

May 15, 1923.

1,454,969

F. HORNBY

MOTOR

Filed April 28, 1920

Fig. 1.

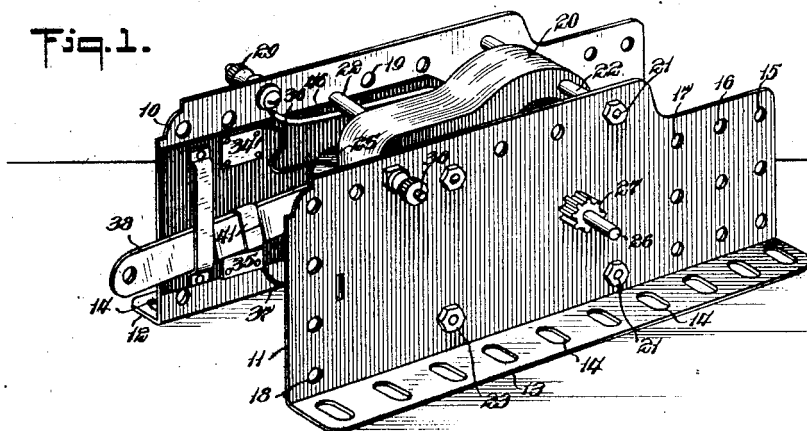


Fig. 2.

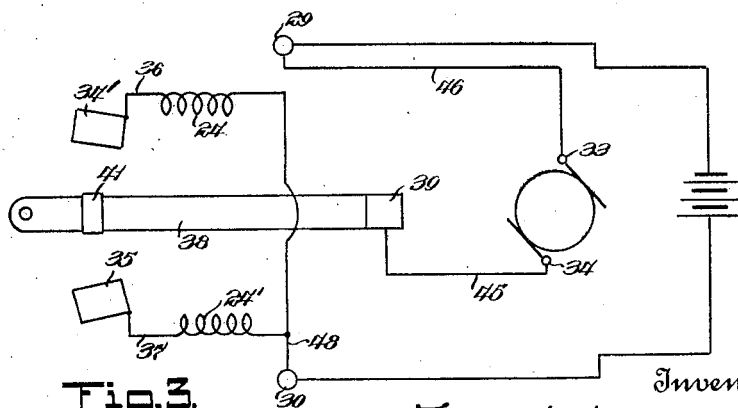
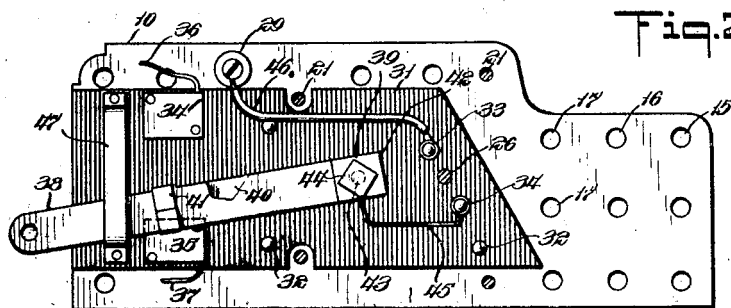


Fig. 3.

Inventor

By *Frank Hornby*
his Attorneys

Dunn, Lee, Morris & Scott

UNITED STATES PATENT OFFICE.

FRANK HORNBY, OF LIVERPOOL, ENGLAND, ASSIGNOR TO MECCANO LIMITED, OF LIVERPOOL, ENGLAND, A BRITISH CORPORATION.

MOTOR.

Application filed April 28, 1920. Serial No. 377,169.

To all whom it may concern:

Be it known that I, FRANK HORNBY, a subject of the King of Great Britain, residing at Liverpool, England, have invented new and useful Improvements in Motors, of which the following is a specification.

My present invention relates to improvements in toy motors, more especially those used in connection with small engineering models which 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 toy-devices (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, etc., which it is desired to operate more or less continuously. Frequently it is desirable to have available an amount of power adequate for operating a toy planing-machine, for example, or a plurality of such devices at the same time.

