

Fig. 1.  
The Meccano Stroboscope in  
its completed form.

# A Meccano Stroboscope

in its motion can be seen readily.

The principle of viewing the moving part for a fraction of a second during each movement or revolution, is used in the Meccano Stroboscope seen in Fig. 1. The model is fitted with an Electric Motor, that drives a cardboard cylinder at high speed. Slots are cut

EVERY Meccano enthusiast will at some stage in his career have built a working model with parts moving or rotating at high speeds. Sometimes it is found that although the model works reasonably well, it does not run really smoothly and produces excessive vibration. It is often difficult to find the exact cause of this vibration, due to the problem of examining working parts moving at high speeds. In actual practice engineers are confronted with similar problems, but fortunately machines known as Stroboscopes are available that enable engineers to examine moving parts quite easily. These machines have the effect of making rotary or vibrating movements appear stationary, and the value of this feature will be readily appreciated.

The principle on which a stroboscope operates will be understood quite easily by carrying out a simple experiment. Stand in front of a pendulum-operated clock, but open your eyes only at each second tick of the clock. Under these conditions the pendulum will appear to remain in exactly the same position, and no swing will be apparent. Now consider a similar principle adapted to a wheel turning at high speed. If a momentary glimpse of the wheel is obtained only once and at exactly the same point during each complete revolution it makes, the wheel will appear stationary. Further, by regulating the frequency of the glimpses the wheel can be made to appear to rotate slowly, so that any irregularities

in this cylinder, and the operator looks at the object to be observed through an eyepiece placed at the same level as the slots. It will be apparent that his vision is obscured by the cylinder except when the cylinder slots are in line with the eyepiece, and the frequency with which this takes place varies according to the speed of rotation of the cylinder. A governor is fitted to control the speed of the cylinder, so that it can be regulated until the movement of the object being observed is apparently brought to a stop.

The frame to house the mechanism of the model is made quite simply from  $5\frac{1}{2}$ " and  $4\frac{1}{2}$ " Angle Girders, and is filled in by  $5\frac{1}{2}$ "  $\times$   $3\frac{1}{2}$ " Flat Plates. The Plate fitted to the viewing side is attached by Hinges, so that it can be opened to give access to the mechanism. Four  $5\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strips are bolted to the base of the frame, and are connected at their lower ends by a Face Plate to form a handle. This handle is employed to hold the Stroboscope when it is in use.

An E15R Electric Motor is bolted to the base in the position shown in Fig. 2, and a  $\frac{3}{4}$ " Sprocket is fixed at each end of the armature shaft. One of these is connected by Chain to a 2" Sprocket 1 on a  $3\frac{1}{2}$ " Rod. This Rod is the governor shaft and it is mounted in one side of the frame and in a hole in the Motor sideplate. The Rod is held in place by a Collar 2.

The governor is shown in Figs. 2 and 3.

Two Handrail Supports are fixed in diametrically opposite holes in the Sprocket 1, and two similar parts are attached in the same way to a Face Plate 3. This Face Plate is free to slide on the governor shaft, with four Compression Springs on the shaft between the Face Plate and the Sprocket 1. Washers placed between the Compression Springs prevent them screwing inside each other. Two  $1\frac{1}{2}$ " Strips can now be attached to each Handrail Support. These Strips must be free to pivot, and they are therefore, mounted on the special bolts provided in Universal Couplings and Swivel Bearings, the bolts being screwed tightly into the threaded holes in the Handrail Supports. The pairs of Strips are then coupled together by 1" Rods, with Collars to hold them in place.

The revolving cylinder can now be made and fitted in place. The assembly of this part of the model should be carried out very carefully to obtain the best results. A piece of thin tinplate or cardboard is required, and must be cut to  $4\frac{1}{4}" \times 3\frac{1}{2}"$  in size. Four slots, each  $1" \times \frac{3}{16}"$  are cut lengthways in the material, so that they are in pairs exactly opposite to each other when the material is rolled into a cylinder. The metal

