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BRUSH HOLDER FOR ELECTRIC MOTORS

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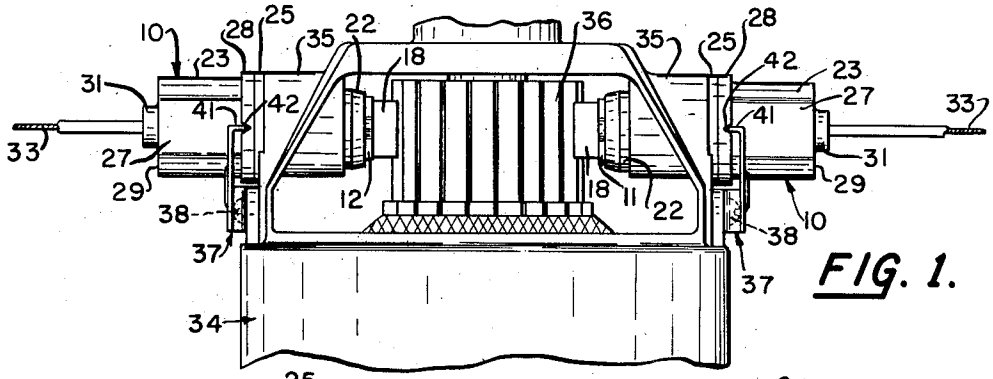


FIG. 1.

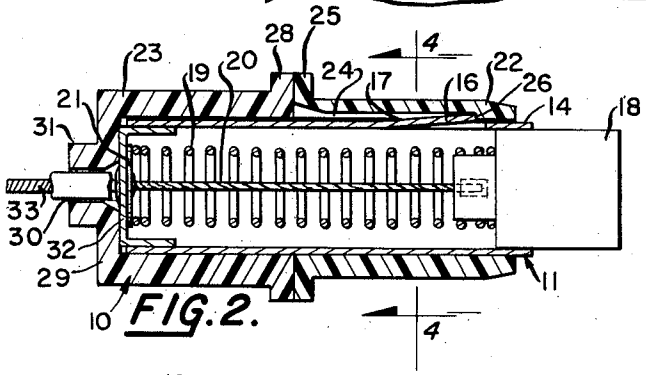


FIG. 2.

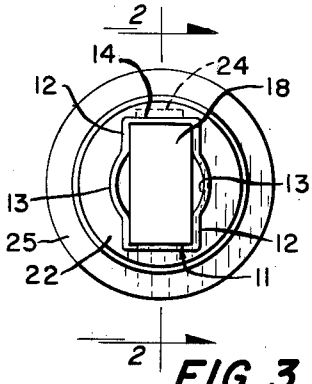


FIG. 3.

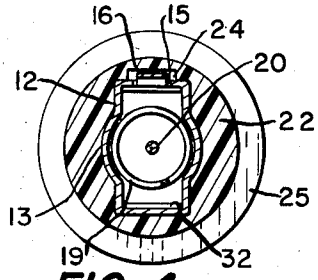


FIG. 4.

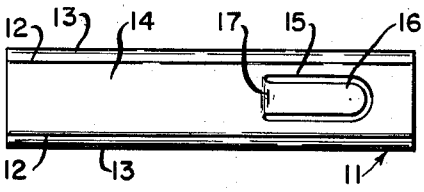


FIG. 5.

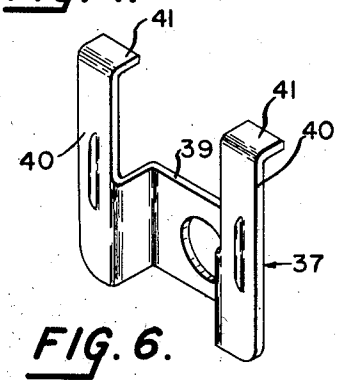


FIG. 6.

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BRUSH HOLDER FOR ELECTRIC MOTORS

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10 Claims. (Cl. 310—247)

This invention relates to brush holders for electric motors.

The main object of the invention is to produce an improved brush holder, efficient for its intended purposes, in which a carbon brush and lead connection are protectively mounted, comprising parts which are assembled without the aid of molding and broaching operations heretofore employed in producing prior art constructions.

