

This model must be one of the most attractive to come from that genius of Meccano, Andreas Konkoly. As can be expected of Andreas' designs, high-quality workmanship is evident throughout.

A large boiler house — with an openable door, ladders, walkways with handrails, and eight representational side vents — is crowned by a boiler with 'steam whistle' and 'safety valve', and a chimney.

A single cylinder is connected to the flywheel, whilst a valve rod is actuated via an eccentric on a crankshaft that is

capable of forward and reverse running.

The speed of the model may be regulated by the use of a 4-speed gearbox in connexion with a compact, heavy centrifugal governor. A shaft from the gearbox is provided with a Cone Pulley in order that another model may be driven from this unit.

A representational steam pipe runs from the boiler to the small cylinder, and a regulating wheel is supplied by a small Steering Wheel on the 'pipe'. The Clockwork Motor supplying the drive has its side-plates extended by a built-up 'roof', and this — together with railings and a 'Meccano' pennant — adds the finishing touches to a very attractive and compact model.

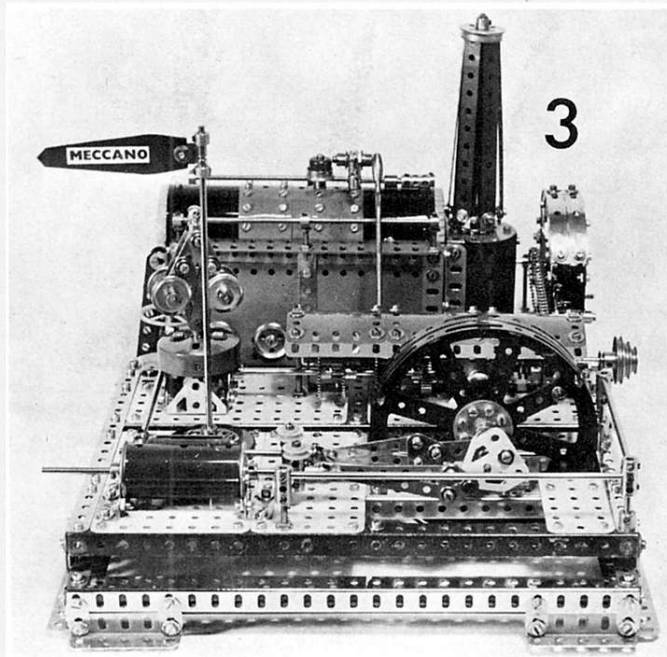
An Electric Motor for continuous running may easily be fitted instead of, or in addition to, the Clockwork Motor illustrated. A Motor-with-Gearbox may be fitted on the Angle Girders on the base which lie between the boiler and the gearbox. A Motor thus fitted should be raised on Collars.

BUILDING INSTRUCTIONS

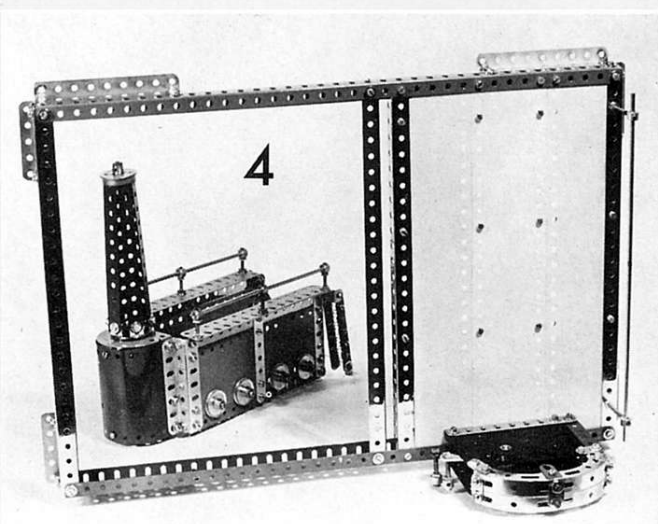
THE FRAME

Figs 4 & 5: The frame is constructed as shown from four 12½" and four 18½" Angle Girders. The legs are four 2½" and four 4½" Angle Girders, each held to the frame by two Fishplates. Four ½"x½" Angle Brackets brace the corners as shown in Fig 5.

Within the basic frame, cross members



STEAM POWER PLANT



are provided by two $1\frac{1}{2}$ " Angle Girders, one of which helps support three $7\frac{1}{2}$ " Strips, which in turn support three $12\frac{1}{2}$ " Strip Plates as shown.

