present at an experimental trip over the road, made to test the results of some repairs to the track and road-bed, as well as to give an idea of the workings of the system to a party of gentlemen interested in railroad matters, among whom were a few from Europe. The run over the road was fully up to the expectations of all present, the train gliding along as smoothly, and as free from jar or oscillation, at the highest speed reached as at the slowest. Even when rounding curves of short radius at high speed, where cars are subject to the violent and disagreeable oscillations caused by the difference in level of the rails combined with the centrifugal force due to the swing around the curve, the Boynton car, on its one-rail track, ran as smoothly and steadily as on a tangent. In fact, the only thing to indicate that the car, when rounding a curve, was not running on a straight stretch of track, was the slight incline given the car by the guide-rail overhead to counteract the centrifugal force caused by the rapid motion and curvilinear course of the train. Inequalities in the track also, which make themselves manifest by oscillations in ordinary railroad travelling, merely caused a slight vertical motion of the car, softened, of course, by the springs. To sum up the impressions produced by a ride over the road, every thing seems to indicate that Mr. Boynton's theories are based on correct scientific principles, that his system solves the problem of high speed combined with safety, and that for a continuous speed greater than fifty miles, reaching perhaps a hundred or more, — a speed urgently demanded by present business methods as a natural sequence to telegraphic and telephonic development, — Mr. Boynton's system, or some modification of it, must necessarily be adopted.

Our illustration shows a freight-engine of a type designed by Mr. Boynton for the bicycle or single-rail system of railroad. Though presenting many novel features, being intended for great hauling power rather than high speed, it embodies the same general principles as the high-speed locomotive illustrated and described in our issue of last week. It carries two boilers, two cylinders, and two sets of drivers. The two-story cab is located midway between the boilers, so that one engineer and one fireman control both parts of the engine.

THE KONGO RAILWAY.[1]

IN November, 1885, a syndicate of English capitalists, headed by Sir William Mackinnon, was constituted with a view of obtaining from the Kongo State the concession of the railway from the Lower Kongo to the Stanley Pool. The time, however, had not yet come for great enterprises on the Kongo. Stability was not yet sufficiently secured. The political work was not sufficiently advanced; so that capital, in order to insure its security, was obliged to demand powers which the Kongo was unable to grant, so that the negotiations fell through, and the English syndicate was dissolved.

Shortly afterwards the affair was taken in hand, at my suggestion, on a more modest scale, by the Compagnie du Congo pour le Commerce et l'Industrie, constituted with a capital of 1,000,000 francs, which sum was afterwards raised to 1,225,000 francs, with the immediate object of studying in a practical and definitive fashion the possibility of laying the railway. The statutes were drawn up, however, in order to allow the Compagnie to become, by simply increasing its capital, the company for laying and working the railway. The Compagnie du Congo was definitely constituted on the 9th of February, 1887. By the 8th of the following month of May, the first expedition of engineers left for the Kongo. On the 10th of June a second group sailed from Antwerp. At the end of July the gangs, assembled at Matadi, were composed of one director of survey, twelve engineers, and one physician. Those who had arrived first determined the geographical position of Matadi, made some soundings to satisfy themselves of vessels of a large draught being able to land without considerable works, and reconnoitred the environs. From the first days of August, work began. One study-gang walked in advance, reconnoitring the country, and determining rapidly, by means of the levelling-compass, the zone of the ground to be surveyed. Three gangs, each composed of three engineers, followed, and drew with the tacheometer the plan of the reconnoitred zone. Haussas, negroes of the Gold Coast, were employed as staff-holders. The zone on which the operations with the tacheometer were performed varied, according to circumstances, from 50 to 200 metres on both sides of the likely axis of the way. The progress of the work, which at the very beginning of the operations was only from 300 to 500 hundred metres per brigade and per day, on the difficult ground near Matadi and Palaballa, soon increased to one or two kilometres, the expedition having passed the mountainous region, and by way of exception was raised to four or five kilometres per day, the maximum space between the stations of the instrument being 300 metres. The operations on the ground continued in 1887 up to December, when the study had been carried on as far as Lukunga. The work then suffered an interruption of four months on account of the rainy season; nevertheless a special gang continued working during January and February, 1888, in order to execute near Matadi the survey of an alteration made in that region to the first direction-line. In May, 1888, the staff having again their full complement, works were resumed. While the chiefs of the gangs went to reconnoitre previously the region which extends between the Lukunga and the Stanley Pool, the other engineers completed the works around Matadi. At the beginning of July the whole staff resumed the operations with the tacheometer. On the 4th of November, 1888, the level was set up for the last time at Stanley Pool, and the engineers went back to Europe.

