Jan. 2, 1951 G. RUDAT ET AL 2,536,958

BRUSH KNOB

Filed Oct. 15, 1948

Fig. 1.

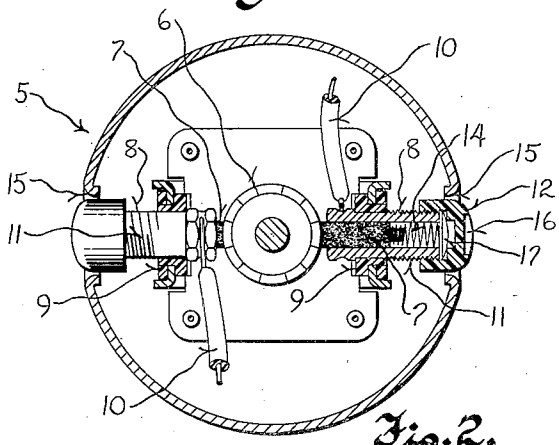


Fig. 2.

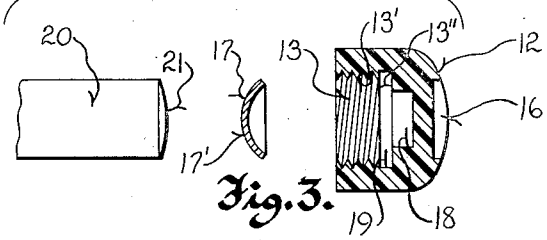


Fig. 3.

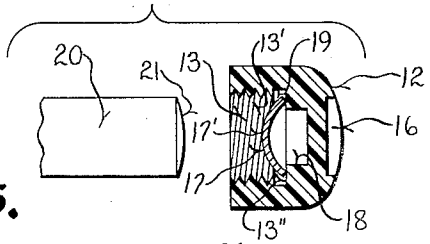


Fig. 4.

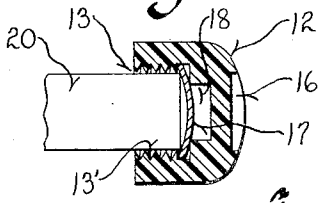
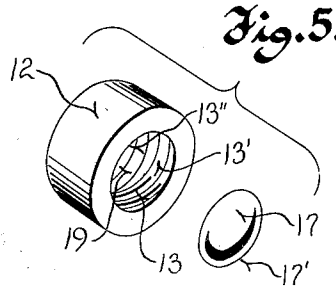


Fig. 5.



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BRUSH KNOB

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2 Claims. (Cl. 171—324)

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This invention relates to electric motors and refers more particularly to brush knobs of the type which close the outer or anti-commutator ends of brush holder tubes in such motors.

Electric motors are commonly provided with metal brush holder tubes which are mounted on the motor frame in some appropriate manner and in which the brushes are axially slidable. To hold the brush in constant engagement with the commutator an insulative knob is secured to the anti-commutator end of the brush holder tube to close the same and a compression spring in the brush holder tube reacts between this knob and the brush.

The brush knob normally projects to the outside of the motor frame or housing so that it may be readily removed from the brush holder tube to permit access to the brush for repair or replacement, and it will therefore be immediately apparent that the knob must be made of insulative material to preclude short circuiting of the brushes. On the other hand it is extremely desirable that the knob have an electrically conductive insert which will firmly engage the outer end of the brush holder tube and against which the brush spring will react, to thereby conduct current from the brush holder tube to the brush spring and thence to the brush. Such an insert is necessary because the sliding contact between the sides of the brush and the inner surface of the tube provides an inadequate and undependable path for current flow; and because of the relatively small size of the insert it should be permanently secured in the brush knob to preclude its loss when work is done on the brushes.

Heretofore inserts of this type have been molded into the brush holder knob, which is usually made of phenolic or similar plastic material, but it will be readily seen that this is a relatively expensive procedure and entails numerous complications in the molding operation.

It is therefore an object of this invention to provide a brush knob of the character described having a metallic insert capable of conducting current from the brush holder tube to the brush spring and in which such insert, although not embedded in the knob during molding, is nevertheless permanently secured in position in the knob.

Another object of this invention resides in the provision of a brush knob insert of the character described which may be formed as a simple and inexpensive stamping and which may be readily inserted into an insulative brush knob and permanently seated therein in one simple and rapid operation involving no expensive or unusual tools.

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Another object of this invention resides in the provision of a method of inserting a conductive brush knob insert into an insulative brush knob and permanently seating the same therein.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

The accompanying drawing illustrates one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view partly in cross section and partly in end elevation showing an electric motor provided with brush knobs having inserts made in accordance with this invention;

Figure 2 shows the brush knob and insert of this invention in longitudinal section, together with the tool used in seating the insert, shown in side elevation, all being shown in proper relative position for assembly;

Figure 3 is a view similar to Figure 2 but with the insert in position in the brush knob preliminary to its securement therein;

Figure 4 is a view similar to Figure 3 but showing the insert seated, with the tool about to be withdrawn; and

Figure 5 is a group perspective view of the brush knob and insert of this invention in position for assembly.

