were purchased in 1926 from Beyer, Peacock & Co. Ltd. These locomotives have a maximum axleload of only 12.75 tons but are the most powerful in the world, operating on a 60lb. rail, developing a tractive effort of 46,200lb.



Platelaying across Chifu Maji Plains, Benguella Railway.



Chemin de Fer du Congo—"Garratt" locomotive.

at 75% boiler pressure. Six of these locomotives have been in service over a year and are giving excellent results, and on the 1 in 40 uncompensated grades loads of from 450 to 500 short tons are being hauled as compared with 230 tons, the load of the previous largest engine known as the 9th class. These "Garratts" are capable of a speed of 45 m.p.h. Wood fuel is at present being used, although it is possible that, in the near future, coal will be introduced. The handling

and firing of the wood fuel is carried out very efficiently on the Benguella Railway and a full head of steam is maintained with these large engines which have a grate area of 51.5 sq. ft. The following are the principal dimensions of these interesting engines:—

Cylinders	...	...	18 $\frac{1}{2}$ " x 24"
Diameter of coupled wheels	...	...	4' 0"
Boiler pressure	...	...	180 lb. per sq. in.
Tractive effort at 75% B.P.	...	...	46,200 lb.
Heating surface:			
Tubes	...	...	2,327 sq. ft.
Firebox	...	...	205 " "
Arch Tubes	...	...	24 " "
Superheater	...	...	2,556 " "
	...	...	458 " "
Total	...	...	3,014 " "
Grate area	...	...	51.5 " "
Water capacity	...	...	5,000 galls.
Fuel	...	...	6 tons
Weight of engine in working order	...	...	158 tons 2 cwt.

All of these locomotives are fitted with Lentz poppet valves. The coupled wheel next to the four-wheeled bogie in both engine units are flangeless so that the rigid wheel base of these locomotives is only 9ft. thus enabling the engine to negotiate curves of 300ft. radius with ease.

The introduction of such huge modern locomotives so early in the history of this railway which are considerably in advance of the equipment on many railways—much longer in existence—is in harmony with the spirit that has brought the

Benguella line into existence, and it can be foreshadowed that in the very near future it will be possible to travel by *trains de luxe* through to such centres as Beira, Johannesburg, Cape Town, Durban and Walvis Bay by railways having the same gauge, and therefore, without change of coach.

As already mentioned, a further important event in railway progress has been recorded this year. The first trains have been run from Bukama to Port Francqui (Ilebo) in the heart of the Belgian Congo near the confluence of the Sankuru and Kasai rivers. Railway development in this vast territory, nearly eight times the area of Great Britain, has been somewhat disconnected due to nature's provision of many thousands of



Royal Train crossing Victoria Falls Bridge, Rhodesia Railways.