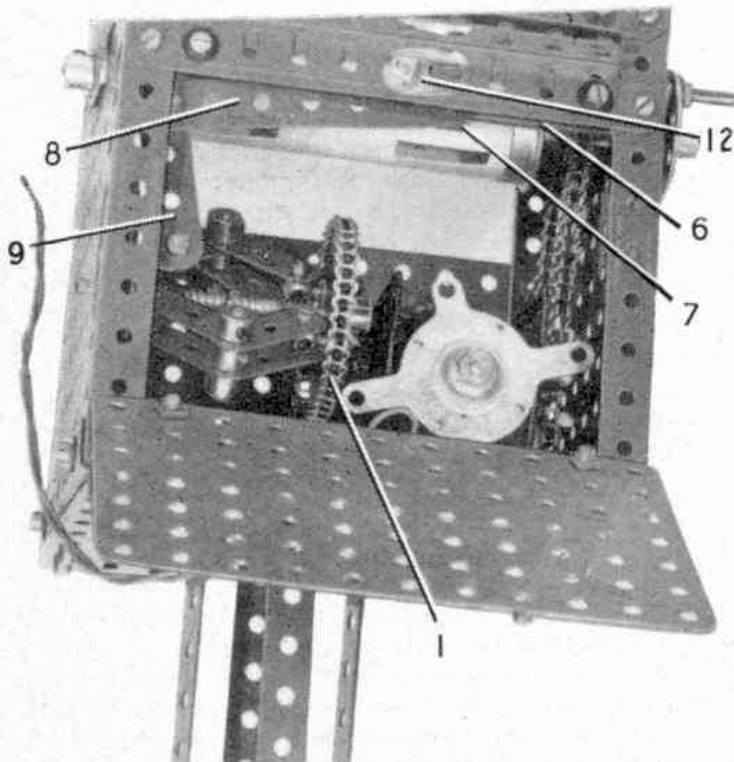


Fig. 3. Another view of the Stroboscope showing the rotating cylinder.

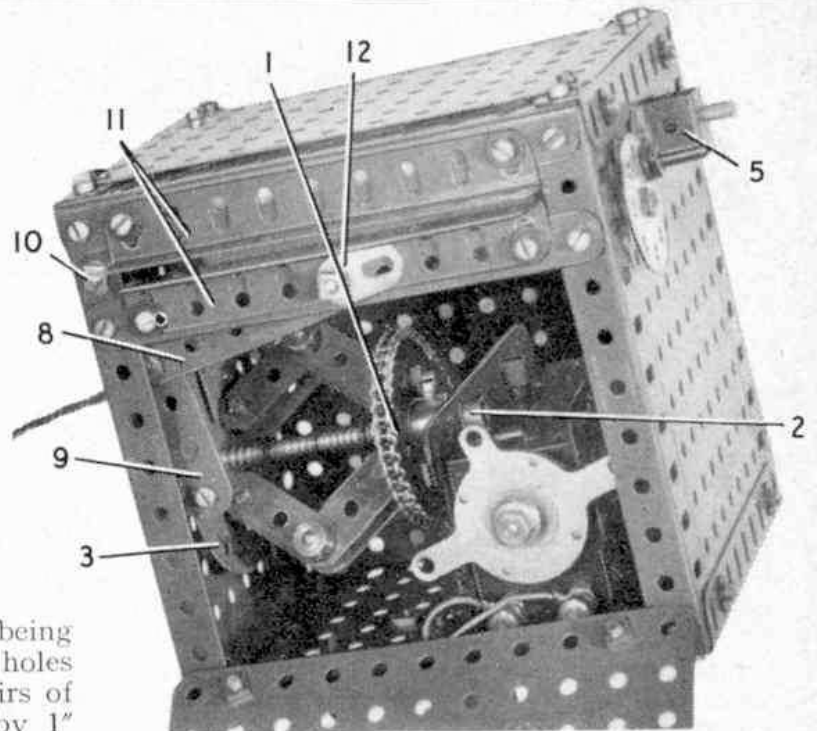


Fig. 2. The Stroboscope with hinged door open to reveal the position of the driving Motor. The governor mechanism can also be seen.

or cardboard can now be rolled to shape, and a  $1\frac{1}{4}"$  Flanged Wheel pressed over each end. The seam in the cylinder is then jointed using glue or solder according to the material from which it is formed.