The railway which is proposed to be laid in the cataract region, according to the survey plans and estimates, will have a gauge of 75 centimetres, with steel rails weighing 23 kilos, steel sleepers at equal distances of 80 centimetres, and weighing 23 kilos, the whole of the line weighing 75 tons per kilometre. The total length of the line will be 435 kilometres. The laying of the first 26 kilometres only will offer some important difficulties, while the remainder of the line will be laid under exceptionally easy circumstances, either in plains by straight lines, or along the hillsides by means of curves of great radius. The earthworks of the first 26 kilometres not only will be much more considerable, but a great deal of it will have to be done by excavating the rock; while farther the cuttings can be proceeded with in argillaceous ground, and nearly always in sandy and friable earth.

If we except the first part, there will be few constructive works, the most important of them being a bridge of 100 metres across the Inkissi, two bridges of 80 metres across the Mpozo and the Kwillu, and six bridges ranging between 40 and 60 metres. The others will have a length of from 5 to 20 metres only in the clear. The construction of the abutments of bridges will be everywhere very easy, as firm soil is to be met with at no great depth from the surface of the ground. Nearly everywhere, except on the first section, the nature of the soil will admit of bricks being made; and in the valleys of the Luima, of the Unionzo, Kwillu, and Inkissi, limestone is to be found in abundance. Fragments of quartzite and sand, everywhere to be met with, will supply the ballast.

The maximum of incline will be 46 millimetres per metre, and will be reached three times during the first portion, where, as a rule, steep inclines will be met with. Nevertheless it has been possible to combine the slopes and horizontals so as to render traction as easy as possible, and during the last 400 kilometres the slopes and inclines are very infrequent and generally insignificant. Likewise, in the first section, curves are rather numerous and of short radius, although the latter will never be less than 50 metres. Thus all the difficulties of laying and working accumulate at the starting-point, — a most fortunate circumstance, as the first section also offers greater facilities for laying; and, on the other hand, by establishing a twofold traction for the first 26 kilometres, and, re-organizing the trains beyond Palaballa, it will be possible to work the whole of the line under far greater economical conditions than if the working difficulties had to be dealt with at some distance from the starting-point.

The locomotives, when loaded, will weigh 30 tons, and drag, with the speed of 18 kilometres per hour, an average useful load of 50 tons.

The starting-point of the railway on the Lower Kongo will be

[1] Paper read before the Geographical Section of the British Association by Capt. Thys.

at Matadi, — a point which is easily reached by sea-going steamers, and where inexpensive works will easily enable those steamers to unload their cargoes on wagons. The terminus of the railway at the Stanley Pool will be at Ndolo, at a little distance above Kinchassa, and also above all the rapids which hinder navigation in the cataract region. Beyond this point light-draught vessels can ascend the Kongo and its affluents for an uninterrupted length of 11,500 kilometres. Ndolo is admirably situated for the building of spacious quays.

Matadi and Ndolo will be the two principal stations. A second-class station will be erected in the district of Kimpésé, where travellers will stop, as two days will be required to pass the distance between Matadi and Stanley Pool. The trains will not run by night. Three other stations will be established along the line, — one at the Lufu, another at the Inkissi, and a third at Ntampa, — thus dividing the total distance between the Lower Kongo and the Stanley Pool into five sections of an average length of 85 kilometres each; each section being itself divided into four sub-sections by three halting-places, with water-tank and crossing-way.

To sum up, the general estimate of the scheme demands a capital of 25,000,000 francs, which will be sufficient to build the road, purchase the rolling stock, cover the general expenses both in Europe and Africa, and meanwhile pay the interest on capital during the construction of the railway, which, according to estimate, will occupy four years.

The figure of 60,000 francs, or more exactly 58,500 francs per kilometre, for the Kongo Railroad, is a maximum price, which has only been reached, on the one hand, because the construction really does, on one portion of the track, involve some difficulties; on the other hand, because the highest valuation has been adopted. When we look to the matter closely, we must even admit that the price we have named is a high one; for, as a matter of fact, the Kongo Railway is an exceptionally easy undertaking. The laying-out of its course was only influenced by purely topographical considerations; and the surveyors had no troublesome allowances to make for connecting the road with any particular establishment for industrial, commercial, or even political purposes. There were no lands to purchase, besides which (and this is an important item, to which I call your full attention) there are and there will be no side profits to be allowed for. The undertaking is, and will remain, completely independent from speculation; the cost of the railway, such as we give it, being strictly that established by the estimates.

Furthermore, the proposed railway is not a wide-gauge railway, but a narrow-gauge railway, adapting itself to all the variations of the ground it will travel over, and exactly befitting the commercial position of a country yet in its infancy. I remember the graphic words used by one of my colleagues on the Board of the Compagnie du Commerce et l'Industrie while we were discussing the width of the road, and I will repeat it to you. "What we want," he said (and we all agreed with him), "is a good and substantial iron track, where locomotives and wagons may be set rolling."