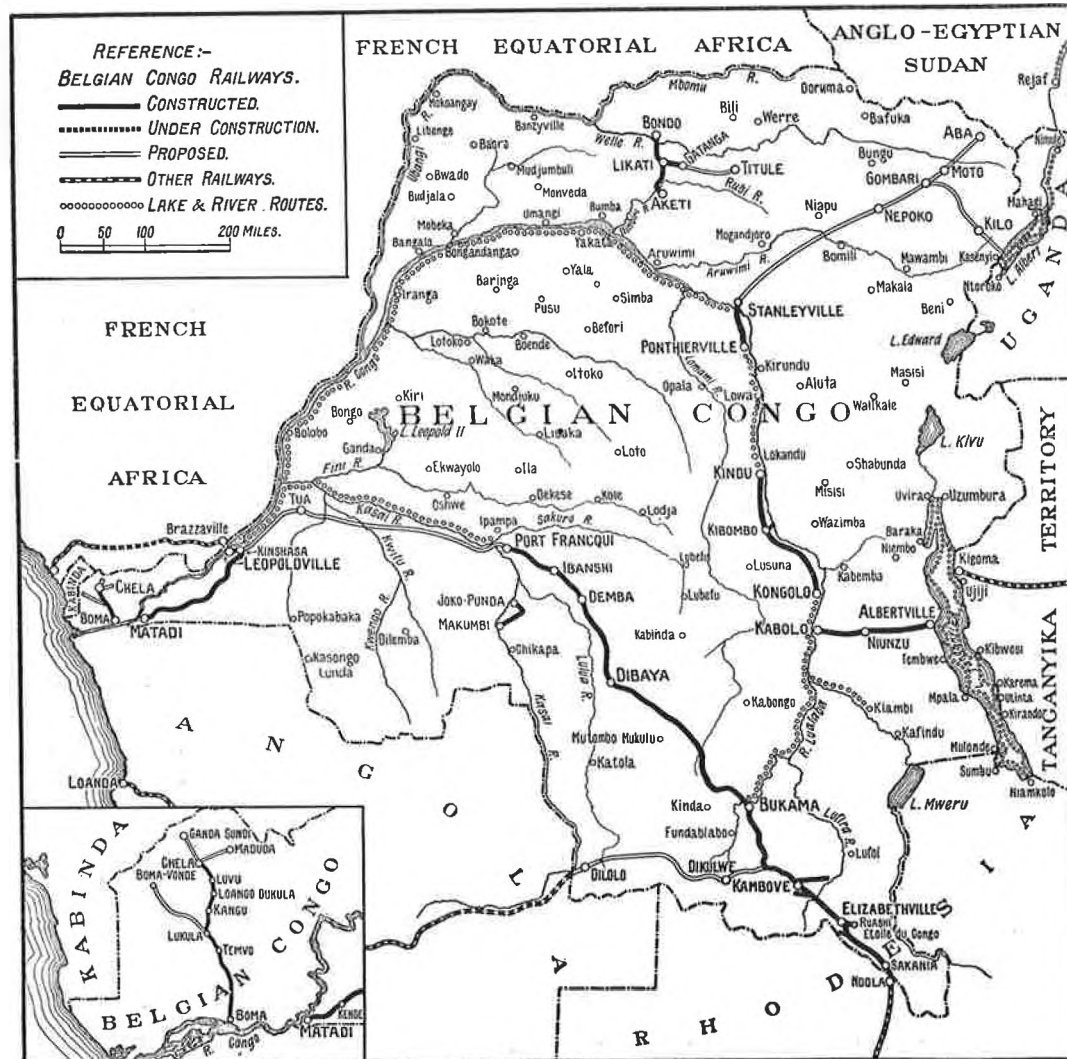
(Photo: Percy M. Clarke)

miles of navigable waterways. During the last five years, however, there has been a very definite attempt to consolidate, as it were, the railway map of the Congo and, in addition to new construction, a big mileage of narrow gauge lines are to be converted to the 3' 6" gauge standard. Some idea of the progress taking place is gleaned from the fact that in 1926 there were roughly 1,500 miles of railway in operation whereas, in 1931, it is estimated the mileage will reach 4,000, most of which will be of the 3' 6" gauge.

Up to the opening of the Bukama-Port Francqui line the only outlet to the sea within the Belgian Congo was by river transport on the Lualaba (Upper Congo) to Kongolo, thence by rail to Kindu, by river again



Relaying on the main line, Rhodesia Railways.



to Ponthierville, rail again being taken to Stanleyville, and thence by river to Leopoldville, whence the Chemin de Fer du Congo runs to Matadi. 95 miles from the coast at which point ocean-going steamers are available.

The construction of the Bukama-Port Francqui line, which is a continuation of the Chemin de Fer du Katanga, was commenced in March, 1923, from both ends and is laid with 60lb. rails, the material for the northern section being conveyed over the Chemin de Fer du Congo from Matadi and thence 500 miles by steamer on the Congo and Kasai rivers to Port Francqui. The construction of the line was considerably hampered by the inadequacy of the Matadi-Leopoldville line to handle the increased traffic. The length of the new Bas-Congo line is 696 miles and its completion establishes a continuous 3' 6" gauge from Port Francqui—latitude 5° south—to Cape Town—latitude 34° south—a distance of 3,294 miles! The last rail joining the north and south sections was laid on the 13th February, 1928, the first through train running on the 5th March, but the line is to be officially opened in July, when it is expected that the King of the Belgians will be present. This new trans-Congo line will ultimately be continued to Leopoldville (400 miles) but for the present river transport will have to be used. The Chemin de Fer du Congo is now being reconstructed throughout and the existing gauge of 2' 6" altered to the standard 3' 6" gauge, thus ensuring in due course the same gauge through to Cape Town. The approximate distance from Matadi to Cape Town will be 3,922 miles. The maximum gradient will be altered from 1 in 22 uncompensated to 1 in 60 compensated, while the radius of the sharpest curve will be 800ft. as compared with 164ft. of the old line. The new line will be laid with rails of 70lb. per yard and will be completed between Matadi and Leopoldville in about three years' time. The new line will be 228 miles long or 14 miles shorter than the 2' 6" gauge line.

