

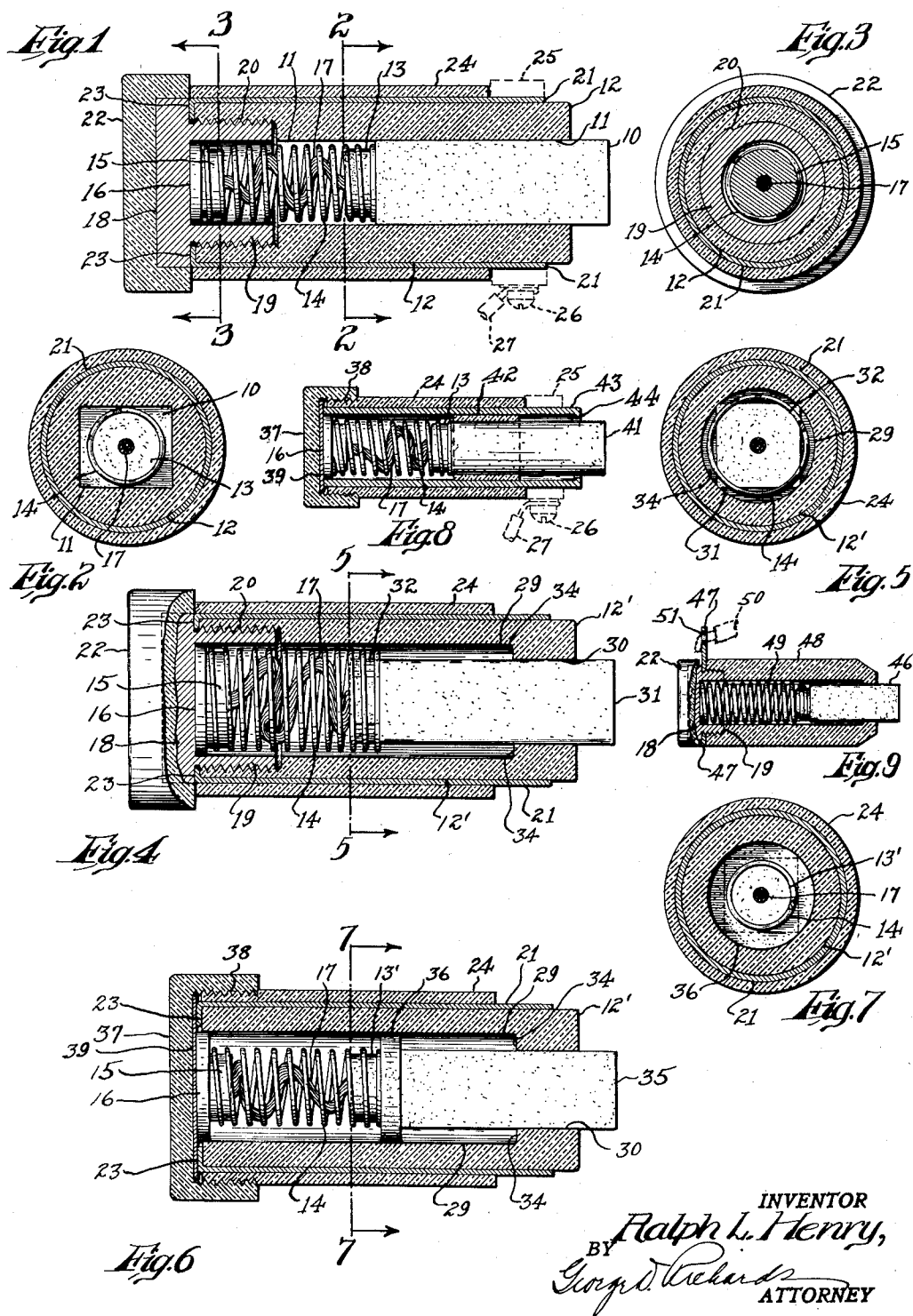
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R. L. HENRY

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BRUSH AND HOLDER THEREFOR

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INVENTOR
Ralph L. Henry,
BY George W. Richards
ATTORNEY

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BRUSH AND HOLDER THEREFOR

Ralph L. Henry, Detroit, Mich., assignor to
Henrite Products Corporation, Ironton, Ohio, a
corporation of Ohio

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This invention relates, generally, to brushes and holders therefor; and the invention has reference, more particularly, to a novel improved brush and brush holder especially adapted for use on small motors, dynamos and the like.