It has been customary to mount the brush in a shaped brass tube molded into a phenolic plastic insulating member. A broaching operation on the inside of the tube was required to size it to fit with a minimum of clearance on the core pins of the plastic mould in order to prevent excessive plastic flowing in between the core and brass tube. A second broaching operation was required after the insulating member had been molded on the tube to remove plastic material from the inside of the tube, and a brushing operation was needed to remove plastic on the outside of the brass tube. An exposed end stamping and lead connection was attached at the outer end of the holder, which required the drilling and tapping of a hole in the plastic member. To protect the exposed end stamping and lead connection, an additional insulating cover was used to avoid exposure of live parts.

The brush holder embodying my invention consists of a brass tube, a terminal connection and two phenolic plastic insulator members, which are separably assembled and mounted in assembled relationship in a motor housing by means of a single clamp, without any molding, broaching or brushing operations.

The brush holder herein shown and described obviates the costly and time consuming operations attending the molding of the tube into the plastic insulator heretofore employed.

An important feature of the invention is the provision of cooperating means on the tube and an insulator member whereby the tube is automatically located and retained in predetermined position merely by inserting the tube in the insulator.

Another feature is the provision of means in an insulator member for covering all live parts of the assembly.

The construction herein shown and described is not only more efficient than prior art mechanisms, but can be produced at substantially lower cost.

These and other advantages will be apparent from the following specification.

In the drawings:

Fig. 1 is a side elevational view of a motor housing in which are mounted two brush holders embodying my invention.

Fig. 2 is a longitudinal vertical sectional view of a brush holder embodying my invention, on a scale larger than the holders shown in Fig. 1, taken in the plane of the line 2—2 of Fig. 3.

Fig. 3 is an elevational view of the inner end of the brush holder.

Fig. 4 is a transverse sectional view in the plane of the line 4—4 of Fig. 2.

Fig. 5 is a top plan view of the brass tube which is part of the holder.

Fig. 6 is a perspective view of a clamp by which the assembled holder is mounted on the motor housing.

In the preferred embodiment of my invention shown in the drawings, the brush holder is indicated as a whole at 10. It comprises an open ended, formed brass tube 11 substantially rectangular in cross section but having side walls 12 partly concave on their inner surfaces as indicated at 13. The top wall 14 of the tube is cut on the line 15 to form a tongue 16 which is bent at 17 so that its free end extends upwardly from said top wall of the tube for a purpose to be explained hereinafter. The tube is designed to receive a carbon brush 18 to which is attached one end of a coiled spring 19 and of a wire 20, which extends lengthwise through the spring, the other end of said wire being attached to a small metal disc 21 against which bears the free end of the compressed coiled spring 19. The cross sectional form of the tube 11 is such that the brush has easy sliding movement longitudinally within the tube, and the concave walls 13 accommodate the compressed coiled spring 19. The brush 18, with attached spring 19, wire 20 and disc 21, is insertible as a unit in the tube 11.

The brush holder 10 also comprises two preformed, phenolic plastic insulator members, an inner one 22 and outer one 23. The inner member 22 consists of an open ended tubular body having a longitudinally extending central bore complemental in shape to the exterior of the tube 11. In its upper portion it is recessed as indicated at 24 to provide a shallow space between the tube 11 and top of the member 22. The recess 24 extends from the outer flanged end 25 of the insulator body to the shoulder 26 near the inner end of said insulator to accommodate the punched up tongue on the tube 11. Preferably the recess 24 is deeper at its open end than at the end closed by the shoulder 26, to facilitate the insertion of the tube 11 and tongue 16, as shown in Fig. 2. When the inner end of the tube 11, that is, the right hand end in Fig. 5, is inserted into the flanged end of the insulator 22, the tongue 16 occupies the recess 24 and its free end abuts the shoulder 26 or closed end of the recess, serving thereby to locate the tube in the insulator in predetermined position and also to exert pressure against the recess upper wall to frictionally retain the tube and insulator in their assembled relationship.