This railway has 151 locomotives, 32 of which are of the "Garratt" articulated type, having been built by the Société Anonyme de St. Léonard of Liège, Belgium, under arrangement with Beyer, Peacock & Co. Ltd. The last 10 of these locomotives were supplied during 1926. They have an 0-6-0, 0-6-0 wheel arrangement and a tractive effort of 22,500lb. (75% boiler pressure), their total weight being 38 tons.

While this railway has come in for a good deal of criticism owing to its inability to deal with the greatly increased traffic due to the construction of the new Bas-Congo line, it may be said that it is mainly due to the comparatively big loads which these small "Garratt" engines hauled that the traffic was ultimately dealt with.

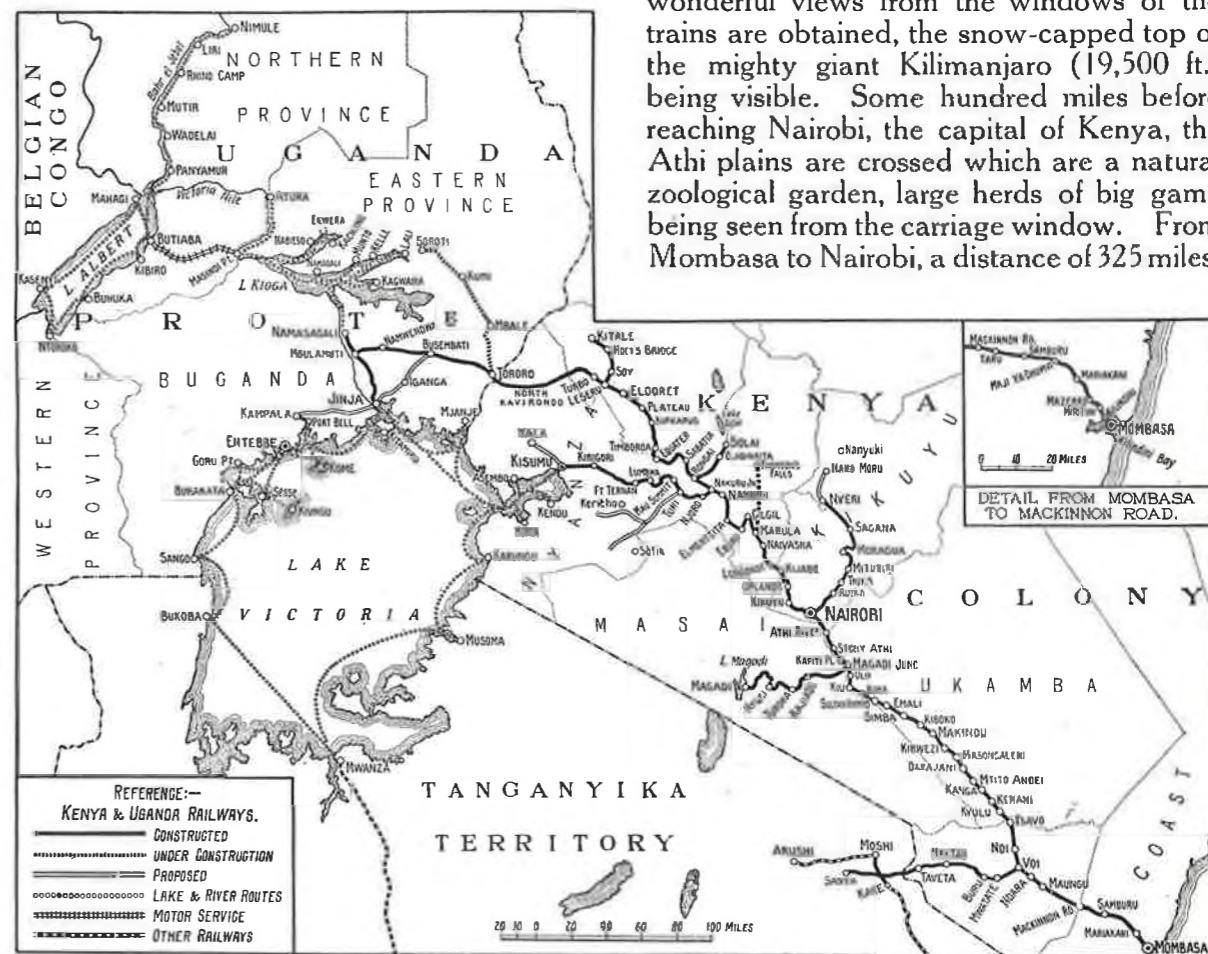
The Kindu-Kongolo line 220 miles long, the Stanleyville-Ponthierville line 80 miles long, a 170 mile length of railway from Kabalo to Albertville on Lake Tanganyika, and also various river and lake steamship services are operated by the Chemin de fer du Congo Supérieur Aux Grands Lacs Africains. This Company has also in hand a railway from Stanleyville towards Lake Albert—the line touching the Kilo and Moto goldfields—and it may be forecasted that junction will ultimately be made with the Kenya and Uganda Railway as well as with the railways of the Sudan Government.

