

A RACK RAILWAY ON THE ISLAND OF SUMATRA.

The island of Sumatra, in the Dutch East Indies, is the only country in Southeast Asia which possesses a rack railway. This line is the more peculiar as it does not serve for passenger traffic, but almost exclusively for the transportation of bituminous coal. At present about 25,000 tons of coal are carried over the line annually. The capacity of this railway could, however, be considerably increased; it is now only operated during the daytime, but in spite of this limited traffic, the line has greatly contributed to the development of the Dutch East Indian colonies.

Thirty-five years ago the Dutch engineer, De Greve, discovered rich and extensive deposits of bituminous coal in the mountainous interior of Sumatra. The distance from these deposits to the coast amounted to only 60 kilometers, but the tract was crossed by high mountains, the chain of Barissan, acting as a barrier to transportation. On account of this drawback, the exploitation of the coal deposits was long delayed. It was only in 1887 that the Netherlands Parliament decided upon the construction of a railway to connect the coal field with the great port of Padang, on the southwest coast of Sumatra. Branch lines were at the same time contemplated to Fort de Kock, to Payacombo, and to the coal fields of Lounto. The first part of the railway was completed in 1891, and the rest in 1896. The total length of all lines with their branches amounts to 130 miles, of which 97 form the main line, and of this no less than 36 kilometers (22.37 miles) are of the cogged-wheel type. The greatest incline is 1:12.5, and the diameter of the smallest curve 150 meters. The railway reaches its highest between two volcanoes in the neighborhood of Fort de Kock, 1,154 meters (3,786 feet) above the level of the sea. Tunnels occur only at two places: one, 70 meters in length, in the valley of Anei, with rack track, and the other one, 826 meters long, with ordinary track. The great inclines which are to be overcome by the railway necessitated at some places the erection of special structures; thus, for instance, of an arch bridge of a span of 59

meters, with an incline of 68 millimeters per meter. The work on the line was carried out by natives of Sumatra and Java, and only for the heaviest work Chinese laborers and some 500 convicts were employed.

per meter. The cost of the construction of the line was \$40,000 per kilometer. H. L. G.

Making Bricks from Glass-Works Refuse in England.

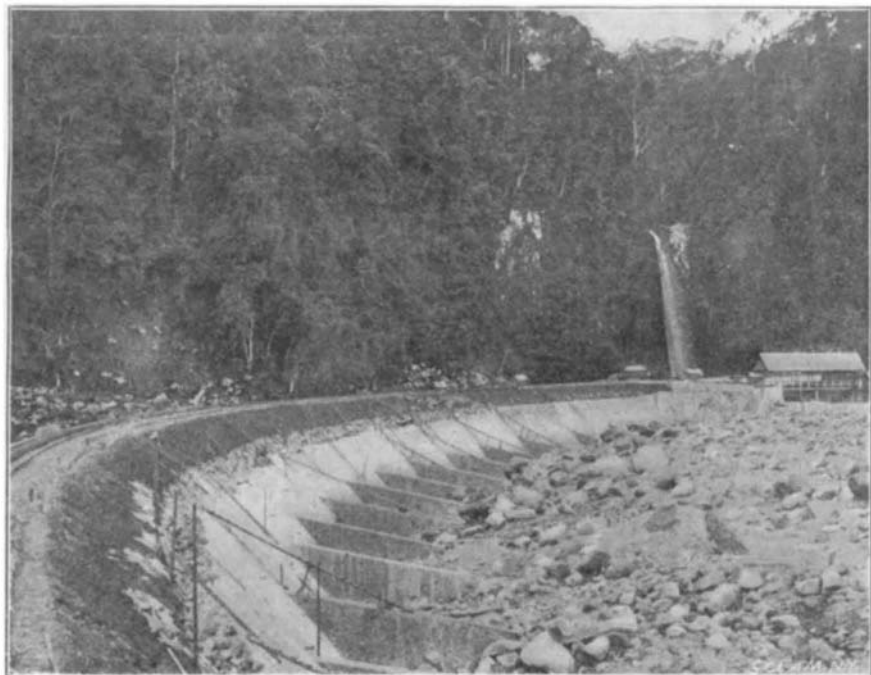
Dr. Ormandy, of St. Helen's, formerly master of science at the Gamble Technical Institute, that city, has recently discovered a process by which good furnace bricks can be made from glass-works refuse. St. Helen's, which is a few miles from Liverpool and within that consular district, is not only the center of the English chemical trade, but contains a number of large glass-works. The millions of tons of refuse which have accumulated around the glass-works heretofore have been treated as of no commercial value. The refuse consists mainly of spent sand, minute particles of glass, and about 3 per cent of iron from the various processes, and it has hitherto been considered that the presence of the iron prevented the use of the material for the manufacture of bricks. Patents have been taken out to protect the process, and a large firm has engaged Dr. Ormandy's services. After making various experiments, the firm is now putting up an extensive plant for the manufacture of the bricks. It is claimed that the bricks will stand a great amount of heat. They are about the color of silica bricks and can be glazed. Considerable secrecy is observed as to the process.

