

Fig. 3. A model vertical steam engine that can be set in motion by means of a Magic Motor.

In building the model vertical steam engine shown in Fig. 3 it is best to begin by placing two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates side by side $2\frac{1}{2}''$ apart and then joining them together by four $3\frac{1}{2}''$ Angle Girders. Two of the Angle Girders can be seen at 1 in Fig. 3. The two inner Girders are spaced $2''$ apart, and the others are bolted across the ends of the Plates. Each Girder carries a Flat Trunnion as shown and these form the bearings for the crankshaft. Flexible Plates are bolted to the flanges of the Plates, and at one end are bridged by a further $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. The four $9\frac{1}{2}''$ Angle Girders 2 that support the cylinder are bolted at their lower ends to Trunnions, and at their upper ends are attached in pairs to $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips that are bolted to and support a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate on which the cylinder is mounted.

The cylinder is a Boiler complete with Ends, the lower End being bolted to the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate. Beneath this Plate is fixed in a central position a Double Bent Strip that forms a guide for the piston rod. A $3\frac{1}{2}''$ Strip 3 bolted to the Double Bent Strip carries an Eye Piece 4, which

is free to slide up and down the Strip. The Eye Piece is fixed on the piston rod 5, which passes through its boss, and is fitted at its lower end with a large Fork Piece 6. The connecting Rod 7 carries at its upper end a Handrail Coupling 8, and this pivots on a $1''$ Rod 9 supported in the arms of the Fork Piece. The lower end of the connecting rod is pivotally connected to the crank pin by a small Fork Piece 10 (Fig. 4).

The valve chest 11 (Fig. 3) is a $2\frac{1}{2}''$ Cylinder bolted to the side of the Boiler.

The crankshaft consists of two Rods each carrying a Coupling at one end as shown in Fig. 4. The Couplings are joined by a $1\frac{1}{2}''$ Rod that forms the crank pin. On one end of the crankshaft is an Eccentric 2 that operates the valve rod 13, to which it is connected by a $2\frac{1}{2}''$ Strip and a Rod and Strip Connector.

The model is driven by a *Magic Motor* 14, which is bolted to one of the rear $9\frac{1}{2}''$ Angle Girders.

Parts required to build model Vertical Steam Engine: 1 of No. 5; 4 of No. 8a; 1 of No. 9a; 5 of No. 9b; 2 of No. 10; 2 of No. 13a; 2 of No. 15a; 1 of No. 18a; 1 of No. 18b; 1 of No. 20; 1 of No. 20a; 2 of No. 24; 76 of No. 37; 78 of No. 37a; 4 of No. 38; 2 of No. 48a; 1 of No. 50a; 3 of No. 52; 1 of No. 53a; 6 of No. 59; 2 of No. 63; 1 of No. 70; 1 of No. 116; 2 of No. 118; 1 of No. 123; 4 of No. 126; 4 of No. 126a; 2 of No. 162; 1 of No. 166; 2 of No. 196; 1 of No. 212; 1 of No. 216. 1 *Magic Motor*.

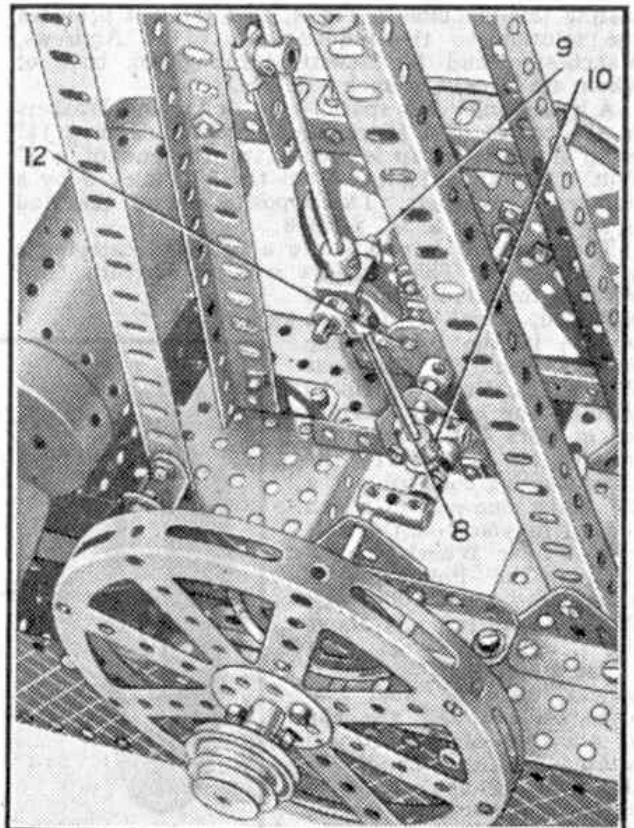


Fig. 4. A close-up view of the crankshaft of the vertical steam engine.