The Uganda extension of the Kenya and Uganda Railway is the third event which tends to make the year 1928 memorable in the history of railway development in Central Africa, and the widest interest has been created by the opening of this line, which thus establishes communication between Mombasa, on the Indian Ocean, and Jinja, on Lake Victoria Nyanza, the source of the Nile, just 65 years after its discovery by Speke. The new railway which branches off from the Mombasa-Kisumu line at Nakuru is 381 miles in length, linking up with the Busoga line at Mbulamuti, 41 miles from

Jinja. The line has been built departmentally by the Kenya and Uganda Railway and the despatch and thoroughness with which this difficult piece of engineering has been executed is in keeping with the great strides that this Railway has made during recent years. The progress of the Kenya and Uganda has been very marked since the Hon. C. L. N. Felling took over the reins some five years ago, as not only has the new line under note been inaugurated, but branch lines have been built, while others have been lengthened and large sums have been spent on modernizing the whole equipment of the line, including the brave step of relaying the Mombasa-Nairobi section with 80lb. rails. The Railway is thus being fitted for the expansion of trade that will inevitably

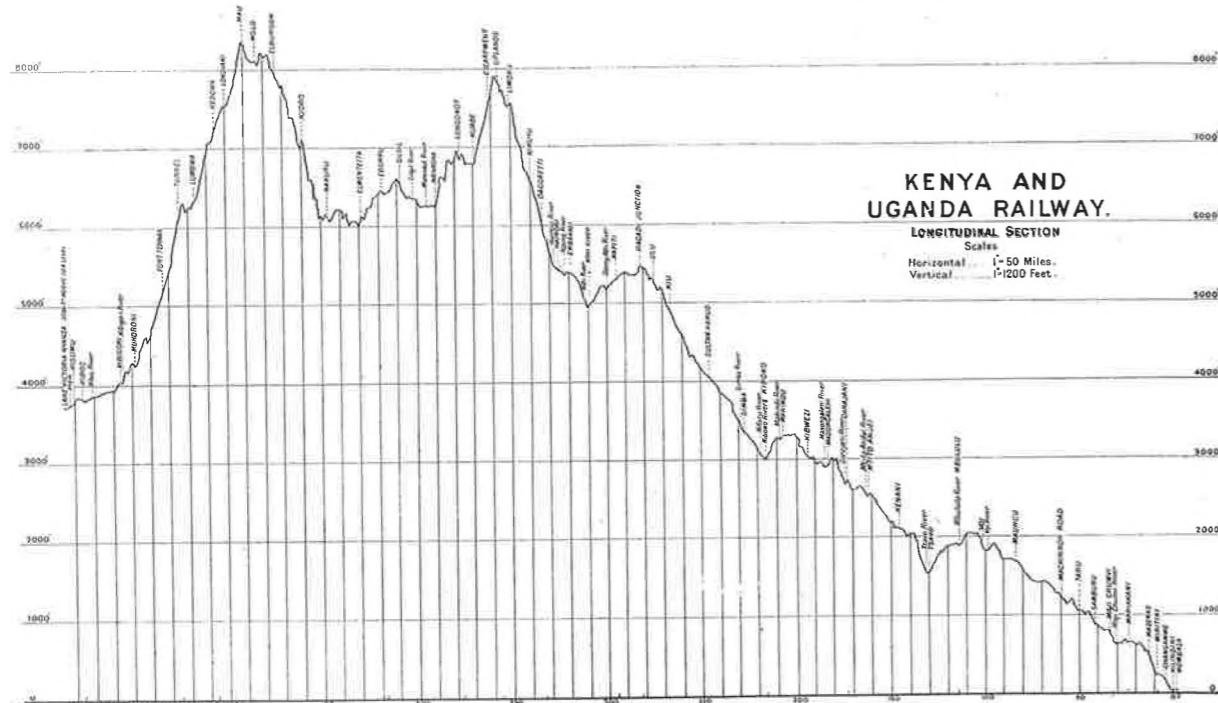
be associated with the opening of the railway into Uganda.

The Kenya and Uganda Railway, which is built to the metre gauge throughout, was commenced from Mombasa in 1895 and was completed to Lake Victoria in 1903. While in the first place the line was not built as a commercial enterprise but more for political reasons the country which has been opened up has revealed the vast possibilities of this extensive territory, and such commodities as maize, cotton, coffee, sisal, soda, etc., are now being exported in large quantities. From Mombasa to Kisumu is perhaps one of the most interesting railway journeys in the world, the railway reaching an elevation of 8,000 ft. as will be seen in the longitudinal section illustrated. Very wonderful views from the windows of the trains are obtained, the snow-capped top of the mighty giant Kilimanjaro (19,500 ft.) being visible. Some hundred miles before reaching Nairobi, the capital of Kenya, the Athi plains are crossed which are a natural zoological garden, large herds of big game being seen from the carriage window. From Mombasa to Nairobi, a distance of 325 miles,



relaying is now in progress, the original rail of 50lb. per yard being substituted by an 80lb. rail, and nearly 250 miles from Mombasa have already been completed with the latter. Regrading is also in progress so that before long the maximum grade coastwards from Magadi Junction to the sea will not exceed 1 in 84. From Nairobi to Uplands the grade is continuous 1 in 50 uncompensated, the sharpest curve having

fine sleeping coaches and dining cars have been recently introduced. The dining car illustrated is 62 ft. long and 9 ft. wide over body, which gives an idea of the extent to which rolling stock has been developed on the metre gauge. Accommodation is provided for 24 passengers and the interior fittings are of distinctive and attractive design. Particular attention has been given to the kitchen, which is capable of dealing



Section of main line, Kenya and Uganda Railway.

a radius of 573 ft., and "Garratt" locomotives are utilized on this section. Between Uplands and the Mau summit the great Rift Valley is crossed and a marvellous panorama of country comes into view. As a result of the opening of the new line the section from Nakuru to Kisumu will be termed a branch line, the new line to Jinja now becoming the main line.

The rolling stock of the Kenya and Uganda Railway may be said to be in the forefront of Central African Railways, and

with 60 passengers at each meal. The Westinghouse automatic brake is used and the goods wagons are of the high capacity bogie type.