THE BOILER HOUSE

Figs 1, 2, 3, 4, & 5: The lower long sides of the boiler house are two $7\frac{1}{2}$ " Angle Girders with their slotted flanges facing inwards. The upper long sides are identical, except that the slotted flanges face outwards. Four $3\frac{1}{2}$ " Angle Girders form the vertical corners. A $3\frac{1}{2}$ " Strip braces the bottom of each end, whilst two $2\frac{1}{2}$ " Stepped Curved Strips brace the top farthest from the chimney end. A $3\frac{1}{2}$ " Narrow Strip adds extra support just below the Curved Strips (see Figs 2 & 5).

The sides are filled in with $7\frac{1}{2}$ "x $2\frac{1}{2}$ " Strip Plates with $3\frac{1}{2}$ " Strips placed vertically in their centres as shown.

Fig 2 gives a good view of the openable 'leaf' door, which consists of two Hinges supporting a $2\frac{1}{2}$ " Flat Girder on which is mounted two $\frac{1}{2}$ " loose Pulleys by two Handrail Supports to form a door handle.

The side vents (Figs 1 & 2) are four 1" loose Pulleys on one side, and four 1" Pulley-with-Boss held by 19mm Bolts on the other.

In the corner holes on the lower frame of the boiler house, four Bolts are fixed with Nuts as shown in Fig 5 to allow connexion to the Strip Plates on the base.

THE CHIMNEY

Figs 4, 5, & 6: The chimney 'house' consists of two vertical $3\frac{1}{2}$ " Angle Girders, attached to the boiler house, and supporting two $5\frac{1}{2}$ "x $2\frac{1}{2}$ " Plastic Plates curved as shown. On top of this assembly, a $2\frac{1}{2}$ "x $1\frac{1}{2}$ " Double Angle Strip braces the chimney house, and a Semi-Circular Plate is fixed to this D A Strip by a $1\frac{1}{2}$ " Flat Girder (hidden below the Semi-Circular Plate in Fig 4, but an identical arrangement makes up the bottom of the chimney house and is shown in Fig 5). A $\frac{1}{2}$ "x $1\frac{1}{2}$ " Angle Bracket supports the Plastic Plates at the front of each Semi-Circular Plate.

Another pair of $2\frac{1}{2}$ " Curved Stepped Strips brace this end of the boiler house, and they carry a $\frac{1}{2}$ "x $1\frac{1}{2}$ " Angle Bracket (pointing away from the chimney house) to support the boiler when added later.

The chimney itself consists of a 6-hole Wheel Disc with a $\frac{1}{2}$ "x $1\frac{1}{2}$ " Angle Bracket fixed to each perimeter hole by their round holes. To each slotted hole of the Brackets is fixed a vertical $5\frac{1}{2}$ " Strip. An

8" Threaded Rod lock-nutted to the centre hole of the Wheel Disc, serves to hold the chimney cap, which is a large Flanged Wheel.

THE WALKWAYS

Fig 4 shows details of the walkways which are $7\frac{1}{2}$ " Flat Girders. The handrails are two $3\frac{1}{2}$ " Rods, held in Collars supported by 19mm Bolts.

The ladders are shown in Fig 2. Both have two $3\frac{1}{2}$ " Strips as their side members. The 'rungs' of the left-hand ladder are six $\frac{1}{2}$ "x $1\frac{1}{2}$ " Double Brackets, whilst those of the right-hand ladder are one $\frac{1}{2}$ "x $1\frac{1}{2}$ " Double Bracket above five $\frac{1}{2}$ "x $1\frac{1}{2}$ " Angle Brackets. The left-hand ladder is secured by a [154a] Right-hand Corner Angle Bracket at the top, and a $\frac{1}{2}$ "x $1\frac{1}{2}$ " Angle Bracket at the bottom; whilst the right-hand ladder is secured at the top by a [154b] Left-hand Corner Angle Bracket, and two $\frac{1}{2}$ "x $1\frac{1}{2}$ " Angle Brackets at the bottom.