This invention is an improvement over that shown in my Patent 1,202,388, of October 24th, 1916, and its object is to provide a cheaper and more satisfactory means for controlling and reversing the motor. I have found that a motor built according to my present disclosure is less expensive to construct and less likely to get out of order or to have parts lost on being disassembled.

For the purpose of illustration, I will now describe a preferred embodiment of the invention. In the drawings: Fig. 1 illustrates this preferred embodiment in perspective; Fig. 2 is an elevation of the inner face of the side-plate which supports the reversing-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 holes.

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

The field 20 is energized by means of one or the other of the two coils 24 and 24', these coils being wound reversely with respect to one another about a spool 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 gear 27 outside of one of said side-plates, and it may extend sufficiently far beyond said gear 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 or other device.

The frame-plates 10 and 11 support respectively the binding-posts 29 and 30, one or both of which will be insulated from the frame,—both being insulated if it be desired to have the motor not grounded. As here shown, one of the side-plates (in the present case, plate 10) supports a comparatively large sheet of insulating-material 31, which may be riveted thereto as at 32. This sheet of insulating-material supports two tubular brush-holders 33 and 34 in position to co-operate with a disk-type commutator carried on the armature-shaft. The insulating-sheet also carries two fixed contacts 34' and 35, adapted to be connected by leads 36 and 37 respectively to the coils 24 and 24' respectively. A movable arm 38 of insulating-material is pivoted to the insulating-sheet 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 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, provides a pivotal mounting for the arm 38 and a means for clamping the 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 fas-

ten a lead 45 which is connected at its other end to one of the brush-holders 34. The other brush-holder 33 is connected to the binding-post by a lead 46. The field coils 24 and 24' are both connected together and also to the binding-post 30.

The direction of rotation of the 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 24' are reversed with respect to one 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 means of the strap 47. This strap also imposes sufficient friction upon the arm so that it will remain placed in a neutral position.

In assembling the motor, the brush-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 thereto may be riveted to the side-frame, and the field and field-windings mounted loosely upon the bolts 21. The other side-plate 10 carries the armature and armature-shaft, and it 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 binding-posts 29 and 30 fastened in place and connected to leads 46 and 48 respectively.

While I have described but one embodiment of my invention, it is to be understood that the drawings and description are to be considered as merely illustrating the invention rather than limiting the same.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A terminal assembly for an electric motor comprising a slab of insulating material, brush-holders mounted thereon, a movable switch member mounted thereon and constantly connected to one brush-holder, and a pair of field connectible terminals also mounted on the slab, said terminals being co-operable one at a time with the switch member.

2. A terminal assembly for an electric mo-

tor comprising a slab of insulating material, brush-holders mounted thereon, a movable switch member mounted thereon and constantly connected to one brush-holder, a pair of field connectible terminals also mounted on the slab, said terminals being co-operable one at a time with the switch member, and a strap co-operating with the switch member to confine its movement and retain it in a predetermined position.

3. The combination with a supporting structure of an electric motor, a field structure provided with two field windings supported in the supporting structure and an armature provided with a commutator pivoted in the supporting structure; of a pair of external terminals carried by the supporting structure, one terminal being insulated, insulating contact supporting means carried by the supporting structure, a pair of brushes co-operating with the commutator, brush-holders for each of the brushes, one brush-holder being electrically connected to one external terminal, a movable switch member electrically connected to the other brush-holder, a pair of contacts either one of which is co-operable with the switch member, a lead from each of the contacts of said pair connected to one of the field windings, said brush-holders, switch member and pair of contacts being supported on the insulating contact supporting means, and connections from the field windings to the other external terminal.

4. A combined terminal assembly and motor supporting structure comprising two frame plates and means for holding the same in spaced relation, a slab of insulating material carried on the inner side of one of said plates, a field structure comprising two coils carried rigidly by the plates in juxtaposition to the insulating slab, two fixed contacts supported by the insulating slab and connected respectively to one end of said coils, a circuit terminal connected with the other ends of said coils, and a movable contact member also carried by and pivoted on the insulating slab for engaging either of said contacts at will.

In testimony whereof I have signed this specification.

FRANK HORNBY,