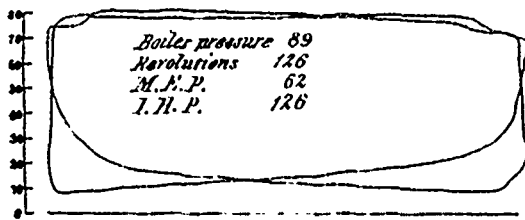
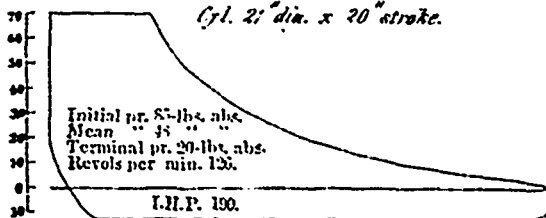


*Diagram No. 1.**Cylinder 16" dia. x 20" stroke.*

as will be seen by reference to the indicator diagram above No. 1 taken from this engine, where the admission of steam takes place throughout the whole stroke and the exhaust is choked to a back-pressure of 25 lbs. This diagram shows a development of 126 horse-power, which may be taken as a fair average of the engine, although it varies greatly on account of the blast of the exhaust in the smoke-stack being used intermittently causing the steam pressure to vary with the activity of combustion. The diagram also shows a consumption of steam of 2.32 cubic feet per stroke, which reduced to its equivalent weight is equal to 492 lbs. per stroke or 7440 lbs. per hour. Adding 15 per cent to these calculated weights for condensation and other losses and dividing by the number of horse-power gives us 67.9 lbs. of feed-water per horse-power per hour. Assuming that the boiler will evaporate 7 lb. of water per lb. of coal, which is an ordinarily good boiler, we get a consumption of 9.7 lbs. of coal per horse-power per hour. In view of the fact that the best modern engines, both land and marine, will develop an indicated horse-power on 2 lbs. of coal per hour, the contrast is at once manifest.

In order to improve this state of affairs the engine was rebuilt and converted into a condensing engine with variable expansion valves as shown on the drawings presented and a condenser and vacuum pump added.

The valves are designed for a range of cut-off from one-eighth to seven-eighths of the stroke, the ordinary point when on a steady run being from one-fourth to one-third, the distribution of steam being then similar

*Diagram No. 2.**Cyl. 21" dia. x 20" stroke.*

to that represented in the diagram No. 2. The steam volumes calculated from this diagram in a similar manner to the former and reduced to an equivalent weight of feed water gives 19.89 lbs. per horse-power per hour, or equal to a saving of 70 per cent. in the consumption of steam by the improved form of engine.

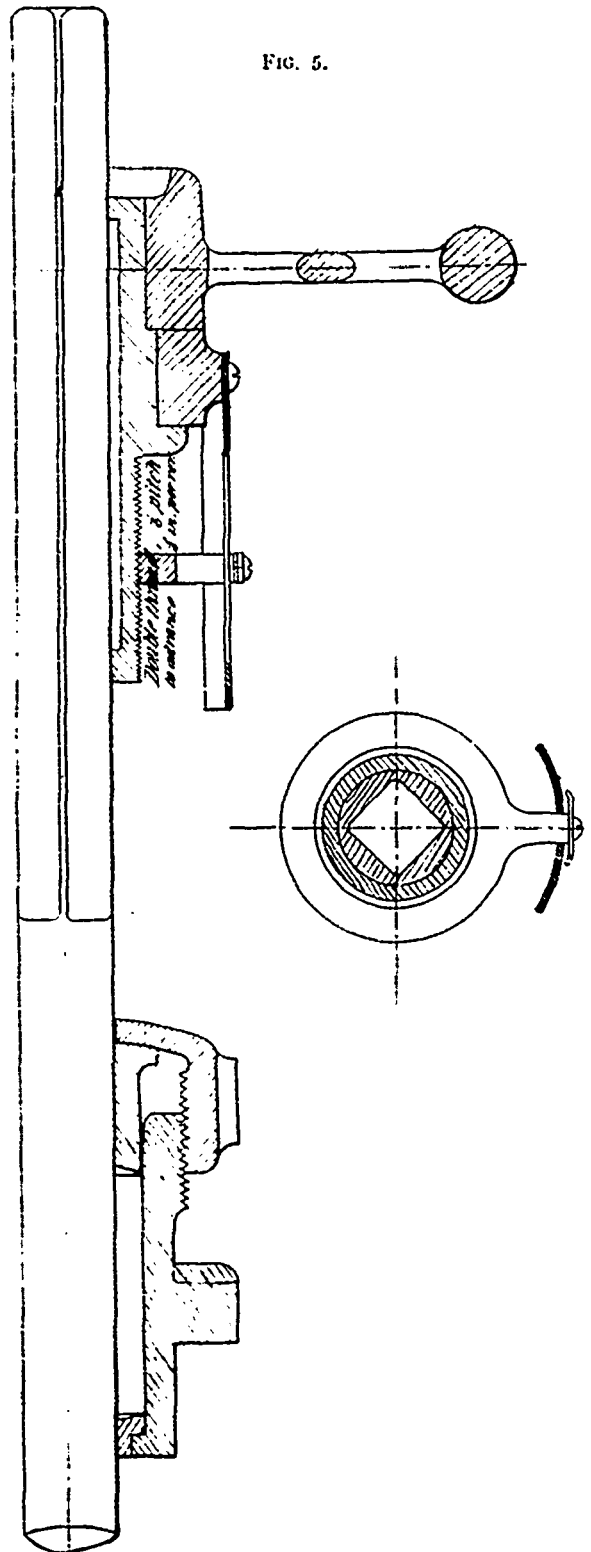
It will be seen on reference to Fig. 3 that the valve gear is of the kind sometimes known as the

## VERTICAL CONDENSING ENGINE WITH VARIABLE CUT-OFF.

(N.B.—For description see page 139.)

## DETAILS OF CUT-OFF REGULATOR.

FIG. 5.

A. W. ROBINSON, *Delt.*