New Outfit Models

A Greek Galley and a Target

PUMPING ENGINE models have often been described and illustrated in the "*M.M.*," but the engine shown in Fig. 1 justifies the appearance of yet another model of this kind. Although this is a simple one, built with Outfit G, it is one of the neatest that have ever been designed.

In building the model, construction should be commenced with the base as shown in Fig. 1. The cylinder, which is represented by a Boiler, is next secured in position. This is done by bolting a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate on opposite sides of the Boiler, and joining these to the two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates which are fastened to the Flexible Plates 9, by means of Angle Brackets. A washer should be placed on the shank of each bolt, between the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates and the Boiler, in order to leave sufficient room to enable the Boiler Ends to be pushed into position.

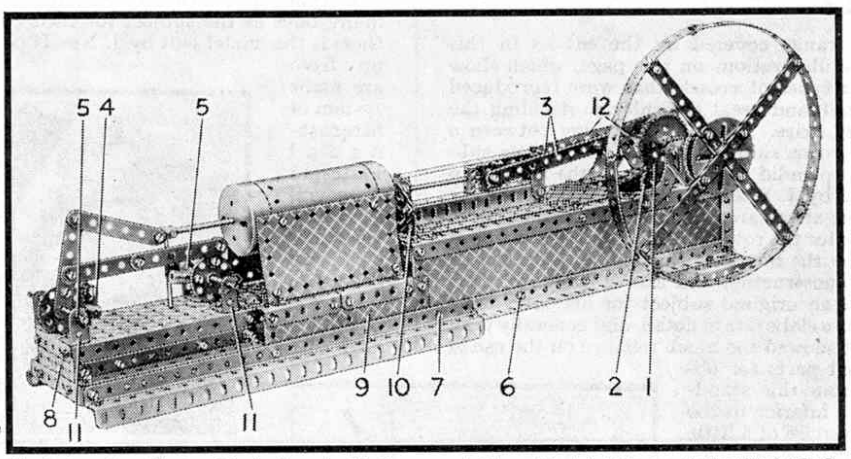

Fig. 1. A neat working model of a Pumping Engine, operated by an Electric Motor and built with Outfit G.

Two $12\frac{1}{2}''$ Angle Girders and two pairs of $2\frac{1}{2}''$ Cranked Curved Strips are now bolted to the $12\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates of the base, and the $12\frac{1}{2}''$ Angle Girders are bridged by five $3\frac{1}{2}''$ Strips located as shown. The $3\frac{1}{2}''$ Strips support a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ and a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate, and the latter forms the base for the crosshead slides. These are made by bolting two $5\frac{1}{2}''$ Angle Girders together in the form of a channel girder, and then bolting two further $5\frac{1}{2}''$ Angle Girders to this, so that a girder with a cross-section like a Double Bent Strip is formed. Two Trunnions are bolted to one end of the Girder, and two $1\frac{1}{2}''$ Strips to the other, and the two sets are connected across their free ends by Double Brackets. The Double Brackets are spanned by a $5\frac{1}{2}''$ Strip, and the tops of the Trunnions are supported by means of $1'' \times 1''$ Angle Brackets 10. The pairs of $2\frac{1}{2}''$ Cranked Curved Strips previously mentioned each have a Flat Trunnion and a Double Bent Strip bolted to them. The Double Bent Strip should be on the inner side.

Construction of the mechanism is now commenced. A 2" Rod forms one part of the crankshaft, and this has a Crank secured on one end. A $3\frac{1}{2}''$ Rod is used for the part of the crankshaft that supports the large flywheel, and also carries a 2" Pulley 1, a Worm, a 2" Sprocket and a Crank. The Crank is coupled to the first Crank by a $\frac{3}{4}''$ Bolt, which is held firmly in position by means of nuts. On the Bolt are two $4\frac{1}{2}''$ Strips 12, spaced by four washers, and bent slightly as shown in the illustration so that they pass on either side of the crosshead slides. The Strips 12 are extended by $5\frac{1}{2}''$ Strips 3, overlapped four holes, and the free ends of these are secured to the centre tapped holes of a Coupling by $\frac{3}{8}''$ Bolts, on which are Collars. An $11\frac{1}{2}''$ Rod is used for the Piston Rod, and this passes through the centre holes of the Boiler Ends, and is secured in the Coupling. Further Couplings are placed on the Rod as indicated.

