

**STEAM** power, undoubtedly, has been one of the most important factors in the immense technological advancement of the world since the start of the Industrial Revolution two hundred years ago. It was steam that drove the machines of industry. There were steam locomotives on the railways. Steam engines drove the ships of the oceans, and steam even powered vehicles on the roads and tractors in the fields. In short, steam opened up a whole new horizon in a newly-industrialised Britain. History, however, is constantly advancing and, as the world progresses with it, the great inventions of the past are replaced by new and better things.

True to this fact of life, steam itself is fast becoming obsolete; superseded by other forms of power—the internal combustion engine, electricity, and now even the energy provided by the atom. As I said in a recent M.M., the great steam engines which once thrilled our parents are quickly disappearing and, in many cases, have already gone. It seems to me that, soon, the only way to remember these old machines will be to reproduce them in model form. In fact, I see no reason why we shouldn't begin right away and for this reason I feature here a Vertical Steam Engine typical of a type in common use earlier this century. Construction of the model, which is powered by an E15R Motor, is not difficult, as you will see.

Beginning with the base, a 12½ in. Angle Girder 1 is extended four holes by a 3 in. Strip 2, at the same time fixing a 2½ in. Angle Girder 3 and a 9½ in. by 2½ in. Strip Plate 4 in position. This Strip Plate is edged along the top by a 9½ in. Angle

# Build a vertical Steam

Girder 5, extended one hole by a 1½ in. Strip 6, and joined to Angle Girder 1 by a 2½ in. Strip 7. Strips 6 and 2 are connected by a 3 in. Strip 8.

Another side is now built up from a second 9½ in. by 2½ in. Strip Plate, bolted to a 12½ in. Angle Girder 9 and edged by a 9½ in. Angle Girder 10, a 2½ in. Angle Girder 11 and a 2½ in. Strip 12. Both sides are then joined at each end by two 5½ in. Angle Girders 13, the intervening space being enclosed by a 5½ in. by 2½ in. Flexible Plate 14. A 5½ in. by 5½ in. Compound Flat Plate 15 is then built up from a 5½ in. by 3½ in. and a 5½ in. by 2½ in. Flat Plate, and is bolted to Girders 5 and 10. At one end, a 3 in. Strip is attached to upper Angle Girder 13 by an Angle Bracket, then three 2½ in. by ½ in. Double Angle Strips 16 are bolted to this and to Strip 8 to provide steps. At the other end, two 5½ in. by 2½ in. Flanged Plates 17, joined by a 5½ in. Angle Girder, are bolted one to each Angle Girder 1 to provide a platform which will later be used for the Electric Motor.

bolted between Angle Girders 5 and 10 in the positions shown. A 4½ in. by 2 in. Flat Plate 21 is fixed to the 3½ in. Angle Girders.

