

## THREE-COLOR FABRIC PRINTING MACHINE.

CONSTRUCTED BY MESSRS. HULSE AND CO., ENGINEERS, MANCHESTER.

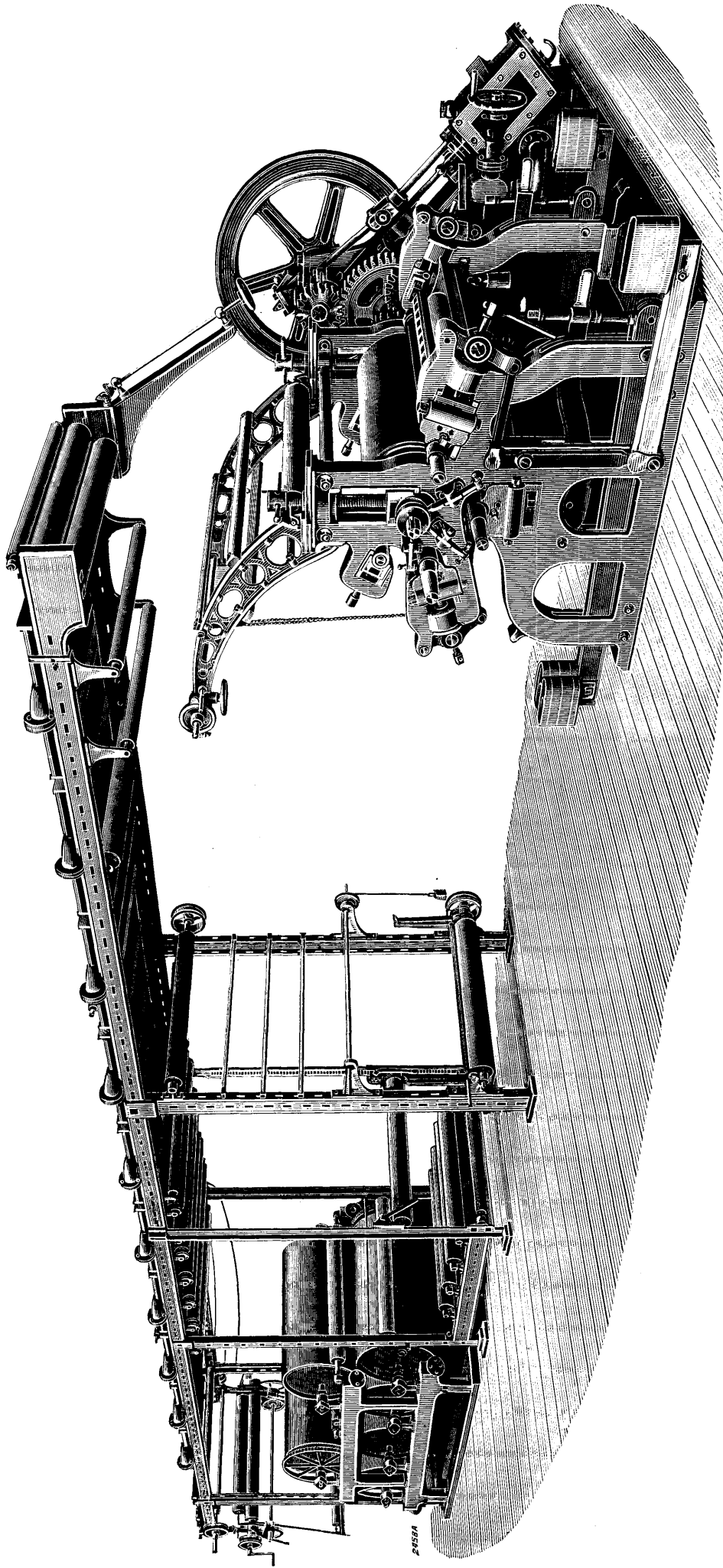
*(For Description, see Page 134.)*

FIG. 66.

machinists and other men employed in the operations. The reduction of labour effected by the use of stoking machinery at these works has resulted in important economy, the cost of carbonising being at least 1s. per ton of coal less than when hand labour was employed. Nor is this by any means the only advantage derived from the use of machinery, another important point being the rapidity and punctuality with which the operation is performed, thus enabling a larger quantity of coal to be carbonised within an equal period of time, and thereby increasing the productive capacity of the plant. Both the coal carbonised and the residual coke are moved mechanically. The coal is raised from the store into which it has been dropped from the railway wagons, by elevators, and delivered into fixed overhead hoppers, from whence the charging machines are replenished as required. The coke, when drawn from the retorts, falls

through shoots in the stage floor into tipping trucks running on a small railway underneath the stage. After the machines have finished their work, the train of trucks is drawn out and conveyed to the coke heap, where the trucks are emptied. Railway stages or gangways are erected at either side of the retort-houses for the delivery of coal and cannel, and these, as well as the store between the houses, are in direct communication with the sidings.

Next to the retort-houses in importance come the condensing, exhausting, and washing apparatus. The condensers are of the water-tube type. Of these there are three of Morris and Cutler's patent horizontal water-tube condensers, each capable of condensing 1½ million feet of gas a day, and one by Clapham Brothers, of vertical form, of a capacity of 3 million cubic feet a day. In these condensers the gas is brought into contact with a number of

small tubes placed close together, through which cold water is allowed to flow. In this way the temperature of the gas is reduced and the condensation of the tarry vapours effected. The exhaust room contains two sets of Gwynne and Co.'s combined engines and duplicate exhausters, the engines being of the inverted vertical type, and the exhausters having a nominal capacity of 100,000 cubic feet of gas per hour each. There are also two other sets of horizontal engines and duplicate exhausters of a capacity of 80,000 cubic feet per hour each. This machinery, together with the various steam engines and pumps required for other purposes, is supplied with steam from four Lancashire boilers each 28 ft. long by 7 ft. in diameter, situated in a boiler-house adjoining the exhauster room. The washing machinery consists firstly of four Livezey washers to cleanse the gas from the remaining traces of tar, and to remove a proportion of the carbonic acid

and sulphuretted hydrogen present in the gas. This is effected by dividing the gas into minute streams and causing it to bubble through the ammoniacal liquor in the washers, the impurities becoming thereby fixed as carbonate and sulphide of ammonium. There are, secondly, three rotary "washer-scrubbers," two of which are Kirkham, Hulett, and Chandler's "standard" washer-scrubbers of a daily capacity of 2½ million feet each, and one Clapham and Laycock's "Eclipse" washer-scrubber of 3 million feet capacity. In these vessels the ammonia is removed from the gas by contact with pure water. The final purification of the gas is effected in the purifying house. This is an iron building 300 ft. long by 73 ft. wide, and in it are erected 16 purifiers, each 33½ ft. long by 26½ ft. broad. The purifiers are divided into four groups of four boxes in each, and the gas passes through them in four separate streams, four purifiers only dealing