THE BOILER

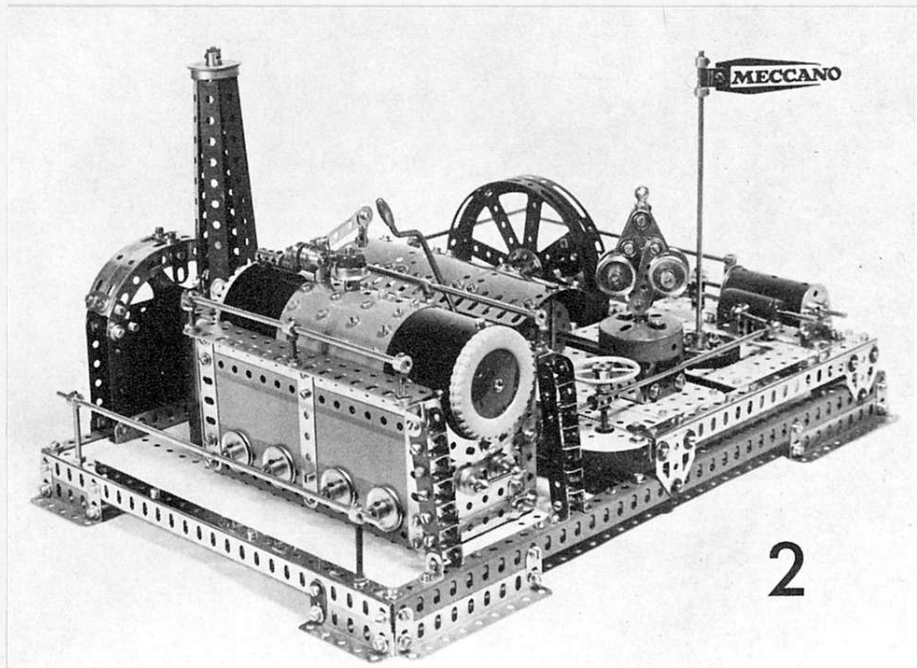
Figs 1, 2, 3, 6, 7, & 8: One extreme end of the boiler side is formed of two $4\frac{1}{2}$ "x $2\frac{1}{2}$ "

Plastic Plates joined as shown. Now follows a $5\frac{1}{2}$ "x $1\frac{1}{2}$ " Plastic Plate plus a $5\frac{1}{2}$ "x $1\frac{1}{2}$ " Transparent Plastic Plate (see Figs 6 & 8).

A No187 Road Wheel is fitted with an 8" Rod, and pressed into the built-up boiler half to form one of the boiler ends. A Face Plate is passed over the 8" Rod and firmly fixed against the Bolts of the $5\frac{1}{2}$ "x $1\frac{1}{2}$ " Plastic and Transparent Plates: this provides the former for the boiler shape.

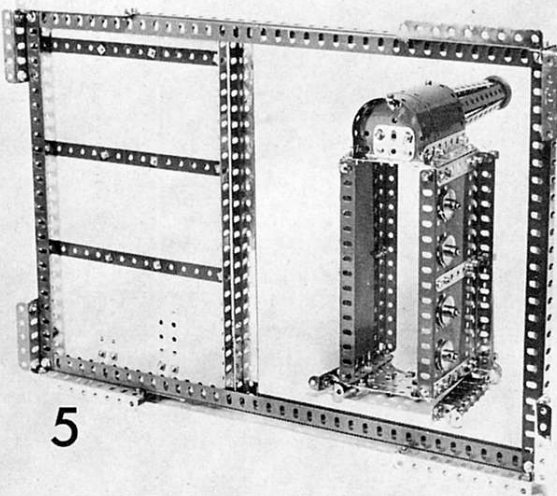
The two halves of the boiler will be connected by two or more $5\frac{1}{2}$ "x $1\frac{1}{2}$ " Plastic Plates as shown in Fig 8, and these should now be fitted to the assembled half.

Now, the other half of the boiler can be completed in exact mirror-image of the first half, with another Face Plate being positioned before the pair of $4\frac{1}{2}$ "x $2\frac{1}{2}$ " Plastic Plates are finally fitted. Another Road Wheel forms the second boiler end. The 'safety valve' and the 'whistle' should be constructed and installed as work on the second half of the boiler progresses.