The locomotives number 167 of various types, the chief classes in descending order of power being the "Garratt" articulated engines, the recently imported 80lb. rail engines, of which we have an illustration, and the class GD. The GD type, which has proved a very serviceable engine, has a tractive effort of 20,000 lb. at 75% B.P., its

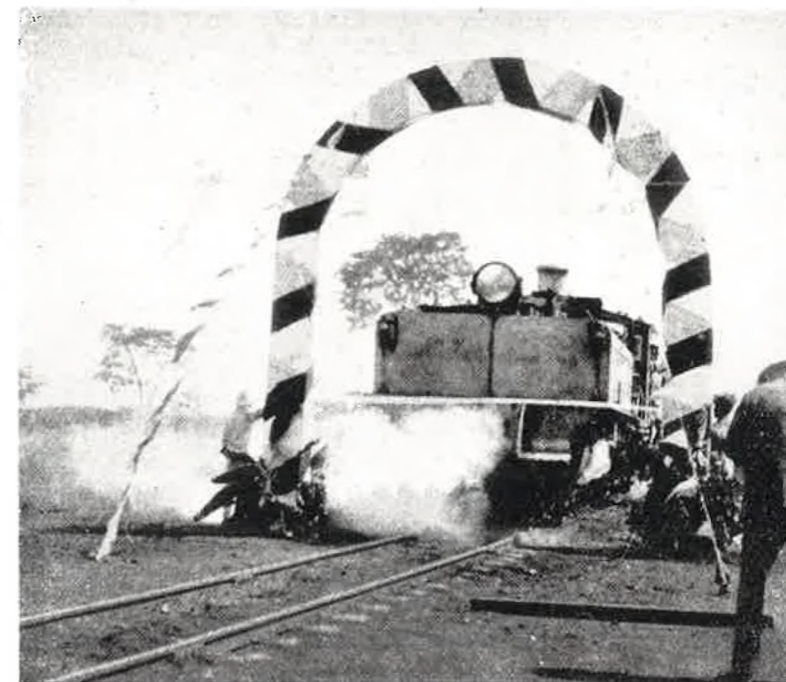


"Garratt" locomotive, Kenya and Uganda Railway.

total weight being 86 tons. These engines haul a compact load of 240 tons on the stiffest section, i.e., between Nairobi and Uplands. The "Garratt" locomotives, of which four were obtained from Beyer, Peacock & Co. Ltd. in 1925, haul 400 tons on the same section and have been so successful that their use has been extended

Cylinders (by stroke) 12...	16 1/2" x 22"
Diameter of coupled wheels	3' 7"
Boiler pressure	170lb. per sq. in.
Tractive effort at 75% B.P.	35,520lb.
Heating surface: Tubes	1,863 sq. ft.
Firebox	174 " "
Superheater	380 " "
Total	2,417 " "
Grate area	43'6 sq. ft.
Water capacity	5,250 galls.
Fuel capacity	6 tons
Weight of engine in working order	131 tons
Max. axleload of last 12 engines	10 1/2 tons

and a further twelve have recently been shipped— assembled— from Beyer, Peacock & Co.'s Works at Gorton Foundry. These engines are practically identical with the first four except for an increased water capacity. Their leading dimensions are as follows:

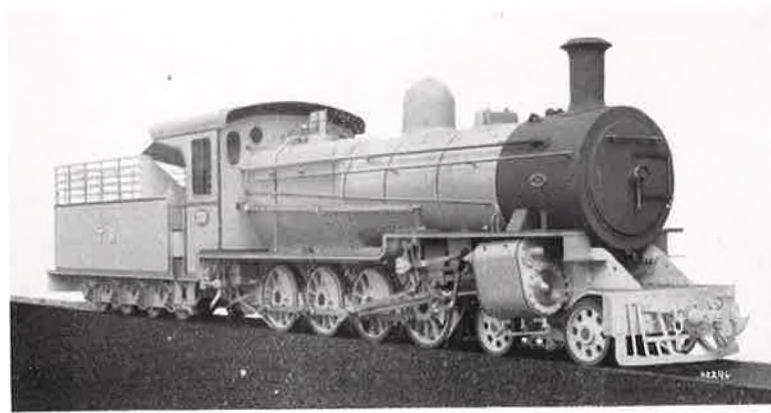


"Garratt" locomotive conveying special train, breaking the tape on entering Uganda from Kenya.

(Photo: R. F. Mayer: reproduced from "The East African Standard.")

It is worthy of note that many of the "Garratts" are handled by African native labour.

