

an electric light from two different points. A circuit similar to this is frequently used to control a light over the staircase in electrically-equipped houses, where the lamp may be switched on from the foot of the stairs and put out again from a second switch at the top, or vice versa. The circuit is extremely simple and we have little doubt that Meccano boys will find numerous uses for it. It is equally applicable, of course, to the control of an Electric Motor.

It will be seen that two switches, each exactly the same, are required. In the diagram the lamp is shown "off," but operation of either switch will cause it to be illuminated. Similarly, if the lamp is on, movement of either switches will extinguish it. The wiring connections will be easy to follow from the diagram; one wire is led from the lamp to the switch-arm terminal (5 in Fig. 5) of one of the switches, and the corresponding terminal of the other switch is connected to the Accumulator. The second terminal of the latter is connected to the lamp and the remaining terminals 2, 3 on the switches are wired together in pairs.

#### Meccano Tapper

The tapper key illustrated in Fig. 7 is designed to form a simple make-and-break contact apparatus. A device of this kind will prove extremely useful when making electrical experiments. It consists of a  $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate, to which a Single Bent Strip 1 and a  $5\frac{1}{2}$ " Strip 2 are directly attached by a  $\frac{3}{4}$ " Bolt 3. A convenient knob is formed by a 1" Pulley Wheel 4 secured by its set-screw to the shank of a  $\frac{3}{4}$ " Bolt 8 passed through the end of the  $5\frac{1}{2}$ " Strip 2.

The contact piece consists of a 6 B.A. Bolt and nut 5 insulated from the plate and connected by an insulated wire to the terminal 6, which is also insulated from the plate. The terminal 7 is connected by another length of wire beneath the base plate to the bolt 3. Care should be taken to see that the Strip 2 makes good electrical contact, metal to metal, with the Single Bent Strip 1 and the bolt 3, and in such cases it is advisable to use nickelled parts in preference to coloured ones, to avoid the necessity of removing the enamel around the connecting bolts. If enamelled Strips are used, a length of wire should connect the bolt 3 to the bolt 8 securing the Pulley Wheel 4, since the latter bolt must make contact with the stud 5.

#### Coil-Winding Machine

Fig. 8 shows a coil winder. This apparatus is devised specially for winding insulated wire round the Meccano Bobbins, part No. 301, when constructing electromagnets, etc. The model is very simple and may be constructed in a few minutes. When complete it will wind the Bobbin quickly and evenly, thus obviating the tedious process of laying on the wire by hand.

The spool of wire 1 is mounted loosely on the  $4\frac{1}{2}$ " Rod 2, to which is secured a 2" Sprocket Wheel 3. The latter is connected by chain to a 1" Sprocket Wheel 4 secured to the  $3\frac{1}{2}$ " Threaded Rod 5. The Meccano Bobbin 6 is secured to this Rod 5 by means of two nuts. When the handle 7 is turned in a clockwise direction, the bobbin 6 revolves and the wire from the spool 1 is wound on to it after passing round the 1" loose Pulley 8. As the number of turns of wire on the bobbin increases it will be found that the Pulley 8 slides along its Rod, thereby guiding the wire always in the correct position. Hence, once the bobbin is started, it is unnecessary to touch the wire by hand unless, of course, some accident occurs to upset the uniformity of the layers on the

bobbins. To prevent the spool from spinning round and paying out the wire too quickly, the following device is adopted. A  $2\frac{1}{2}$ " Strip 9 is bolted to a Double Bracket, which is free to pivot about a 1" Rod 10. This Rod is journaled in another Double Bracket bolted to a  $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip in the rear of the model, and a short length of Spring Cord 11 is tied to the centre hole of the Strip 9 and to some fixed portion of the model. The tension of the Spring Cord should be adjusted so that it always holds the  $2\frac{1}{2}$ " Strip firmly against the edges of the spool 1.

Fig. 6 shows a circuit diagram for a lamp controlled by two switches. The circuit includes an Accumulator, a Lamp, and two Switches. The switches are connected in a way that either can turn the lamp on or off.

Fig. 6

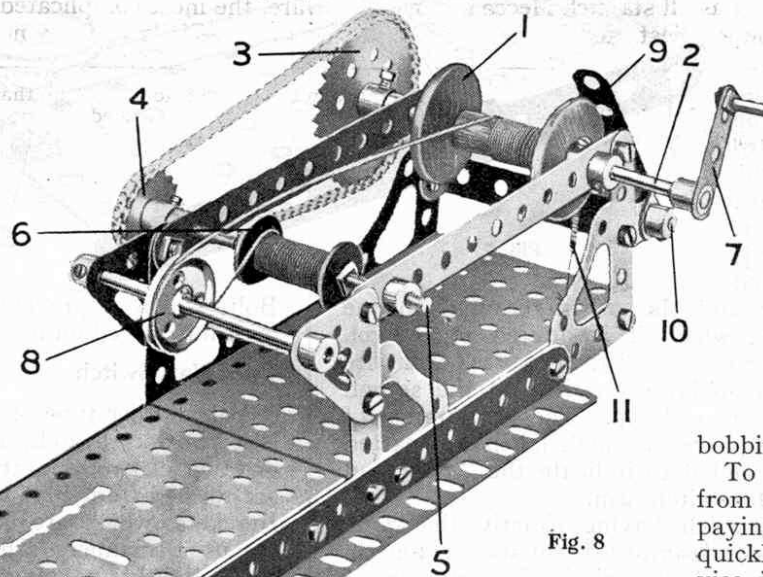


Fig. 8

The following is a list of parts required to build the Meccano coil-winder:—

2 of No. 2	1 of No. 22A	2" of No. 58	1 of No. 95
3 " " 5	22 " " 37	10 " " 59	1 " " 96
2 " " 8A	2 " " 37A	1 " " 62	4 " " 108
2 " " 11	1 " " 48A	1 " " 80A	1 " " 115
1 " " 15A	2 " " 52	14" " " 94	2 " " 133

All the models described in this article will work excellently if constructed carefully, but it must be borne in mind that the slightest fault in a piece of electrical apparatus may not only prevent the model working correctly, but it may also cause considerable damage.