2,600 H.P. 0-6-6-0 ELECTRIC FREIGHT LOCOMOTIVE, GREAT INDIAN PENINSULA RAILWAY.

(Built in conjunction with Metropolitan-Vickers Electrical Co. Ltd.)

5 ft. 6 in. Gauge.

2,600 H.P. 0-6-6-0 Electric Freight Locomotive, G.I.P. Railway.

IN 1928 the Vulcan Foundry built the Mechanical Parts for 31 heavy Electric Freight Locomotives on order with Messrs. Metropolitan-Vickers Electrical Co. Ltd., for the Great Indian Peninsula Railway. These Locomotives were required for the very steeply graded "Ghat" sections of the G.I.P. main lines running out of Bombay, which are encountered between Kalyan and Igatpuri and Kalyan and Poona. These sections were at that time in course of being electrified on the 1,500 volt D.C. overhead system because the difficulties of operating them with Steam Locomotives had greatly increased due to the heavier traffic. The first

Freight Train operation on one of the "Ghat" sections, G.I.P. Railway.

of these lines has 32 miles (51.5 Kms.) of continuous up grade steeper than 1 in 100, including 6 miles (9.65 kms.) of 1 in 37, whilst the latter has 15 miles (24.1 kms.) of 1 in 37 to 1 in 40.

Hauling a heavy Freight Train near Bombay, G.I.P. Railway.

In consequence a powerful locomotive was required and an 0-6-6-0 design of articulated construction carried on two six wheeled trucks, was adopted. Although the total length over buffers is 66 ft. 1 in. (20,141 mm.) the wheelbase of each truck is only 15 ft. 1 in. (4,596 mm.), thus enabling the sharpest curves to be easily negotiated.

Each of the trucks is driven by two 650 h.p. motors connected to the running wheels through a jackshaft with connecting and coupling rods ; the total h.p. which can be developed is therefore 2,600. The continuous rating Tractive Effort is 40,000 lbs. (18,144 Kgs.) at 20.5 m.p.h. ; for an hourly rating at 18 m.p.h. it is 56,000 lbs. (25,481 Kgs.), and the maximum T.E. (at 25% coefficent) is 67,200 lbs. (30,482 Kgs.). The maximum permitted speed is 45 m.p.h. (72.5 k.p.h.).

The total weight of 123 tons is divided into 72.25 tons for the Mechanical Parts and 50.75 tons for the Electrical Equipment.

On each truck two motors, bolted together, are mounted above the frame between the two outer axles. Each pair of motors drives a common jackshaft by means of flexible gears with helical teeth ; crankpins on the jackshaft gear wheels transmit the power to the wheels through the rods. By raising the jackshaft axis above that of the driving wheels, the rods are located in one plane, thus reducing the bending moment on the crankpins.

The central body containing the driving cabs and control gear, is built upon one main longitudinal girder connecting the two motor units by means of large spherical pivots at the ends and supplemented by the necessary side members. These pivots are supported in housings on the bogie frames and through these housings the tractive effort is transmitted.

Four spring-loaded side bearers are fitted under the ends of the main cross stays of the underframes, bearing in sockets on the inner ends of the bogie frames, to give the necessary freedom between body and trucks when running.

Two reciprocating compressors driven by 1,500 volt motors provide air for operating the air brake on the Locomotive whilst two exhausters create the vacuum for the brakes of the train. The air brake on the Locomotive is operated automatically when the driver applies the vacuum brake valve. A foot pedal controls the compressed air sanding and an air operated hand valve raises and lowers the pantographs. All the necessary controls and meters are duplicated in each driving cab.

A résume of the leading particulars of these Locomotives is as follows :—

Gauge : 5 ft. 6 in. (1,676 mm.).
Motors : 4 ; each 650 h.p.
Capacity : 2,600 h.p.
Current : 1,500 volt D.C.
Tractive Effort : (Continuous)
40,000 lbs. (18,144 Kgs.) at 20.5 m.p.h.
Tractive Effort : (Hourly rating)
56,000 lbs. (25,481 Kgs.) at 18 m.p.h.
Tractive Effort : (Maximum)
67,200 lbs. (30,482 Kgs.).

Diam. of Wheels : 4 ft. 0 in. (1,219 mm.).
Truck Wheelbase : 15 ft. 1 in. (4,596 mm.).
Total Wheelbase : 54 ft. 11 in. (16,738 mm.).
Length over Buffers : 66 ft. 1 in. (20,141 mm.).
Maximum Axle Load : 20½ tons.
Weight of Mech. Parts : 72¼ tons.
Weight of Elec. Parts : 50¾ tons.
Total Weight : 123 tons.
Minimum Negotiable Curve : 500 ft. (152 Ms.).