A recent addition to the motive power of the railway is a very fine non-articulated locomotive, shown in our illustration, which ranks amongst the



4-8-0 Locomotive, Tanganyika Railways.

heaviest and most powerful orthodox type metre gauge engines in the world. This class is employed on the newly laid 80lb. section. Their tractive effort is 33,500lb. at 75% boiler pressure.

On January 9th, 1928, a special train conveying

H.E. the Governor of Uganda and officials and representatives of the country's various activities left Nairobi for Jinja arriving there on the 11th January, where the opening ceremony of the Uganda extension was celebrated. Thus was forged another link in the chain of African communications. In due course it is hoped to continue the line on to Kampala and thence to Fort Portal below Lake Albert and finally to the Belgian Congo border, where it will doubtless link up with the projected line in the Congo to the Kilo and Moto gold-fields.

Many older railways might well be jealous of this special

train which set out on the 500 mile journey to Jinja. Up-to-date in every respect with sleeping coaches and restaurant car, the train was hauled by a 4-8-2, 2-8-4 "Garratt" locomotive to which reference has been made, or in other words, the largest engine in the world operating on a 50lb. rail. Seldom, if ever, has a newly laid 50lb. track been initiated into service by use of the highest powered locomotive that the

rail will carry! But for the "Garratt," two engines would have had to be employed on this heavy special, which would surely have been incongruous with the engineering skill and efficiency that has been exhibited in this fine piece of departmental



Dining Car, side view (built by the Metropolitan Carriage, Wagon & Finance Coy. Ltd.)

railway construction. The "Garratt" engine was driven by Sir Edward Grigg, Governor



2-8-2 Mikado Locomotive for 80 lb. rail (built by Messrs. Robert Stephenson & Co. Ltd., Darlington)

of Kenya, and High Commissioner for Transport, across the border into Uganda, and our illustration shows a photograph of the engine breaking the tape. Sir Clement Hindley, Minister of Railways for India, was also present. The special train ran without a hitch, and, to quote the words of the *East African Standard*, "The 'Garratt' Locomotive hauled the special train over the 1,000 miles with remarkable success."

After leaving Nakuru the new line rises to a height of 9,040 ft. near Timborua, this being the highest point reached by a railway in the British Empire. From there it pursues its course across the fertile Uasin Gishu Plateau. Between Tororo and Mbulamuti the railway crosses the Mpolagoma Swamp which presented special engineering difficulties. An extension from Tororo north to Soroti is at present under construction.

Mr. H. G. Dempster, Resident Engineer of the Kenya and Uganda Railway, has been in charge of the construction of the Uasin Gishu and Uganda extension line, Messrs. Rendel Palmer and Tritton being the Consulting Engineers.

It is expected in the near future to inaugurate a bi-weekly service between Mombasa and Jinja, a distance of 827 miles, to improve and accelerate the transport of mails and passengers between Uganda and the coast.

There is perhaps only one note of regret

in connection with the developments of this important system, which is the fact that the gauge differs by $2\frac{3}{8}$ in. from the majority of South African and Central African lines, but this disadvantage will not be felt until linking up is effected with the Congolese and Sudanese 3ft. 6in. gauge railways.

While not coming under the subject of these few notes, the picture would be incomplete without a reference to the Tanganyika Railway, which runs from Dar-es-Salaam to Kigoma on Lake Tanganyika. This line, built by the Germans between the years 1904 and 1914, also of the metre gauge, is 772 miles long. From Tabora 530 miles from the coast, an important branch 238 miles long is under construction to Mwanza on Lake Victoria. This branch is already open to Shinjanga and when complete will establish communication between Kenya and Uganda and the south, via Lake Victoria, the Mwanza-Tabora-Kigoma railway, Lake Tanganyika, Albertville-Kabolo railway and the Lualaba river to Bukama. Thus the evolution of the transport system of Stanley's Darkest Africa unfolds.

Thanks are due, for the kind loan of blocks and photographs, to the *Railway Gazette*, Sir Douglas Fox & Partners, the Benguella Railway, Pauling & Co. Ltd., the Kenya and Uganda Railway and Southern Rhodesia offices in London.



"Garratt" locomotive with load, Nairobi Station, Kenya and Uganda Railway.