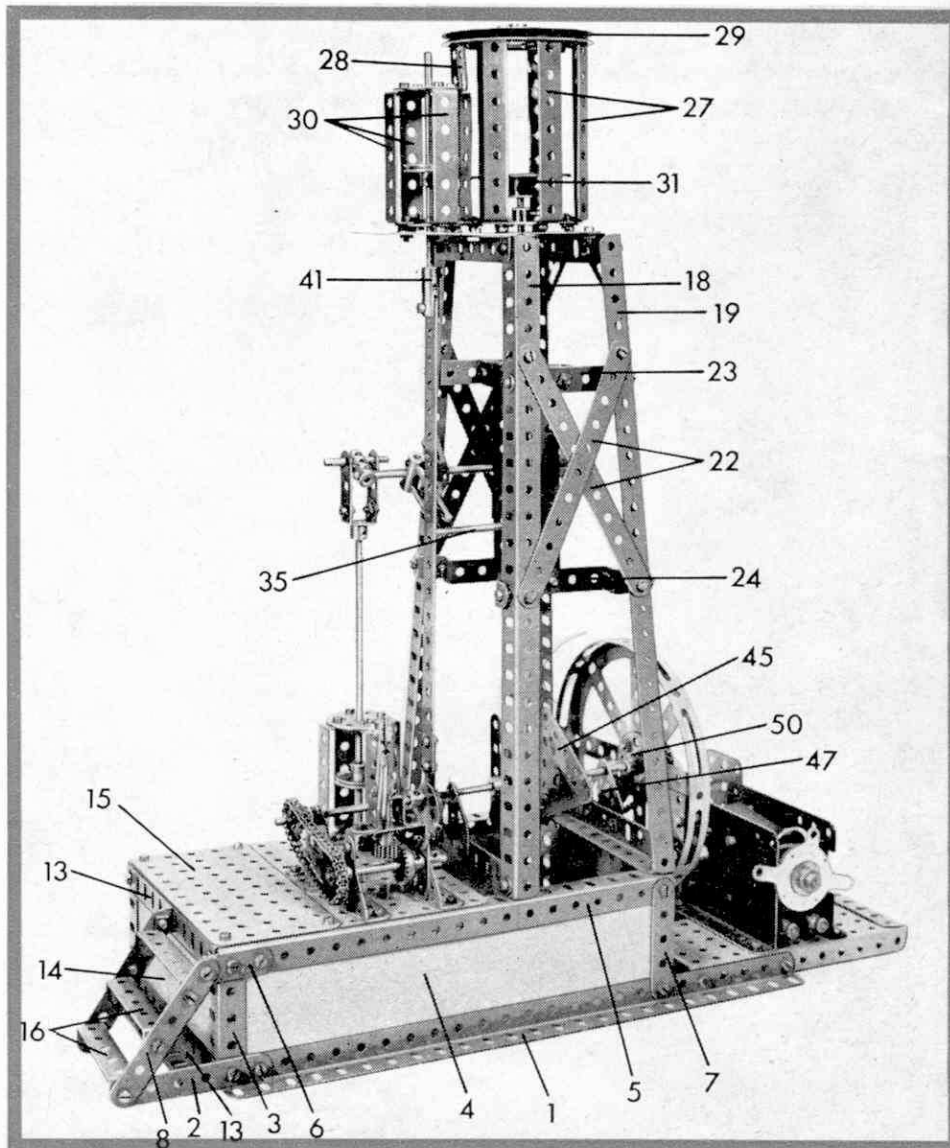
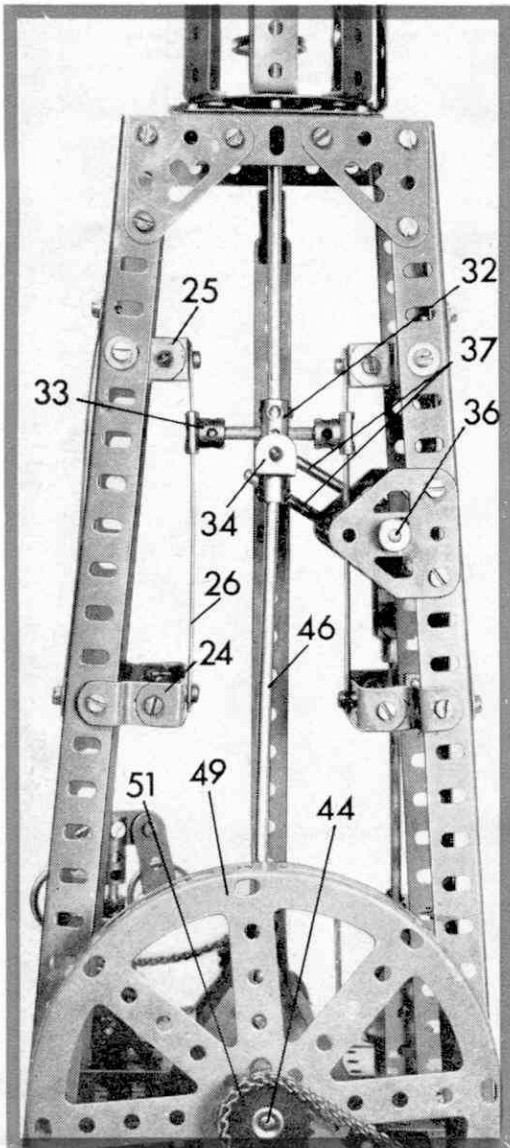
Bolted diagonally between Angle Girders 18 and 19 at each side are two 5½ in. Strips 22, while a 2½ in. by ½ in. Double Angle Strip 23 is bolted straight between them. Another similar Double Angle Strip 24, is fixed, by means of ½ in. by ½ in. Reversed Angle Brackets, lower down the Angle Girders, two Spacing Washers on the shank of each of the Bolts securing the Reversed Angle Brackets to the Girders. A 'box' 25 is then built up from two Double Brackets and is bolted to the centre of Double Angle Strip 23, to be joined by a 4½ in. Strip 26 to the centre of Double Angle Strip 24.