A Double Arm Crank 4 is bolted to one side of the frame (Fig. 1) and in it is fixed a 1" Rod. One Flanged Wheel of the cylinder is freely mounted on this Rod, and a 2" Rod passed through the other side of the frame and through a Double Bent Strip 5, is fixed in the other Flanged Wheel. A  $\frac{3}{4}"$  Sprocket on the 2" Rod is connected by Chain to the second  $\frac{3}{4}"$  Sprocket on the Motor armature shaft, see Fig. 3.

The governor control mechanism is made by passing a 6" Screwed Rod 6 through the sides of the frame. At one end lock-nuts are used to hold the Screwed Rod in place, and at the other end a Wheel Disc is clamped tightly between two nuts. A Threaded Pin in the Wheel Disc serves as a control handle. A Threaded Boss 7 is screwed on the Screwed Rod and a  $3\frac{1}{2}"$  Strip 8 pivots on a bolt held in the Threaded Boss by a nut. The bolt must not grip the Screwed Rod. Strip 8 is lock-nutted to a 3" Strip 9 that pivots freely on a bolt 10, which is fixed in the frame by two nuts. An Angle Bracket bolted to the lower end of Strip 9 acts as an adjustable stop, and rubs against the

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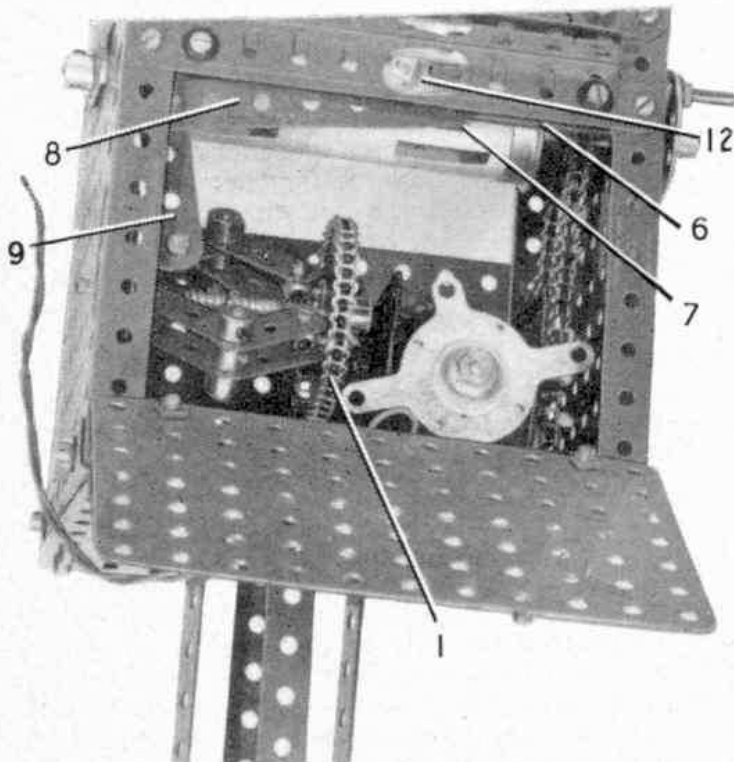


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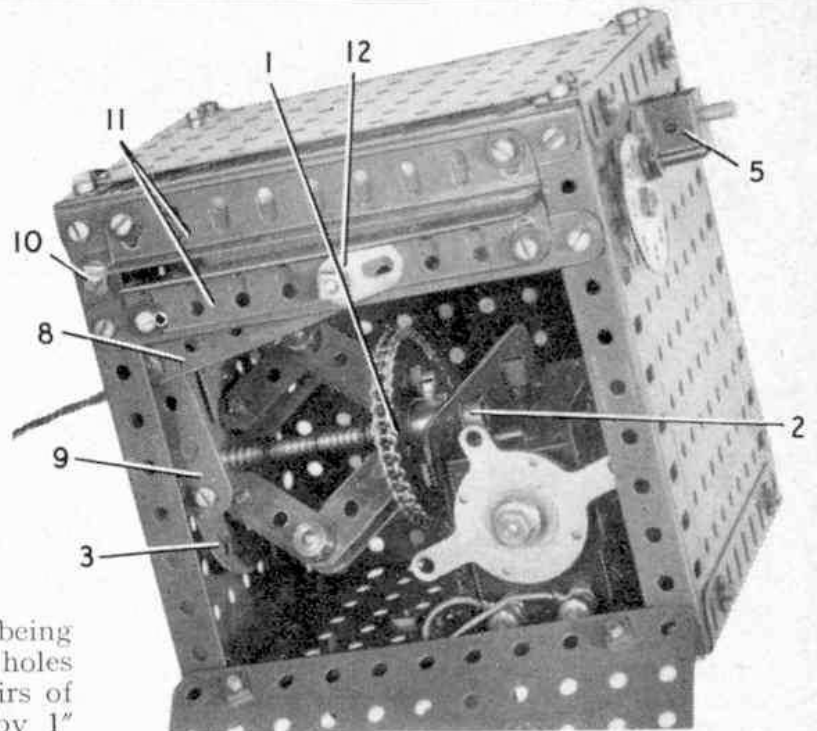