Pairs of $1'' \times 1''$ Angle Brackets 11 are bolted to the Flanged Plate, which is held in place at the rear of the cylinder by a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 8 and $5\frac{1}{2}''$ Strips, and these form bearings for $3\frac{1}{2}''$ Rods 5 that support Bush Wheels and are held in position by Spring Clips. One Bush Wheel has a 3" Strip and a Coupling secured to it, and the other has a Flat Bracket and a Coupling. In each case the Couplings are pivotally connected by Flat Brackets 4 to Collars that are carried on vertical Rods, which slide in $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips inside the model and represent the piston rods of the pumps. The two pumps are connected by a system of pivoted Strips, as shown in the illustration.

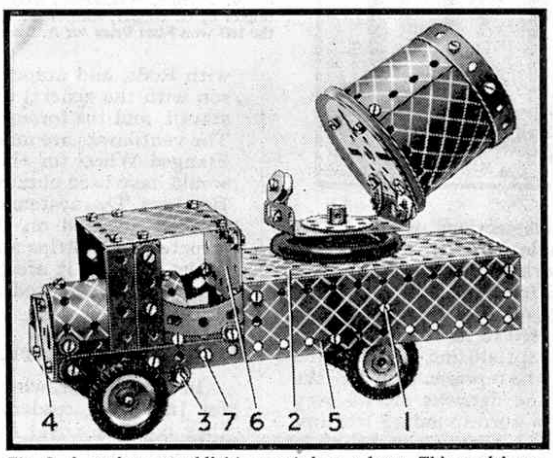

Fig. 2. A modern searchlight mounted on a lorry. This model can be built with Outfit C.

The model is driven by an E6 Electric Motor, which is mounted inside the model on $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips held in place by Bolts 6 and 7. The only reduction gearing, fitted between the Motor side plates, consists of two stages, each of ratio 3 : 1 and using a 57-teeth Gear and a $\frac{1}{2}''$ Pinion. The final shaft of the reduction gear carries a $\frac{3}{4}''$ Sprocket Wheel, which is connected by Chain to a 1" Sprocket 2 carried on a Rod that is journalled in the frame of the model. A second 1" Sprocket on the same shaft drives the 2" Sprocket 1.

Parts required to build the model Pumping Engine: 16 of No. 2; 2 of No. 2a; 5 of No. 3; 3 of No. 4; 2 of No. 5; 2 of No. 6a; 7 of No. 8; 4 of No. 9; 7 of No. 10; 2 of No. 11; 12 of No. 12; 6 of No. 12a; 1 of No. 13; 1 of No. 15b; 5 of No. 16; 3 of No. 17; 1 of No. 20a; 2 of No. 24; 1 of No. 26; 2 of No. 27a; 1 of No. 32; 4 of No. 35; 156 of No. 37; 3 of No. 37a; 22 of No. 38; 2 of No. 45; 2 of No. 48a; 4 of No. 48b; 1 of No. 51; 2 of No. 52; 3 of No. 53; 8 of No. 59; 2 of No. 62; 6 of No. 63; 4 of No. 90a; 20" of No. 94; 1 of No. 95; 2 of No. 96; 1 of No. 96a; 1 of No. 109; 1 of No. 111; 3 of No. 111c; 2 of No. 126; 2 of No. 126a; 1 of No. 162; 2 of No. 189; 2 of No. 191; 1 of No. 193; 1 of No. 195; 2 of No. 197; 1 E6 Electric Motor.