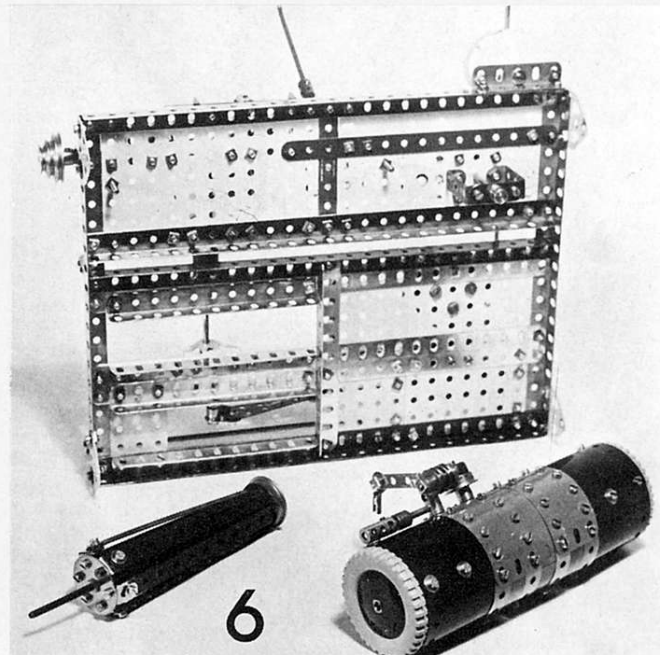


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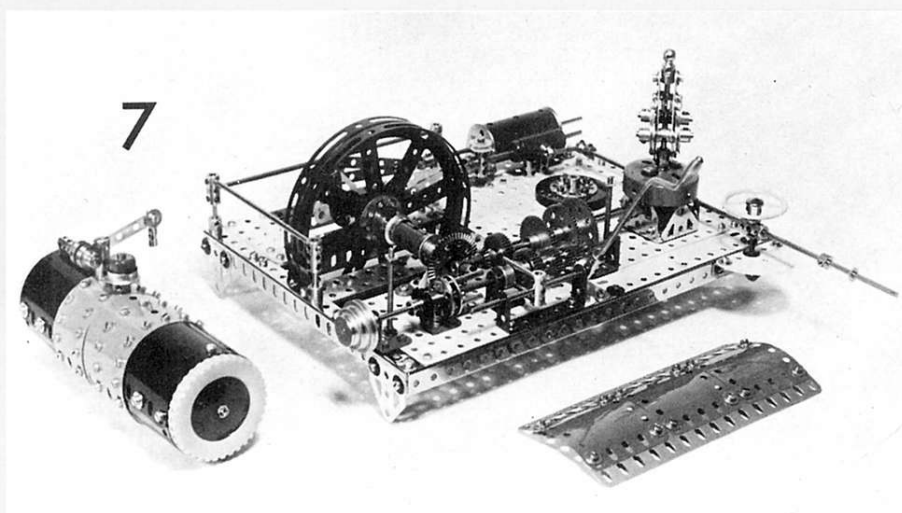
Designed by Andreas Konkoly
and described by "SPANNER"



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6



THE 'SAFETY VALVE'

Figs 2 & 7: This fitting consists of a Chimney Adaptor fitted inside a small Flanged Wheel, and held to the boiler top by a central 28.5mm Bolt.

THE 'STEAM WHISTLE'

Figs 2, 6, & 7: A Strip Coupling has a 2½" Narrow Strip fitted in its slot as shown, and this Strip carries a counterweight, represented by a 28.5mm Bolt on which is placed in order: a ½" Pulley-with-boss, a

Washer, the end hole of the Narrow Strip, another Washer, another ½" Pulley-with-boss, and finally, a Nut.

On its other end, the Narrow Strip carries a Rod and Strip Connector on a Bolt that is lock-nutted to the end hole of the Strip so that the Connector is free to swing.

The Strip Coupling is fixed to the boiler top by a short Threaded Pin — or a Bolt from inside the boiler — and a Washer is used as spacing. A 9.5mm Bolt passes up through the end top hole of the boiler, and secures a Coupling, spaced from it by the necessary number of Washers. In the Coupling is mounted a new-style (shoulderless) Threaded Pin (or a 1" Threaded Rod if such a pin is not available). This Pin serves to extend the Coupling with a Screwed Rod Adaptor, the 'point' of which rests against the Strip Coupling. Any portion of the Pin/Threaded Rod left showing after adjustment may be sleeved by Washers.

FITTING THE BOILER

The boiler is now placed in position, where it is retained by virtue of the walk-way Flat Girders pressing on the Bolt

heads on the side of the boiler.