Fig. 2. The Stroboscope with hinged door open to reveal the position of the driving Motor. The governor mechanism can also be seen.

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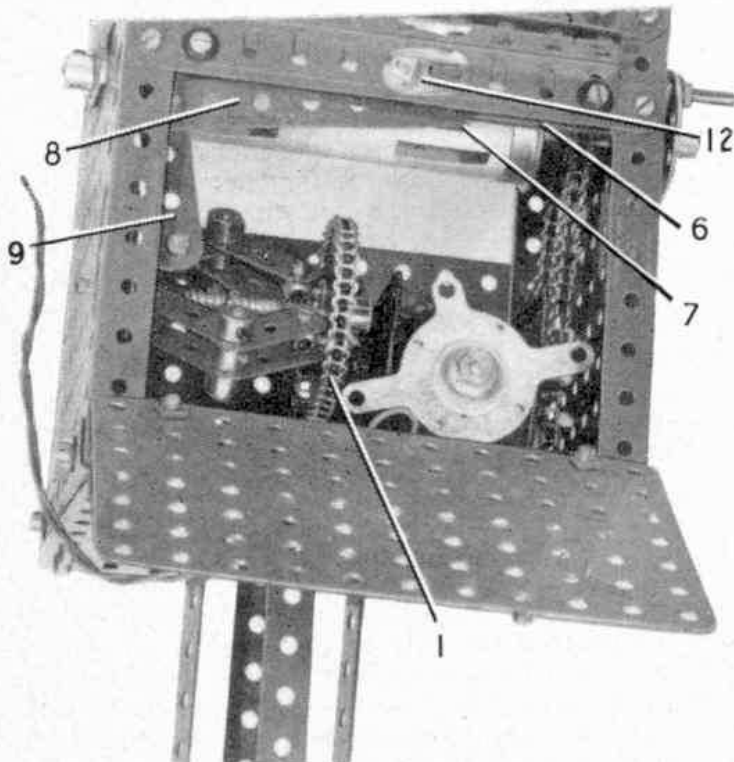


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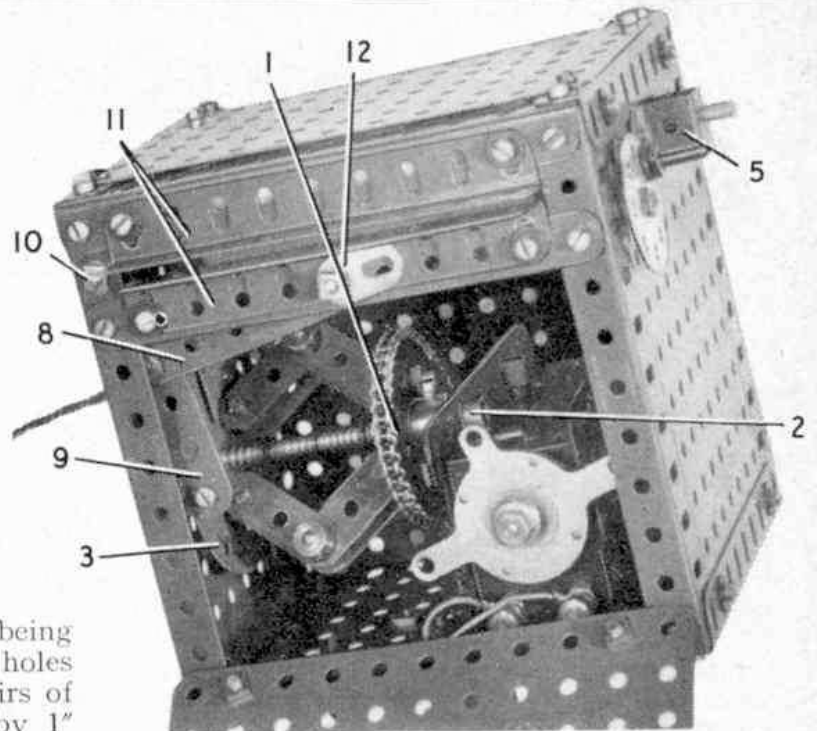


