

PATENT SPECIFICATION



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COMPLETE SPECIFICATION.

Improvements in Toy Electric Motors.

I, FRANK HORNBY, British subject, of Meccano Limited, Binns Road, Old Swan, Liverpool, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to toy electric motors and more especially to those used in connection with small engineering models which are known as constructional toys and are made up from standard co-operable parts, so that they may be disassembled and then re-assembled into other toys or models. Many of the constructional toys or "models" which can be built by the use of perforated plates, strips, pulleys, and other elements, constitute structures having moving parts, such as lathes, wind-mills, merry-go-rounds, and so forth, which it is often desired to operate more or less continuously. Frequently it is desirable to have available an amount of power adequate for operating a toy printing-machine, for example, or a number of such devices at the same time. This invention particularly relates to motors of the kind described and claimed in the Specification of prior British Letters Patent No. 4564 A.D. 1915 granted to me, and its chief object is to provide a cheaper and more satisfactory means for controlling and reversing the motor. It has been found that an electric motor built according to the present invention is less expensive to construct and less likely to get out of order or to have parts lost on being dis-assembled.

According to this invention, the contacts and switching mechanism for switching on and off and reversing the motor are mounted upon a sheet of

insulating material carried by one of the side plates between which the motor is mounted. The motor may be fitted with two field windings wound relatively in opposite directions and then the sheet of insulating material carries a pair of fixed contacts and a pivotted switch arm adapted to contact with either of the fixed contacts or to take up an intermediate position. One end of each field winding is connected to one of the fixed contacts and the other ends are joined together and are both adapted to be connected to a source of electrical supply such as a small battery, the opposite pole of which is connected to one of the brush holders. Thus the switch arm is adapted to connect the other brush holder to one or other of the fixed contacts or to disconnect it from both.

In order that the invention may be clearly understood and readily carried into effect, an example of the same will now be described more fully with reference to the accompanying drawings in which:—Fig. 1. illustrates a preferred construction of electric motor in perspective; Fig. 2. is an elevation of the inner face of the side-plate which supports the switch mechanism, and Fig. 3. is a diagram showing the electrical connections.

The motor-unit to be used in such toys is a structure supported from two substantially-similar side plates 10 and 11. These plates may be flanged at 12 and 13 respectively, and the flanges provided with a plurality of holes 14 whose dimensions and spacings correspond to those of the plurality of holes in the other standard units of the system of structural units with which the new motor is to be assembled. The said side-plates also have a plurality of similarly dimensioned and

spaced holes as at 15, 16, 17, 18, and 19, so that other structural units may be fastened to said plates by means of small bolts which pass through these last-named
5 holes.

The motor field structure 20 is here shown as a flat U-shaped laminated member, but it may be of any suitable or desired construction. The said field
10 structure is supported from the side plates 10 and 11 by means of four bolts 21, surrounded by sleeves 22, and secured by nuts 23, the sleeves 22 serving as distance-pieces to maintain the field structure away
15 from the side plates.

The field 20 is energized by means of one or the other of the two coils 24 and 24¹, these coils being wound reversely with respect to one another about a spool
20 25 which surrounds the field-structure. The armature-shaft 26 extends into suitable holes in the side-plates 10 and 11, and may be provided with a small pinion 27 outside of one of the side-plates,
25 and it may extend sufficiently far beyond the pinion 27 to receive a pulley or other device. The other end of the armature shaft may also extend sufficiently beyond its side-plate likewise to receive a pulley
30 or other device.

The frame-plates 10 and 11 support respectively the terminals 29 and 30, one or both of which will be insulated from the frame—both being insulated if it be
35 desired not to have the motor earthed. As here shown, one of the side-plates (in the present case, the plate 10) supports a comparatively large sheet of insulating-material 31, which may be riveted thereto
40 as at 32. This sheet of insulating-material supports two tubular brush-holders 33 and 34 in position to co-operate with a disc-type commutator carried on the armature-shaft. The insulating-sheet
45 31 also carries two fixed contacts 34 and 35, adapted to be connected by leads 36 and 37 respectively to the coils 24 and 24¹ respectively. A movable arm 38 of insulating-material is pivoted to the
50 insulating sheet 31 at 39, and is provided on the back side thereof, as shown in Fig. 2, with a thin strip of metal 40. The outer end of this strip of metal is wrapped about the arm, as at 41, while the other
55 end of this metallic strip is bent about the end of the arm 38, as shown at 42. The screw 43, supported by the insulating sheet 31, provides a pivotal mounting for the arm 38 and a means for clamping the
60 bent over end 42 of the metal strip to the arm 38. The nut 44 on the screw 43 provides a convenient member on which to solder or otherwise fasten a lead 45

which is connected at its other end to one of the brush holders 34. The other brush
65 holder 33 is connected to the terminal 29 by a lead 46. The field coils 24 and 24¹ are both connected together at one end and also to the terminal 30.