The transport-power of the Kongo Railway, with its seventy-five centimetres gauge, between "bourrelets," will meet all present requirements, and will meet them for a large number of years to come.

The construction of the Kongo Railway will be proceeded with by the Compagnie du Chemin de Fer du Congo, commanding a registered capital of £1,000,000 sterling, of which one-fifth has been subscribed by English capitalists, thanks to the spirited enterprise and the great authority of Sir William Mackinnon.

Thanks to the disinterested intervention of the Belgian Government, who have subscribed £400,000 worth of shares which will never bear more than 3½ per cent interest, and who forfeit all excess of profit in favor of the other shares, it will only require, in order that the ordinary capital invested in the undertaking may reap a return of 8 per cent, that our receipts shall reach 3,000,000 francs, — an amount which, according to the terms laid down by the contract for the early period of the undertaking, will certainly be realized if the up traffic reaches 2,250 tons, if passenger traffic reaches the total figure of 300 up and down passengers, and if the railway in its down journey carries 200 tons of ivory, 600 tons of gutta-percha, and 3,000 tons of miscellaneous goods, paying only 100 francs for carriage. These figures will undoubtedly be reached from the beginning. Even at the present time, 1,800 tons are carried up the Kongo. We only, therefore, provide for an increase of 450 tons within four years. The 200 tons of ivory above mentioned merely represent what is actually conveyed by native carriers. As to the 600 tons of gutta-percha, one single branch of the Compagnie du Haut Congo — the Luébo branch — is in a position to purchase 240 tons per annum; and the 300 remaining tons will be provided by palm-oil, gums, wood for building-purposes, etc.

The opportunities afforded to communication by the 11,500 kilometres of practicable waterway of the Upper Kongo and its tributaries will, indeed, enable us to drain towards the Stanley Pool, for carriage by the railway, the various exchangeable commodities which the immense territories of the Upper Kongo abundantly produce.

HEALTH MATTERS.

A Physiological Study of Absinthe.

AS commonly met with, absinthe only contains about thirty minims of essence of absinthe to the litre, the remainder consisting of alcohol, together with from sixteen to a hundred drops each of the essence of anise-seed and star anise-seed, coriander, fennel, peppermint, angelica, hyssop, and mélisse; and the color is given by fresh parsley or nettles. Cadiac and Meunier, as reported in *The Medical Analectic*, recently undertook to investigate the action of the various components of the liqueur, in order to ascertain to which of them its peculiarly intoxicating effects were due. They found that hyssop induces epileptiform attacks in ten-grain doses, while fennel induces visual troubles and languor. Poisonous doses of coriander give rise to sudden anæsthesia and muscular convulsions. Mélisse determines a passing stimulation, followed by lassitude and sleepiness. Both varieties of anise-seed possess powerfully stimulating properties, with consecutive visual troubles, muscular inco-ordination, and dulness of sensation, with abrogation of the will and heavy sleep.

Although not, strictly speaking, poisonous, anise-seed is a violent excitant of the nerve-centres, even in the relatively small quantities contained in the usual allowance of the liqueur. If the dose be increased, epileptiform attacks are induced. A litre of ordinary absinthe only contains about thirty drops of the essence, — a dose which, if taken all at once, only gives rise to powerful mental stimulation, increasing the appetite and facilitating digestion. Moreover, it leaves behind it neither depression nor somnolence. The sum total of the effects of the blend is a sensation of comfort and physical and mental activity, followed by lassitude and indisposition to exertion, and, in large doses, to epileptiform attacks. The authors are disposed to attribute the major part of the injurious effects to the collateral essences, and seriously recommend manufacturers to discard the use of several of these, and of anise-seed in particular.

THE NATIVE EGYPTIAN AS A SUBJECT FOR SURGICAL OPERATION. — The native Egyptian is an extremely good subject for surgical operation. Clot Bey, the founder of modern medicine in Egypt, has it that "it requires as much surgery to kill one Egyptian as seven Europeans. In the native hospitals, the man whose thigh has been amputated at two o'clock is sitting up and lively at six." Shock is almost entirely unknown, and dread of an impending operation quite an exception. In explanation may be noted the resignation inculcated by their religion; the very small proportion of meat in, and the total absence of alcohol from, their diet; and in general their regular, abstemious, out-of-door life.

THE DISEASED-MEAT SCARE. — The *Medical Record* comments editorially on Dr. Behrend's article, which has excited much talk and learned editorial writing in the daily press. It says, "But it is yet entirely unproved that the meat of tuberculous cattle ever caused tuberculosis in man. Bovine tuberculosis is generally pulmonary. Tuberculous bacilli are found sometimes in the glands, but practically never in blood or muscle, except in acute general infection. Even if the bacilli do get in meat-muscle, Nocard, who is an ingenious and skilful bacteriologist, has shown that they are destroyed or digested in the tissue. And Nocard has positively