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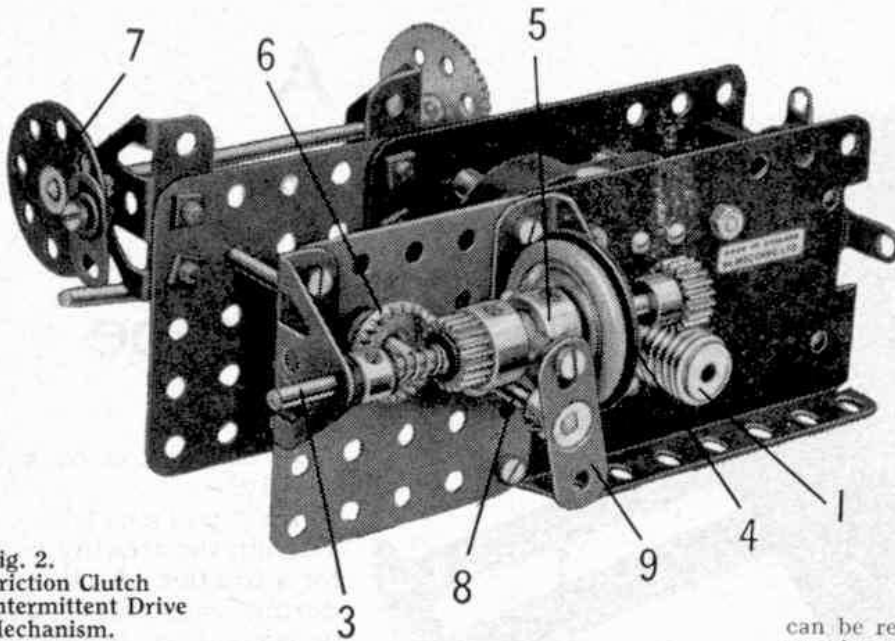


Fig. 2.  
Friction Clutch  
Intermittent Drive  
Mechanism.

On a  $3\frac{1}{2}$ " Rod 2, secure a 1" Pulley Wheel 3, and a free Bush Wheel 4, Collars are placed on the Rod as shown. Two  $1\frac{1}{2}$ " lengths of Spring Cord are attached to the boss of Bush Wheel 4 by nuts and bolts, and also to Set Screws in the boss of the 1" Pulley 3. A Collar 5 is fastened in the centre of each length of Spring Cord. The Pulley 3 is driven with a Driving Band from a  $\frac{1}{2}$ " Pulley on the armature shaft.

In the lower hole of the Double Bent Strip 1, a  $3\frac{1}{2}$ " Screwed Rod 6 carries a Threaded Crank 7, and a Double Arm Crank with Threaded Pin is secured to one end. The Threaded Rod is held in position with two lock-nuts on each side of the lug of the Double Angle Strip.

Bolt a 2" Slotted Strip 8 to each lug of the Double Bent Strip 1. These support a  $3\frac{1}{2}$ " Rod 9, on which the Threaded Crank 7 slides and also bears against the Bush Wheel 4.

When the Threaded Crank 7 is farthest away from the driving side of the Motor, the slower the Motor runs.

To make the loops on the Spring Cord, the ends should be held over a match until they are red hot, then it is quite easy to twist them around the bolts.

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Face Plate 3 when the governor is working.

The eyepiece is formed by two  $4\frac{1}{2}$ " Angle Girders 11, the lower one of which is bolted to a  $5\frac{1}{2}$ " Strip fixed across the frame. A Fishplate 12, mounted on a lock-nutted bolt, serves as a catch to hold the hinged  $5\frac{1}{2}$ " x  $3\frac{1}{2}$ " Flat Plate in its closed position.