The boiler-house-and-boiler unit is now bolted to the base frame in the position shown.

THE MOTOR

Figs 1, 2, & 4: Firstly, a 4½" Flat Girder is attached to the side of the base frame as shown in Fig 1, then, to the three Strip Plates, a 4½" Angle Girder is fixed, and between these, the No 1 Clockwork Motor is fitted. Any resulting gaps should be spaced with Washers.

The Motor sideplates are extended with a pair of vertical 3" Strips, each joined to the top of the Motor by Fishplates. Four 3" Stepped Curved Strips serve to form the arched 'roof' of the motor, and these support four Formed Slotted Strips as seen. Two 1½" Angle Brackets support the structure in the centre, and three Fishplates hold the assembly together at '10, 12, and 2 o'clock'. Four ½"x½" Angle Brackets hold the Curved Strips to the end of the Formed Strips.

A Bolt lock-nutted to the lower hole of the external 1½" Angle Bracket serves as a hook for storage of the Motor winding key.

On the drive shaft of the Motor, a 1" Sprocket Wheel is fitted, and on the operating levers of the Motor, Collars on 28.5mm Bolts act as handles (see Fig 1).

THE PLINTH

The remainder of the model is set on a raised platform or plinth, the construction of which is as follows: Referring to Figs 1, 2, 3, 6, 7, 8, & 9: Four Flat Trunnions support the frame which is made from two 12½", and two 9½" Angle Girders (Fig 6). Within these are two 12½" Angle Girders and two 12½" Flat Girders arranged as shown (horizontally) in Fig 6.

The narrow part of the plinth is now filled in with the following: a 5½"x3½" Flat Plate, a 5½"x1½" Flexible Plate, and a 3½" Strip. A 7½" Strip braces the underside as shown.

Infilling of the wide part of the plinth is by a 3"x1½", a 5½"x2½", and a 5½"x3½" Flat Plate, whilst underneath they are braced by four 5½" Angle Girders in one direction, and one 5½" Angle Girder at right angles to the four.

THE CRANKSHAFT

Figs 1, 7, 8, & 9: On the edge of the narrow part of the plinth (Fig 9) is fixed a Trunnion spaced by three 2½" Strips. On the centre of the wide part of the plinth, a similar arrangement is placed, but this time with five 2½" Strips as spacing. A 6½" Axle Rod is placed in the bearings thus formed, and this Rod carries a Double Arm Crank fitted with a Flat

Trunnion, and a Single-Throw Eccentric as shown. A Collar and a Washer next to the lower (on Fig 9) supporting Trunnion limit Rod travel.

The flywheel comes next on the Rod. It consists of a pair of Hub Discs fitted back-to-back and clamped by a pair of 8-hole Bush Wheels. This is followed by an ornamental feature made up of a Sleeve Piece held between two small Flanged Wheels [this arrangement is not possible with modern cast Flanged Wheels, and may be omitted if pressed Wheels are not available].

Two Washers follow the supporting Trunnion, and these are in turn followed by a 1½" Bevel Gear. Referring to Fig 7, it can be seen that the Bevel Gear is followed by a Washer, a Coupling, another Washer, and a final Collar.

The flywheel carries a Nut and a 12mm Bolt fitted with a Collar and a Washer on each side of the spoke to which it is fitted. This assembly acts as a counterweight, and care should be taken later to ensure that this fitting is at the top of the flywheel when the end of the connecting rod is at the bottom, as shown in Fig 8.

THE VALVE CYLINDER

Figs 1, 7, & 9: Two vertical Short Couplings (Fig 7), held on 19mm Bolts, serve as supports for a horizontal Sleeve Piece representing the valve cylinder. The 'steam entry' connexion is a Handrail Support fixed as shown, and spaced by a Washer. The ends of the valve cylinder are Chimney Adaptors.

THE MAIN CYLINDER

Figs 1, 2, 3, 8, & 9: The main body of this unit is a cylinder fitted with a large Flanged Wheel at each end, each of which is fitted with two Fishplates which secure them to a pair of 1½" Angle Girders forming the brackets for attachment to the plinth.