## Cylinder and Valve Gear

In the case of the Cylinder, seven 3½ in. by ½ in. Double Angle Strips 27 and a 1 in. by ½ in. Angle Bracket 28 are bolted between a 3 in. Pulley 29 and a Faceplate, which is then fixed by two ½ in. Bolts to Flat Plate 21. Note, however, that the cylinder is positioned so that the Angle Bracket faces the 'unused' section of the Flat Plate. This unused section is now fitted with the valve cylinder which consists simply of two 8-hole Wheel Discs connected by four 2½ in. by ½ in. Double Angle Strips 30.

## Crankcase and Slide bars

The Crankcase isn't a case in the enclosed sense, but consists simply of two pairs of Angle Girders 18 and 19, each pair made up of two 12 in. Angle Girders joined at the top by a 3½ in. Angle Girder and at the bottom by a 5½ in. Angle Girder 20



# Engine with 'Spanner'

The main cylinder piston is represented by a 2 in. Sprocket Wheel 31, mounted on the end of a 6½ in. Rod that slides in the boss of the Faceplate. The lower end of this Rod is fixed part way in the longitudinal bore of a Coupling 32, carrying a 1½ in. Rod in its centre transverse bore. Mounted on each end of this Rod is a Slide Piece 33 which engages with the appropriate slide bar provided by Strip 26. A large Fork Piece is pivotally attached to the lower end of Coupling 32 by a 2½ in. Rod 35, passed through the arms of the Fork Piece and fixed in the lower transverse bore of the Coupling.

At this stage, a 5 in. Rod 36 is held by Collars in the apex holes of two Flat Trunnions bolted to one pair of Angle Girders 18 and 19. Mounted tight on this rod is a Coupling, in the end transverse bores of which two 2 in. Rods 37 are fixed. These Rods pass one each side of Rod 35. Mounted on the end of Rod 36 is another Coupling that carries a 1½ in. Rod in its free end transverse bore. Loose on this Rod are two 1½ in. Strips 38, attached to the lugs of another large Fork Piece, in the boss of which an 8 in. Rod 39 is fixed. This Rod slides in another two 8-hole Wheel Discs joined by four 2½ in. by ½ in. Double Angle Strips 40, representing the pump and bolted to Compound Flat Plate 15. A 1 in. fixed Pulley acts as the piston.

A 1 in. fixed Pulley on a 4½ in. Rod also acts

as the piston for the valve cylinder, as can be seen from the accompanying photographs. Fixed on the lower end of the Rod is a Strip Coupling 41, carrying a 12½ in. Strip, to the opposite end of which a Single Throw Eccentric 42 is bolted.