To use the Stroboscope it is held by its handle and the operator looks through the eyepiece at the object to be observed. The Motor should first be allowed to run at its maximum speed, then slowed down gradually by turning the governor control in the retarding direction. In this way the Stroboscope

can be readily "tuned in" to the correct speed to slow down or stop the movement of the object under observation.

*Parts required to build the Meccano Stroboscope:*- 1 of No. 5; 1 of No. 3; 1 of No. 4; 8 of No. 6a; 8 of No. 9; 6 of No. 9a; 1 of No. 10; 1 of No. 12; 1 of No. 16; 1 of No. 17; 3 of No. 18b; 2 of No. 20; 1 of No. 24a; 74 of No. 37a; 65 of No. 37b; 32 of No. 38; 1 of No. 45; 4 of No. 48d; 6 of No. 52a; 7 of No. 59; 1 of No. 62b; 1 of No. 64; 1 of No. 79a; 1 of No. 94; 1 of No. 95; 3 of No. 96a; 2 of No. 109; 1 of No. 111c; 2 of No. 114; 1 of No. 115; 4 of No. 120b; 4 of No. 136; 1 E15R Electric Motor; 8 bolts from Universal Couplings or Swivel Bearings; 1 piece of tinfoil or cardboard,  $4\frac{1}{2}$ " x  $3\frac{1}{2}$ ".

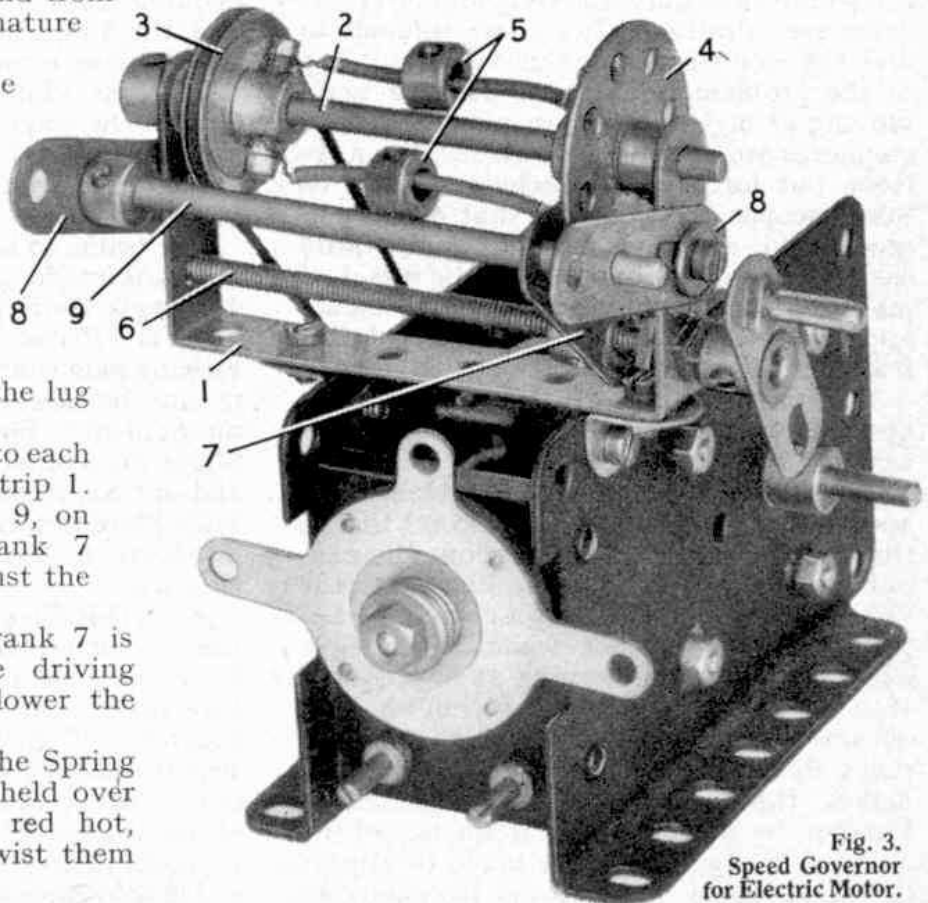


Fig. 3.  
Speed Governor  
for Electric Motor.