THE VALVE ROD

Figs 1, 3, & 8: The Single-Throw Eccentric has a 1" Triangular Plate fixed to its arm (Fig 8). Two 2½" Narrow Strips are fixed to the remaining holes in this Plate, and these are both joined by their end holes to an End Bearing which carries a 4½" Rod in its boss. Mounted on this Rod in

THE VALVE ROD

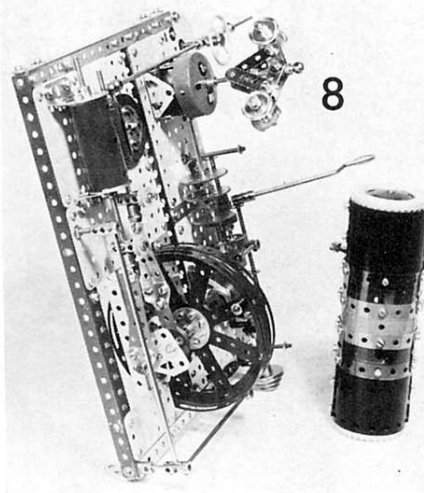
Figs 1, 3, & 8: The Single-Throw Eccentric has a 1" Triangular Plate fixed to its arm (Fig 8). Two 2½" Narrow Strips are fixed to the remaining holes in this Plate, and these are both joined by their end holes to an End Bearing which carries a 4½" Rod in its boss. Mounted on this Rod in the position shown, is a Coupling with a ½" Bolt. The Rod passes through the Chimney Adaptors mentioned above.

THE MAIN CONNECTING ROD

Figs 2, 3, & 8: The Flat Trunnion on the Double Arm Crank that is fitted to the end of the crankshaft is connected by a lock-nutted Pivot Bolt [147b] to an arrangement that is identical to that of the valve rod, except that the Narrow Strips are 3" long, and the Axle Rod is 6½" long. The Triangular Plate is spaced from the Flat Trunnion by a Washer, a Collar, and one of the lock-nuts.

THE GOVERNOR'S BASE

Fig 9: Two 1½" Angle Girders each supporting a Flat Trunnion are fixed to the plinth as shown in Fig 9. The tips of the Flat Trunnions are connected by a 1½"x1½" Double Angle Strip spaced from them by a Washer at each end. The D A Strip carries two Bolts pointing upwards and secured by Nuts as shown. These Bolts will later hold the Boiler End that crowns this assembly. The remaining sides of this structure are a pair of Trunnions fixed to the plinth as shown.



THE 4-SPEED GEARBOX

Figs 7 & 9 First Shaft: Within the assembly just described, a 25-tooth Pinion is fixed on a horizontal $6\frac{1}{2}$ " Rod which passes out through the centre hole of the Flat Trunnion, on each side of which is placed a Washer. A Collar is fitted on the Rod next to the Washer outside the governor housing.

Referring to Fig. 9, the sequence of Gears on the shaft (from left to right) is as follows: 60-tooth, 57-tooth, 50-tooth, 38-tooth [1" Gear], and finally, a $\frac{1}{2}$ " Bevel Gear (teeth outwards). The Rod terminates in a journal formed by the Coupling on the crankshaft (see Fig. 7).

Second Shaft: this is a $5\frac{1}{2}$ " Rod journalled alongside the first shaft in two supports formed by 1"x1" Angle Brackets as shown in Fig. 7. The order of parts on this Rod (from right to left in Fig. 7) are: support, Washer, 15-tooth Pinion, 19-tooth Pinion, 25-tooth Pinion, 1" Gear, a Socket Coupling supported on the boss of the 1" Gear and a Collar, Washer, support, and finally, a 1" Bush Wheel [Part 518].

A further pair of 1"x1" Angle Bracket supports provide the bearings for the **Third Shaft**, colinear with the second shaft. From right to left (in Fig. 7), it carries: another 1" Bush Wheel — bearing a pair of Long Threaded Pins in diametrically opposite holes, whose shafts engage holes in the first 1" Bush Wheel — Washer, support, $\frac{3}{4}$ " Sprocket, support, Cone Pulley (this latter may be replaced with any other suitable Pulley, Gear or Sprocket Wheel).

A $2\frac{1}{2}$ "x1" Double Angle Strip forms both bearings for the **Fourth Shaft** — a 4" Rod carrying on its end a Coupling fitted with a $3\frac{1}{2}$ " Crank Handle which forms the gear change lever. The second shaft is slid by means of a fork made from two Rods (set in another Coupling fixed to the centre of the fourth shaft) which engages the groove of the Socket Coupling. By the use of this gear lever, an imaginary 'operator' can control the speed of the Power Plant from the walkway by the 'whistle' lever.