The direction of rotation of the
70 armature will depend upon whether the contact 41 is brought over contact 34 or over contact 35, because of the fact that the windings 24 and 24¹ are wound in reverse directions with respect to one
75 another. The arm 38 therefore can be operated not only as a reversing lever, but also as a switch for starting or stopping the motor.

The travel of the arm 38 is limited by
80 means of the strap 47. This strap also imposes sufficient friction upon the arm so that it will remain placed in a mid-way or off position.

In assembling the motor, the brush
85 holders 33 and 34, the lead 45, the lever-arm 38, and the contacts 34 and 35 are fixed on the insulating sheet 31 before it is fastened to the side frame 10. The insulating sheet with these parts fastened
90 thereto may be rivetted to the side-frame, and the field structure 20 and field windings 24, 24¹ mounted loosely upon the bolts 21. The other side plate 10 carries the armature and armature shaft, and it
95 may readily be placed upon the bolts 21 and the structure fastened together by means of the nuts 23. The leads 36 and 37 are then soldered to the contacts 34 and 35, and the terminals 29 and 30
100 fastened in place and connected to leads 46 and 48 respectively.

The invention is not limited to the construction shown in the drawings and here-
105 inbefore described.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—
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1. An electric motor, for use in conjunction with constructional toys, and mounted between side plates in which the contacts and switching mechanism for
115 switching on and off and reversing the motor are mounted upon a sheet of insulating material carried by one of the side plates.

2. An electric motor for use in conjunction with constructional toys and
120 mounted between side plates, provided with two field windings relatively oppositely wound and adapted to be alternately brought into circuit in accordance with the direction of rotation of the
125 motor desired.

3. An electric motor for use in conjunction with constructional toys, as claimed in the preceding claims, in which the sheet of insulating material carries a pair of fixed contacts each connected to one end of one of the field coils, the other ends of which are connected together and are both adapted to be joined to a source of supply to which one brush holder of the motor is also adapted to be joined, a switch arm pivotted upon the sheet of insulating material being arranged to connect the other brush holder to either of

the said fixed contacts or to take up an "off" position.

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4. The improved electric motor for use in conjunction with constructional toys having its parts constructed, arranged and connected substantially as described with reference to the accompanying drawings.

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Dated this 20th day of April, 1920.

For the Applicant,
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FIG. 1.

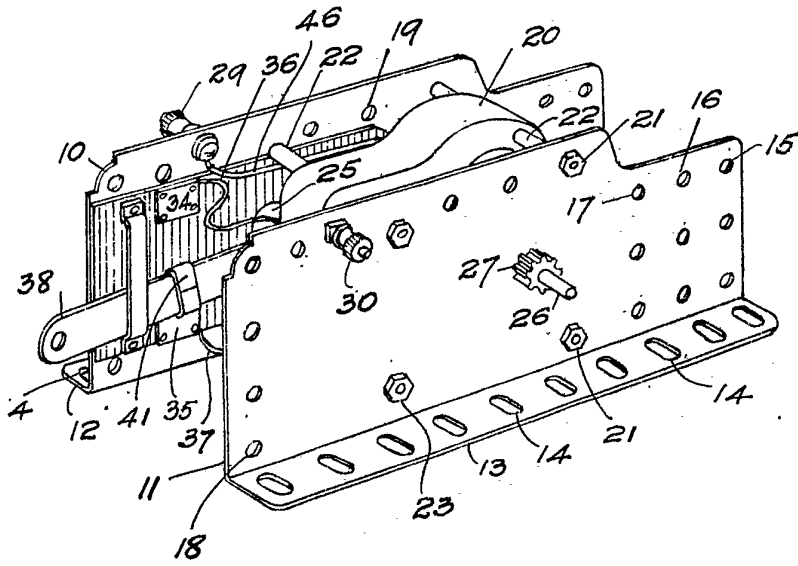


FIG. 2.

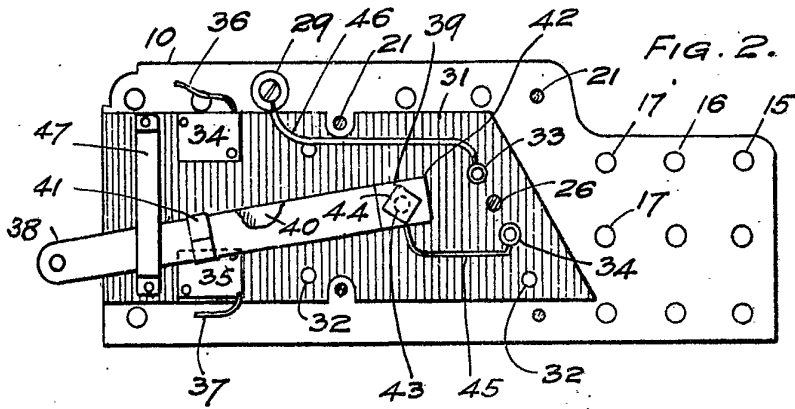


FIG. 3.