## Crankshaft and Governor

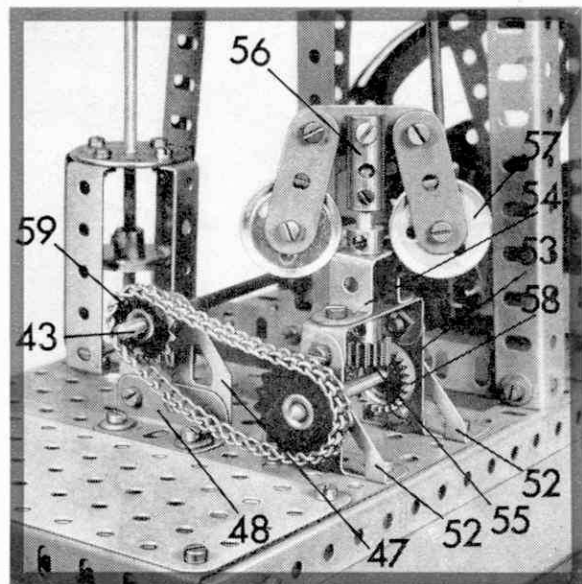
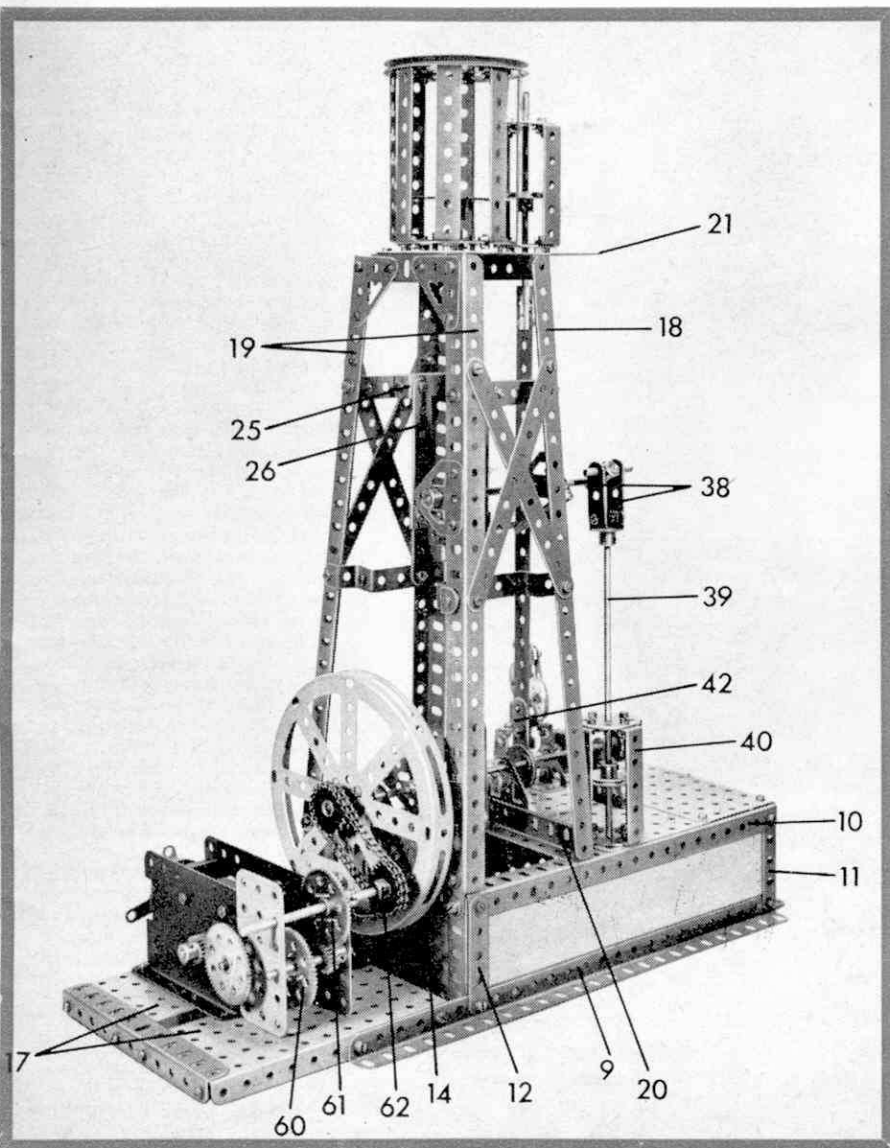
The boss of Eccentric 42 is mounted, tight, on the crankshaft, which is built up from a 5 in. Rod 43 and a 2½ in. Rod 44, the inside end of each of which is fixed in the boss of a Crank bolted to a 2½ in. Triangular Plate 45. Another Crank is bolted to the inside of the Triangular Plate so that its boss coincides with one apex hole, and in this boss is fixed a 1 in. Rod carrying a Coupling 46. Fixed in the longitudinal bore of this Coupling is a 5½ in. Rod 48, the upper end of which is fixed in the boss of Large Fork Piece 34.