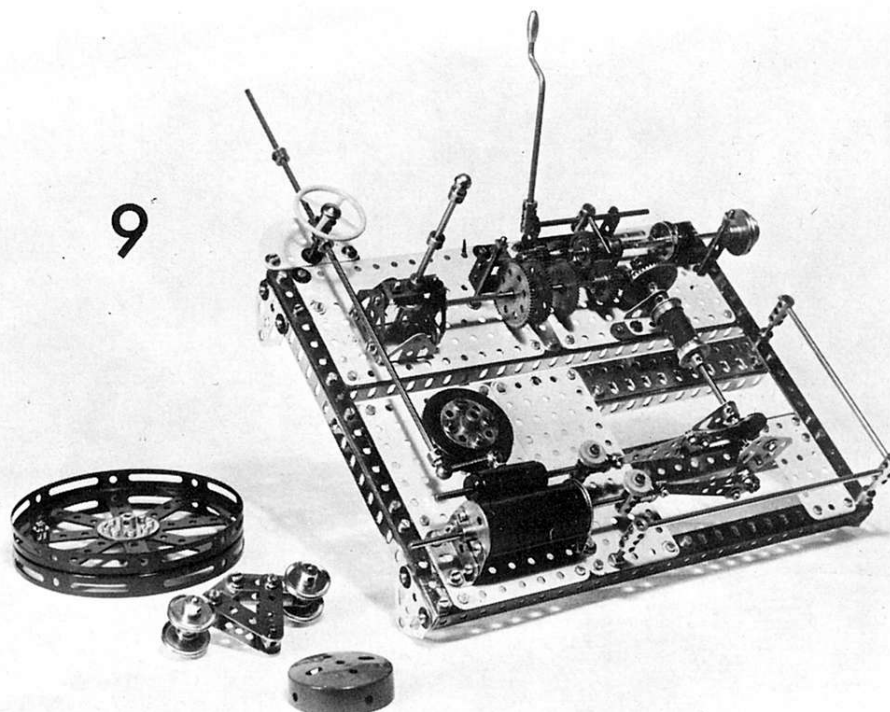
THE GOVERNOR

Figs. 6, 7, 8, & 9: Referring to Fig. 6, two $1\frac{1}{2}$ "x $\frac{1}{2}$ " Double Angle Strips are fixed under the governor's base, and braced with a $1\frac{1}{2}$ " Strip. Next, the governor itself is constructed (Fig. 8). A Handrail Coupling forms the peak of this unit, in it is fixed a $6\frac{1}{2}$ " Rod with a Collar just below the former part. This Collar is fixed to the Rod by Bolts that each hold a pair of 2" Strips (with centre hole) which are free to swing.

Lower down the shaft a Collar is fixed to limit the movement of the governor's arms. Next on the shaft is another Collar which must remain free to slide on the Rod. To this Collar are fixed two pairs of 2" Strips by [No 17246] Shouldered Bolts from a Universal Coupling or Swivel Bearing. The other ends of the Strips are loosely bolted to the centre holes of the first 2" Strips by the use of Bolts with pairs of Nuts locked together (Fig. 7). Thus, when the lower Collar is moved upwards, the whole governor unit 'expands', and the arms move outwards. When the arms are almost horizontal, the central 'limit' Collar should be set to prevent further upward movement of the lower Collar.

The governor's weights are formed by four 1" Pulleys-with-boss locked to $1\frac{1}{2}$ " Rods in the outer holes of the arms. Two Washers space each Pulley from each arm, and two Washers and a Collar on the $1\frac{1}{2}$ " Rods fill the space within each arm (Fig. 7).

A fixed Collar supports the governor shaft, as it rests on top of the Boiler End that forms the top of the governor's base (Fig. 8). Before the latter is fitted in place with a pair of Nuts, a $\frac{3}{4}$ " Contrate Wheel



is fixed onto the governor shaft in mesh with the Pinion inside the governor's base (Fig. 9).

Underneath the plinth, a Collar — below the $1\frac{1}{2}$ " Strip — terminates the governor shaft and prevents it from moving upwards (Fig. 6).

