

A Novel Electric Motor

Easily Made with Meccano

Many readers will be interested in the following account showing how an interesting working model of an electric motor may be constructed from standard Meccano parts.

THIS motor is designed on quite unorthodox lines, but it is none the less interesting on that account. The armature in particular, which also does duty as the commutator, is distinctly novel. Although this motor has run at a speed of 600 revolutions per minute under test, it should be mentioned that it has very little power and is not capable of doing any useful work. Its interest lies in the fact that it demonstrates the principles on which more powerful motors are constructed. In passing, it may be mentioned that when running at 600 revolutions per minute the armature receives 9,600 pulls per minute, and the brush is making and breaking contact 4,800 times per minute, wonderful figures considering the small size and nature of the model.

Constructing the Motor

To construct the motor first build the frame as shown in the illustration. The switch arm (1) is a 3½" Strip pivotally bolted to the base plate (2) by means of an ordinary Meccano Nut and Bolt. Two metal Washers are placed on this Bolt between the Strip (1) and the base plate (2). The switch slides over two Flat Brackets (3 and 4), of which (3) is bolted direct to the plate (2), one metal Washer being placed between it and the plate. Flat Bracket (4) is bolted to and insulated from the plate (2) by a 6 B.A. screw, a fibre bush being placed between it and the plate. These two Flat Brackets must not be allowed to touch each other, nor must the Flat Bracket (4) touch the plate (2). A 2" Strip (5) is bolted over the switch arm (1), being separated from the plate (2) by two metal Washers on each bolt.

The combined armature and commutator (6) consists of a Face Plate and four 5½" Strips. In each of the holes next to the boss of the Face Plate is a 6 B.A. screw, which is not insulated, as shown in Fig. 1.

How the Brush Makes Contact

The two magnets (7) are placed as shown, care being taken that the north pole of one and the south pole of the other are near the armature (6). Wind nine layers of No. 26 wire on each bobbin.

At the far end of the plate (2) are two terminals, both insulated from the plate. From one of them a wire goes to the 6 B.A. screw of the Flat Bracket (4) and from the other a wire goes to one of the wires from the lower magnet (7). Join the other wire from this magnet to one of the wires from the upper magnet. The other wire from the upper magnet is taken to the 6 B.A. screw (8), which is insulated from the main frame of the model in the usual way.

The brush (9) consists of 4" bare copper wire. Bend this wire into a semi-circle and fasten one end to the 6 B.A. screw (8) so that there is electrical connection with the upper magnet (7) but not with the main frame.

The free end of the wire (9) must brush against the commutator, which consists of the eight 6 B.A. screws on the Face Plate (6). The brush (9) must be adjusted so as to begin to touch one of the 6 B.A. screws of the commutator when two of the arms of the armature are equidistant from the magnets (7), and must break contact immediately the next arm of the armature comes opposite the magnets.

The Working of the Motor

The path of the current through the motor is as follows: From one of the terminals at the rear of the model the current passes along the wire to the lower magnet (7), and from there to the upper magnet (7), the insulated screw (8) and the brush (9). From the brush it passes to the commutator, the frame of the model and the switch arm (1), and then to the Flat Bracket (4) and the other terminal. In our illustration the switch is shown in the "off" position.

When the switch is "on," no current will flow unless the brush (9) is in contact with one of the 6 B.A. screws of the commutator. If brush (9) is in contact with one of these screws current will flow, the cores of the bobbins (7) will be magnetised, and an arm of the armature (6) will be drawn round until it is opposite the poles of the magnets. Immediately the armature reaches this position, however, the brush, if correctly adjusted, breaks contact, the current is thereby automatically switched off, and the cores of the bobbin (7) cease to be magnetic and no longer hold the armature. Being thus set free, the armature will "free-wheel" round on account of the impetus already given to it, the brush will make contact with the next 6 B.A. screw and the cycle of operations will be completed.

The motor can be built with Outfit No. 5, or Outfit No. 4 and a 2" Strip, or Outfit No. 3 and a 2" Strip and a Face Plate, and the Electrical Outfit.

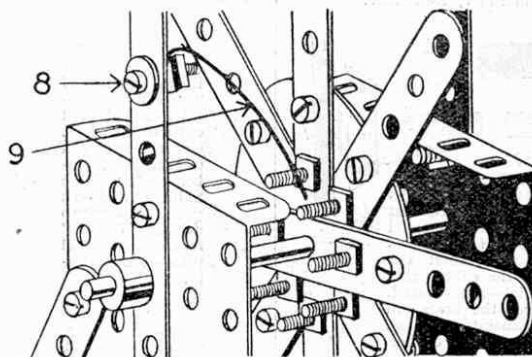
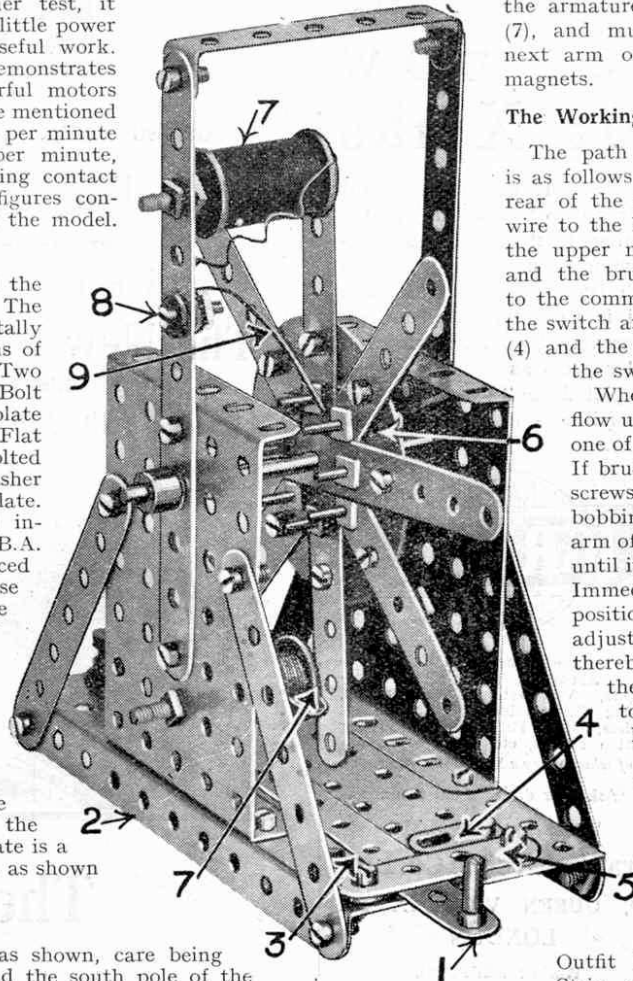


Fig. 1. Details of Commutator

Parts required:

| | |
|------------|---------------|
| 6 of No. 2 | 1 of No. 109 |
| 5 " " 3 | 1 " " 115 |
| 1 " " 6 | 2 " " 301 |
| 2 " " 10 | 5 " " 302 |
| 1 " " 16 | 3 " " 303 |
| 30 " " 37 | 12 " " 304 |
| 5 " " 37A | 13 " " 305 |
| 9 " " 38 | 2 " " 306 |
| 1 " " 48A | 2 " " 308 |
| 1 " " 52 | 30 yds. " 313 |
| 2 " " 53 | 10" " " 314 |
| 2 " " 59 | 4" " " 315 |