The complete Crankshaft is journaled in three Flat Trunnions 47, two bolted to the 5½ in. Angle Girders fixed between 5 and 10 at the bottom of the crankcase, and the other to a 1½ in. Angle Girder 48 bolted to Compound Flat Plate 15. Collars hold the shaft in place, the Collar at the Compound Flat Plate end being spaced from the Flat Trunnion by three Washers. Mounted on the opposite end of the shaft is the flywheel, obtained from a Hub Disc 49 bolted to an 8-hole Bush Wheel 50, and a 1 in. Sprocket Wheel 51.

Turning to the governor, two Trunnions 52, each extended one hole by a 1½ in. Strip 53, are bolted to the Compound Plate 15. The upper ends of the 1½ in. Strips are joined by a 1½ in. by 1½ in. Double Angle Strip, to the top of which a Double Bent Strip 54 is fixed. Journaled in this and in the Double Angle Strip is a 2 in. Rod, held in place by a Collar and a ½ in. Pinion 55. A Strip Coupling 56 carrying a 1½ in. Strip, is mounted on the top of the Rod, while a further two 1½ in. Strips are lock-nutted one to each end of the first 1½ in. Strip. Two 1 in. Pulleys without Boss 57 are bolted to the ends of these Strips.

In mesh with Pinion 55 is a ¼ in. Contrate Wheel 58 on a 2½ in. Rod journaled in the apex holes of Trunnions 52 and held in place by a Collar and a 1 in. Sprocket Wheel. This Sprocket Wheel is connected by Chain to a ¼ in. Sprocket Wheel 59 on the end of the Crankshaft.

As mentioned earlier, power for the Model is supplied by an E15R Electric Motor bolted to Flanged Plates 17, but the sideplates of the Motor are extended by two 3 in. by 1½ in. Flat Plates to provide bearings for a 3½ in. and a 2 in. Rod. A ½ in. Pinion on the Motor output shaft engages with a 57-teeth Gear Wheel on a 2½ in. Rod, journaled in the Motor sideplates and also carrying a ½ in. Pinion. This Pinion meshes with a 57-teeth Gear Wheel 60 on the above-mentioned 2 in. Rod while another ½ in. Pinion on this Rod engages with another 57-teeth Gear 61 on the above-mentioned 3½ in. Rod, which is held in place by a Collar. A 1 in. Sprocket Wheel 62 on the end of this Rod is connected by Chain to Sprocket Wheel 51 on the crankshaft.



## Parts required

1 of No. 1a	4 of No. 17	5 of No. 59
4 of No. 2	2 of No. 18a	4 of No. 62
2 of No. 2a	1 of No. 18b	4 of No. 63
3 of No. 4	1 of No. 19b	2 of No. 63b
2 of No. 5	2 of No. 22	1 of No. 70
8 of No. 6a	2 of No. 22a	2 of No. 73
6 of No. 8	1 of No. 24	2 of No. 76
2 of No. 8a	4 of No. 24a	1 of No. 94
7 of No. 9	4 of No. 26	3 of No. 96
1 of No. 9b	3 of No. 27a	1 of No. 96a
5 of No. 9d	1 of No. 29	1 of No. 109
1 of No. 9f	170 of No. 37a	6 of No. 111c
4 of No. 11	158 of No. 37b	2 of No. 116
1 of No. 12b	36 of No. 38	1 of No. 118
1 of No. 13a	1 of No. 45	4 of No. 125
1 of No. 14	1 of No. 48	2 of No. 126
1 of No. 14a	15 of No. 48a	5 of No. 126a
2 of No. 15	7 of No. 48b	1 of No. 130a
1 of No. 15a	2 of No. 50	2 of No. 133
1 of No. 16	2 of No. 52	2 of No. 197
4 of No. 16a	1 of No. 53a	1 E15R Electric Motor