The outer insulator member 23 has flattened side walls 27, and, like the member 22, is provided with a central bore shaped to receive the tube 11. The flanged end 28 is adapted to abut the flanged end 25 of the member 22. The outer end of the insulator 23 is closed by a wall 29 provided with a central opening 30 surrounded by the annulus 31.

A terminal connection, in the form of a U-shaped piece of metal 32, to which is connected an insulated lead wire 33, is located in the closed end of the member 23, with the wire 33 extending outwardly through the opening 30, and the terminal connection bearing against the inner surface of the end wall 29.

A conventional motor housing 34 is provided with tubular extensions 35 for receiving the brush holders 10, as shown in Fig. 1. An armature is indicated at 36. Before mounting the brush holders 10 in the motor housing, the parts are assembled as shown in Fig. 2, by sliding the inner end portion of the tube 11 into the flanged end of the insulator 22 with the tongue 16 in the recess 24. The terminal connection is inserted into the tube 11 with the insulated wire 33 extending outwardly through the opening 30 in the end wall 29 of the insulator 23, and sliding the insulator 23 over the outer end portion of the tube 11.

When the free end of the tongue **16** contacts the recess shoulder **26**, the flanges **28** and **25** of the insulator members contact as shown in Figure 2, and the described parts are retained in separable assembled relationship by frictional engagement between the tube and insulator members and the pressure exerted by the spring metal tongue **16** against the upper wall of the recess **24**. Finally the brush unit, including the brush **18**, spring **20**, wire **19** and disc **21**, is inserted in the tube **11**, with the disc contacting the terminal connector **32**.

To install the brush holders and brushes as shown in Fig. 1, the assembled units are inserted from the outside of the motor housing **34** into the tubular projections **35**, the movement being limited by the contacting of the insulator flange **25** with the edge of the housing projection **35**. Then a clamp **37**, such as shown in Fig. 6, is attached by a screw **38** to the motor housing. The clamp **37** comprises an apertured cross piece **39** and two offset vertical arms **40** terminating in inturned ends **41**. To apply the clamp to the brush holder **10**, the arms **40** are passed upwardly to straddle the insulator **23** and contact the flat sides **27** thereof, and when the clamp has been fastened by the screw **38** extending through the apertured cross piece **39** into the housing **34**, the inturned ends **41** engage notches **42** in the exposed face of the flange **28** of the insulator **23**. This construction holds the brush holder assembly firmly in position in the motor housing and also prevents the holder assembly from turning. The brushes **18** yieldingly contact the armature **36**, and wear of the brushes is automatically compensated for by the expansion of the compressed spring **20**.

From the foregoing it will be apparent that the separately fabricated parts which constitute the brush holder of my invention can be quickly and easily assembled and are retained in their intended relationship without additional operations or separate fastening means, and without resorting to molding, welding or the like. Further, the form and construction of the insulator members are such that all live parts of the brush assembly are protected and the connection to a source of electrical current can be made conveniently outside of the holder.

Changes may be made in details of construction and in the form of parts without departing from the scope of my invention as defined by the appended claims.

I claim:

1. A brush holder for electric motors comprising an open end tube, two axially aligned hollow insulator members, the tube having a sliding fit within said members, one of said insulator members being open ended, cooperating means on said open end insulator member and tube retaining the tube in the insulator in separable predetermined relationship, an apertured end wall on the other of said insulator members, an insulated wire extending loosely through said apertured end wall, and a terminal connector attached to the wire and located in the tube adjacent said insulator end wall.

2. A brush holder for electric motors comprising an open end tube, two axially aligned hollow insulator members, the tube having a sliding fit within said members, one of said insulator members being open ended, cooperating means on said open end insulator member and tube retaining the tube in the insulator in separable predetermined relationship, said means comprising a spring metal tongue projecting from the tube and engaging a wall of the insulator member, an apertured end wall on the other of said insulator members, an insulated wire extending loosely through said apertured end wall, and a terminal connector attached to the wire and located in the tube adjacent said insulator end wall.