THE temperature of the free air is the title of a paper communicated by Dr. Hergesell to Part V. of Petermann's Geographische Mittheilungen. The author's observations show that even at a height of a few hundred meters there is a very small diurnal range: at night time it amounts, in some ascents, to only a few tenths of a degree, and in the day time, at about 500 meters, to some 3° or 4° Cent., when solar radiation is unobstructed. On cloudy days, and in the mean values, the daily amplitude is much less. With respect to the vertical increase of temperature, the results of thirty sets of observations show that in all levels up to 10,000 meters an extremely varying temperature obtains, according to the season of the year and the conditions of weather. The decrease at that height reached or exceeded 40° Cent. in all cases, but no fixed rule could be laid down as to the regular decrease with altitude.

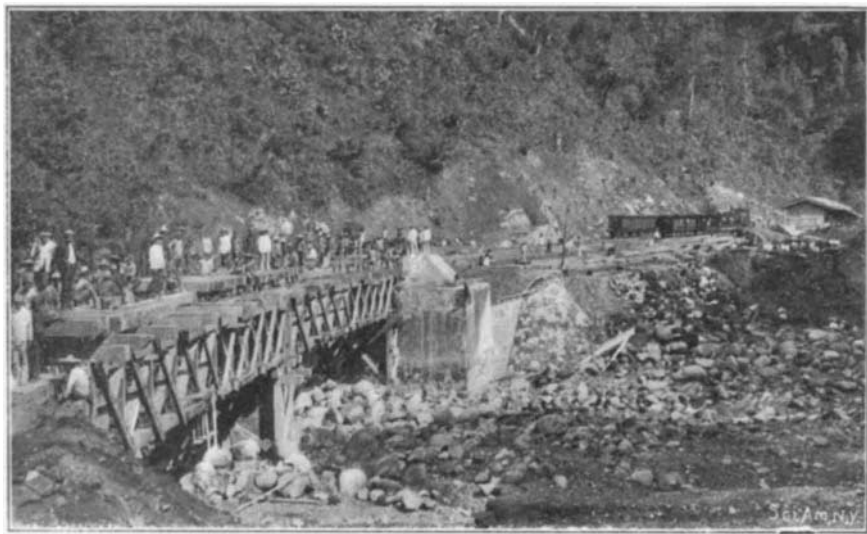


LOOKING DOWN THE TRACK, SUMATRA RACK RAILWAY.

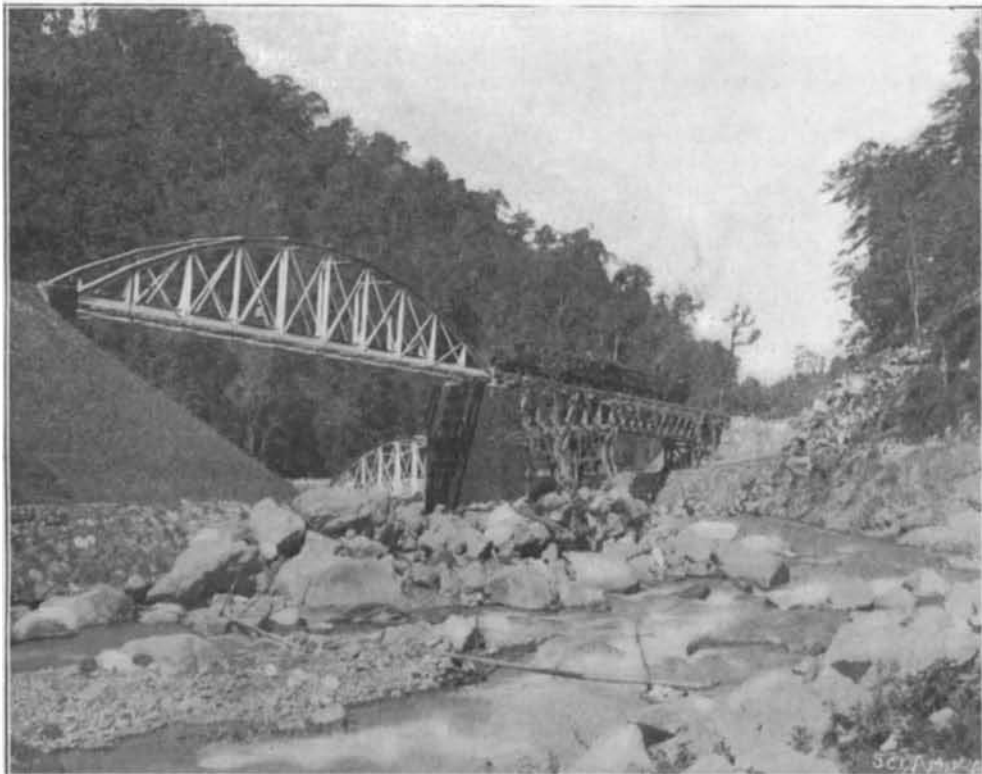
The coal is carried on this line at the rate of 0.76 cent per ton per kilometer. Cars of the American style are used, of 20 tons capacity. The gage of the railway is 1.067 meters, the same as that of the Netherlands State Railways of Java. The heaviest locomotives running on the line have a weight of 35 tons. The rails, 7 meters in length, weigh 25.7 kilogrammes



ALONG THE ANEI RIVER, SHOWING TRACK.



THE RAVINE OF THE RIVER ANEI.



THE RAVINE OF THE RIVER ANEI AFTER AN INUNDATION.



RIVER ANEI.