Referring now more particularly to the accompanying drawing, in which like numerals indicate like parts throughout the several views, the numeral 5 designates generally an end bell comprising part of the housing or casing of an electric motor having a commutator 6 engaged by opposite conductive brushes 7. The brushes are held in metal brush holder tubes 8, in which they are axially slidable and from which they project for engagement with the commutator, and the brush holder tubes are retained in position on the end bell of the motor housing by suitable insulative mountings 9. Current is supplied to the tubes, and thus to the brushes therein, by means of a conductor 10 connected to each of the tubes.

The outer or anti-commutator end of each

brush holder tube is externally threaded, as at 11, and said end of the tube is closed by an insulative brush knob 12 having a threaded well 13 to enable it to be screwed in place over the threaded end of the tube 8. A compression spring 14 reacts between the knob and the brush 7 to maintain the brush constantly engaged with the commutator.

Each brush knob projects slightly beyond the exterior of the motor housing, through a suitable port 15 in the housing, so as to expose a screw driver slot 16 in its head for access. Hence the knob may be readily screwed off the end of the tube to permit access to the spring 14 and brush 7 without necessitating disassembly of the motor housing.

At the bottom of the well 13 in the knob is the insert 17 of this invention which, in its final assembled form, is a circular, dished metallic element having its concave surface facing the mouth of the well. It will be seen that as the brush knob is screwed into place on the brush holder tube the end of the tube is brought into firm engagement with the marginal edge portion of the insert 17 and since the outer end of the compression spring 14 seats against the insert the presence of the insert in the knob insures that a good conductive path will be provided between the tube and the brush.

The brush knob is formed in the usual manner as a phenolic or plastic molding, its threads 13' being formed at the same time and extending for the full depth of the well. At the same time a cavity 18 is formed in the bottom of the well and since this cavity is smaller in diameter than the threaded well an annular shoulder 19 results at the junction of the side wall of the cavity and the bottom wall of the well.

The insert 17 is initially formed as a disk 17' stamped from sheet metal and having a diameter slightly smaller than the inside diameter of the threaded well. At least the marginal edge portion of the disk is dished, and preferably it has a curved cross section as shown. This stamping is inserted into the well with its convex surface facing the mouth of the well until its periphery rests upon the bottom of the well, as shown in Figure 3. Next a tool 20, similar to a punch but having a convex face 21 at its front end, is inserted axially into the well and pressed against the convex face of the stamping. It will be seen that when sufficient pressure is brought to bear upon the stamping, it will "flip over," i. e., it will reverse its curvature so that its outermost surface will be concave. As the disk flips over it fulcrums on the annular edge or shoulder 19 causing the periphery of the stamping to bite into or engage under the adjacent threads 13'.

Thus when the tool is withdrawn the stamping will be found to be seated in the bottom of the threaded well with its rear convex surface engaging the shoulder 19 and protruding into the relief cavity 18. Obviously the relief cavity must be provided in the knob in order to enable the stamping to "flip over," and while the shape of the cavity and the location of the annular edge or shoulder 19 may be varied from that shown they should always be such that the disk will be restrained from taking too great a curvature.

From the foregoing description, taken together with the accompanying drawing, it will be readily apparent that this invention provides an inexpensive brush knob of the character described, and a practical method of providing the same with a metallic insert that will preclude the necessity for molding such inserts into the brush knob and will at the same time provide an entirely satisfactory insert which is permanently seated in the brush knob and which may be installed therein with very little work and without requiring unusual tools.

What we claim as our invention is:

1. A brush holder knob comprising: an insulative rigid body having a threaded well by which the knob may be secured to the threaded end of a metal brush holder tube; and a unitary dished metal disk non-removably wedged in the bottom of the well by having its convex side bearing against a portion of the body at the bottom of the well and its rim bearing against the side wall of the threaded well near the bottom thereof.

2. A brush holder knob comprising: a rigid insulative body having a bore providing a relief cavity and a counterbore providing a well coaxial therewith, the well being threaded to receive the threaded end of a metal brush holder tube, the junction between the bore and the bottom of the threaded well providing an annular shoulder spaced radially in from the side of the threaded well; and a unitary dished metal disk non-removably wedged in the bottom of the threaded well by having its convex side bearing on the annular shoulder and protruding into the relief cavity and its periphery bearing against the side of the threaded well near the bottom thereof.

GEORGE RUDAT.
CHARLES B. LEE.

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