THE GEARBOX COVER

Figs. 1, 3, & 7: This item may be omitted if desired, thus giving a better view of the gearbox; alternatively, a 'clear-view' cover may be devised by the builder, using Transparent Plates. The cover shown in the illustrations consists of two $7\frac{1}{2}$ " Flat Girders bolted to three $2\frac{1}{2}$ " Curved Plates as shown, and supported by two 3" Screwed Rods in the positions indicated. If Electrical Terminal Nuts [Part 542] are used instead of standard Nuts at the top of the Rods, the gearbox cover may easily be removed for inspection, oiling, etc.

FLAGPOLE ASSEMBLY

Figs. 1 & 2: Four $\frac{1}{2}$ " Bolts secure an 8-hole Bush Wheel and a Wheel Flange to the plinth. The flagpole is an 8" Rod bearing a suitable made-up flag attached to the pole via a Right Angle Rod and Strip Connector held in position by a pair of Collars.

THE HANDRAILS

Fig. 1: Two Rod Sockets are fixed to the plinth — near the flywheel — as shown. These Sockets are fitted with 1" Rods to which Couplings are fixed. The Couplings are connected by a $5\frac{1}{2}$ " Rod. The Coupling at the corner of the plinth is also fitted with an 8" Rod which is supported at its other end by another Coupling (or Threaded Coupling) fixed to the plinth by a 28.5mm Bolt as shown.

THE 'STEAM PIPE'

Figs 2 & 7: A Semi-Circular Plate is secured to the side of the plinth by a $2\frac{1}{2}$ " Angle Girder. A 19mm Bolt passes up through this Plate to support a horizontal Coupling with a short Threaded Pin fitted in the other central tapped bore. Two Washers are placed on the shaft of the Pin, followed by a $1\frac{1}{4}$ " Steering Wheel representing the steam regulator.

A $1\frac{1}{2}$ " Rod is now fitted in the 'eye' of the Handrail Support on the side of the valve cylinder. On the other end of this Rod, the 'eye' of a Handrail Coupling is fitted. The boss of this Coupling holds an

$11\frac{1}{2}$ " Rod which passes through the Coupling of the 'steam regulator'. A Collar and a Washer are next placed on the Rod, as seen in Fig. 7. This Collar is fitted against the side of the boiler house after final assembly.

The remainder of the 'steam pipe' Rod disappears inside the boiler house as the plinth is now fitted in position.

FINAL ASSEMBLY

Figs. 1 & 2: The plinth is bolted to the base frame by means of the Flat Trunnions as shown. After the plinth is in place, the Sprocket Wheels on the Motor and gearbox are connected with Chain.

The final touch is provided by the handrail behind the boiler house. This is an $11\frac{1}{2}$ " Rod journalled in Collars supported by two 2" Screwed Rods firmly nutted to the base.

All bearings should be lightly oiled before the model is run.

LIST OF PARTS REQUIRED

of	No	of	No	of	No
4	1b	1	26c	3	115
6	2	1	27	2	115a
9	3	1	27a	2	109
2	4	1	27d	2	118
8	5	1	29	1	123
8	6	1	30a	4	126
1	6a	1	30c	7	126a
4	7a	2	31	1	130a
10	8	394	37b	3	136
2	8a	469	37c	2	136a
4	8b	85	38	1	137
5	9	2	38d	1	154a
5	9a	1	46	1	154b
6	9b	3	48	8	154c
4	9d	2	48a	2	147b
25	9f	27	52a	3	155
7	11	1	59	2	163
25	12	1	62a	3	164
4	12a	10	63	1	171
2	12b	1	63b	1	173a
3	13	2	63d	2	179
4	14	1	70	1	185
2	14a	2	72	2	187
1	15a	1	77	1	189
1	15b	2	79	2	193d
4	16	2	80c	4	194c
1	16a	1	81	4	194d
6	18a	4	82	2	194e
2	18b	4	89a	2	195
1	19a	1	90a	2	197
3	20	1	96	3	200
4	20b	2	96a	1	212
4	22	2	103b	1	212a
4	22a	1	103c	3	214
2	23	2	103f	1	215
2	23a	4	103h	1	218
2	23b or 23c	13	103k	3	235
3	24	10	111	2	235a
1	24c	8	111a	2	235b
2	25	8	111c	1	235d
1	26	5	111d	2	518
		2	114		

1xNo1 C/W Motor. 2x17246 U. Coupling Bolts.