3. A brush holder for electric motors comprising an open end tube, two axially aligned hollow insulator members, the tube having a sliding fit within said members, one of said insulator members being open ended and having a central bore the walls of which are complemental to the exterior surfaces of the tube, a recess in one of said walls communicating with said central bore, the recess being open at one end and closed at the other end, resilient means on the tube adapted to project into said recess and to contact the closed end of the recess, an apertured end wall on the other of said insulator members, an insulated wire extending loosely through said apertured end wall, and a terminal connector attached to the wire and located in the tube adjacent said insulator end wall.

4. In combination with a motor housing having a pair of tubular projections at opposite sides of the housing, a brush holder insertible in each of said tubular projections, said holder comprising an open end metal tube, two axially aligned insulator members, the tube having a sliding fit within said members, each of said insulator members having a radially projecting flange adjacent an open end abutting the other flange, one of said flanges abutting the outer end of the tubular extension of the motor housing, cooperating means on the tube and one of said insulator members retaining the tube in said insulator in separable predetermined relationship, an apertured end wall on the other insulator member, an insulated wire extending through said apertured end wall, a terminal connector attached to the wire and located in the tube adjacent said insulator end wall, and means engaging said other insulator member and attached to the motor housing retaining said insulator members in flange abutting relationship on the tube.

5. In combination with a motor housing having a pair of tubular projections at opposite sides of the housing, a brush holder insertible in each of said tubular projections, said holder comprising an open end metal tube, two axially aligned insulator members, the tube having a sliding fit within said members, each of said insulator members having a radially projecting flange adjacent an open end abutting the other flange, one of said flanges abutting the outer end of the tubular extension of the motor housing, the other of said flanges having notches in its outer face, cooperating means on the tube and one of said insulator members retaining the tube in said insulator in predetermined relationship, an apertured end wall on the other insulator member, an insulated wire extending through said apertured end wall, a terminal connector attached to the wire and located in the tube adjacent said insulator end wall, a clamp engaging the notched flange of the other insulator member, and means attaching the clamp to the motor housing for retaining said insulator members in flange abutting relationship on the tube.

6. A brush and holder for electric motors comprising a brush unit consisting of a brush, a coiled spring connected at one end to the brush, a wire connected at one end to the brush and extending through the coiled spring, and a metal disc attached to the other end of the wire retaining the spring compressed between the brush and disc, and a holder for the brush unit consisting of an open end tube, a pair of hollow axially aligned insulator members, the tube having a sliding fit within said members, one of said insulator members being open ended, cooperating means on said open end insulator member and tube retaining the tube in the insulator in separable predetermined relationship, an apertured end wall on the other of said insulator members, an insulated wire extending through said apertured end wall, and a terminal connector attached to the wire and located in the tube adjacent said insulator end wall, the brush being slidably located in said tube and the disc of the brush unit contacting with said terminal connector.

7. A brush holder for electric motors comprising an open end tube, two axially aligned hollow insulator members, the tube having a sliding fit within said members, one of said insulator members being open ended, and cooperating means on said open end insulator member and tube preventing rotation of the tube relatively to said member and including resilient means on the tube yieldingly engaging the insulator member and limiting its sliding movement relatively to the tube in one direction

but permitting withdrawal of the tube from said insulator member by sliding movement in the opposite direction.

8. In combination with a fixed support, a brush holder for electric motors comprising an open end tube, two axially aligned hollow insulator members, the tube having a sliding fit within said members, one of said insulator members being open ended and the other having opposite flat sides and a closed end, cooperating means on said open end insulator member and tube preventing rotation of the tube relatively to said member and including resilient means on the tube yieldingly engaging the insulator member and limiting its sliding movement relatively to the tube in one direction but permitting withdrawal of the tube from said insulator member by sliding movement in the opposite direction, a clamp having spaced apart arms adapted to engage the flat sides of said closed end insulator member and means for attaching the clamp to the fixed support.

9. The brush holder defined by claim 3, in which the recess in the open ended insulator member is deeper at its open end than at its closed end.

10. The brush and holder defined by claim 6, in which the cooperating means on said open end insulator member and tube includes resilient means on the tube yieldingly engaging the insulator member and limiting its sliding movement relatively to the tube in one direction but permitting withdrawal of the tube from said insulator member by sliding movement in the opposite direction.

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