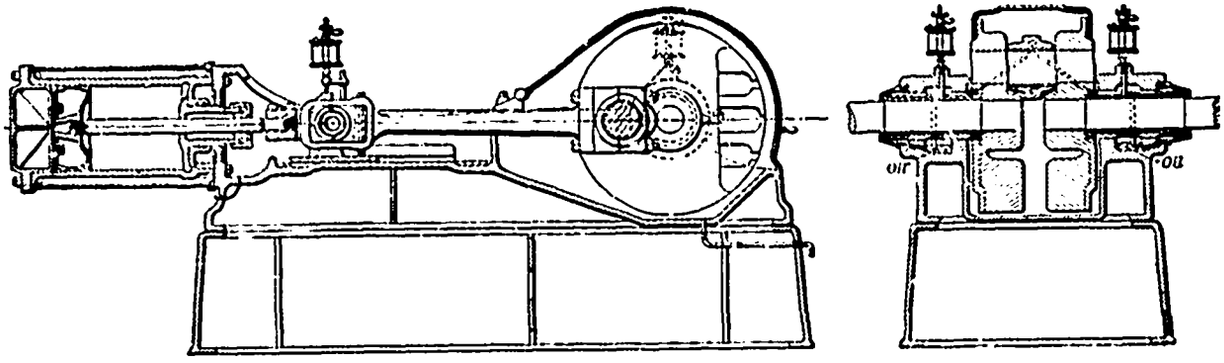
appearance, and free access is given to the crank-pin box, when the hinged crank case is raised. The crank pin is oiled through two half inch holes, one extending from each side of the crank to the centre of the crank-pin, all oil wasting from the inner ends of the shaft bearing being instantly carried to the crank, while all oil wasting from the outer ends of shaft bearings is caught, and by a ring riding on the top of shafts and dipping into the oil below, is returned again and again to the bearing, until it finds its way to the crank-pin and escapes to the crank pit, to be drawn off and filtered. In practice the crank-pin does not need oiling other than as stated, but a sight-feed oil cup is provided in addition to those oiling the shaft bearings, which will, if desired, feed oil direct to the crank-pin through one of the half-inch holes before mentioned.

The fly-wheel governor is a modification of the Straight Line, and, together with the valves, is used by arrangement with the Straight Line Engine Co.; the oiling devices mentioned will also be recognized as essentially "Straight Line."

The eccentric rod, so called, although there is no eccentric, has ball and socket bearings at each end, the balls being case-hardened and ground, and the sockets or boxes of phosphor bronze. The rocker arm, by which the eccentric rod drives the valve, is horizontal, with a vertical axis; there is no twisting strains on either of its bearings, a straight line passing through all three of them. An index finger attached to this arm, as shown in plan view, Fig. 3, shows, by the graduations over which it passes, the movement of the valve, and thus is of assistance in valve setting.

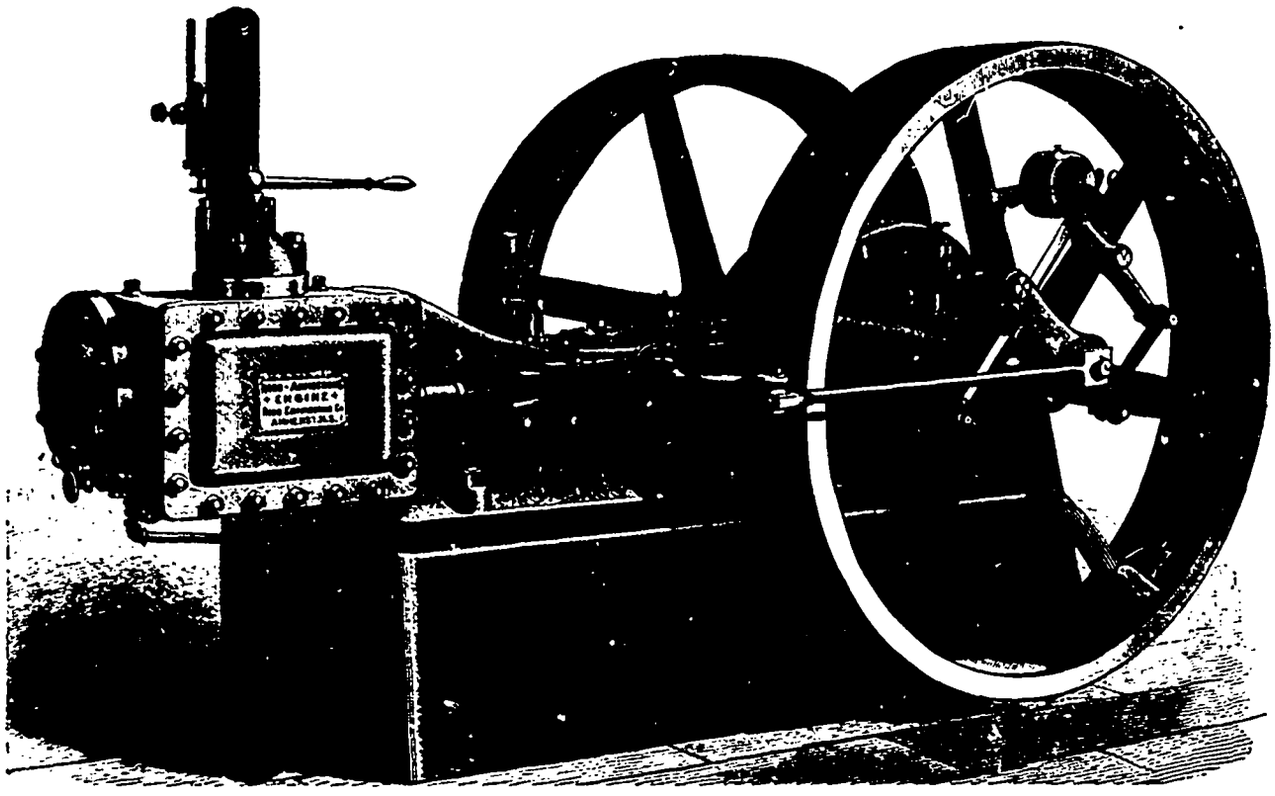
A small sight-feed oil cup, directly over the centre of the rocker arm, supplies oil through a tube to the outer end of the arm. The eccentric rod is hollow, being, in fact, a piece of hydraulic pipe, and through it the oil passes to the eccentric pin, any oil finally escaping being caught and held in the flanged fly-wheel.



THE ROBB-ARMSTRONG ENGINE.—FIGS. 2 and 3.

The centre bearing of the rocker arm works in a bath of oil so arranged that it is constantly flooded, and so that no oil can escape to the floor, any overflow draining to the crosshead guide, and finally to the crank pit.

The crosshead is a single steel casting, of the "Slipper" type, the bottom of the slipper being babbitted. The piston rod is being secured by being gripped in two places, about two inches apart, one place being threaded and the other a parallel fit. The crosshead is split and is gripped onto the rods by bolts; this proves very good, in that it can be taken apart and put together again without getting out of line more than permissible in the highest grade of engine work—a point in which the usual methods of securing piston rods to crossheads (with the exception of the taper fit and key) are often faulty. The crosshead pin is of cast-iron, as it is believed that, in connection with the large and long bearing, it is the best material



THE ROBB-ARMSTRONG ENGINE.