Heretofore, brush holders commonly used on small motors and the like had been somewhat unsatisfactory in use because the metal brush housings of these holders tend to abrade the brushes, which abrading action increases with the age and decreased length of the brushes and results in the rapid deterioration of the same. Also, these metal brush housings often cause current to flow between the sides of the brush housing and the brush, resulting in arcing and the burning of the brush, causing unsatisfactory brush operation.

The principal object of the present invention is to provide a novel brush holder having an insulating brush housing so designed as not to injure or abrade the brush in use, and which brush housing not only serves to guide the brush axially thereof, but also prevents current flow and arcing between the sides of the brush housing and the brush.

Another object of the present invention lies in the provision of a novel brush and brush holder having cooperating means for definitely limiting the feeding movement of the brush, whereby the brush is always applied to the commutator with a suitable pressure and the binding or wedging of worn out brushes between the commutator and the brush holder is eliminated.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

The invention is clearly illustrated in the accompanying drawing, in which:

Fig. 1 is a longitudinal sectional view of a brush holder embodying the principles of the present invention and illustrates a brush therewithin.

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a sectional view taken along line 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a view partly in longitudinal section and partly broken away of a somewhat modified form of brush holder and illustrates a brush therein.

Fig. 5 is a sectional view taken along line 5—5 in Fig. 4.

Fig. 6 is a view similar to Fig. 4 of a modified form of brush holder.

Fig. 7 is a sectional view taken along line 7—7 of Fig. 6 looking in the direction of the arrows.

Fig. 8 is a view similar to Fig. 6 of another modified form of the invention; and

Fig. 9 is a view similar to Fig. 4 of still another modification of the invention.

Similar characters of reference are employed in all of the above described views to indicate corresponding parts.

Referring now to Figs. 1 to 3 of the said drawing, wherein one form of the novel brush holder of this invention is illustrated, the reference numeral 10 designates a brush which is slidably contained within a conforming brush receiving and guiding aperture 11 provided in an insulating, cylindrical brush housing 12. The brush 10 and the conforming longitudinally extending receiving aperture 11 of housing 12 are illustrated as of rectangular cross-sectional shape, but it is to be understood that the receiving aperture of housing 12 may have any desired cross-sectional shape depending on the cross-sectional shape of the brush used. The brush housing 12 may be made of any suitable electrical insulating material, such as a phenolic condensation material, fibre or resin.

The brush 10 is shown as formed with a cylindrical boss or extension 13 upon which is snugly engaged one end portion of a coil compression spring 14 which serves to urge the brush 10 outwardly of housing 12 and into engagement with a commutator in use. The frictional engagement between spring 14 and extension 13 serves to retain spring 14 and brush 10 in connected relation. The other end portion of spring 14 snugly engages a cylindrical boss 15 provided on an electrically conducting contact button 16. The contact button 16 has one end portion of a flexible conducting lead or cable 17 fixedly connected thereto as by sealing the end portion of the flexible lead into a conforming recess provided in the contact button by the use of solder. The flexible lead 17 extends within spring 14 and has its other end portion secured to the brush 10 as by molding the same in the brush.

Spring 14 presses the contact button 16 against a metallic screw cap 18 that has an annular portion 19 within which the button 16 is received. The exterior surface of annular portion 19 is threaded at 20 into an annular recess provided in the outer end portion of housing 12. The screw cap 18 is formed with an exterior covering portion or layer 22 of insulating material, such as phenolic condensation material molded onto the cap 18. An electrically con-

ducting sleeve 21 of metal or metallic alloy is fixed upon the exterior surface of brush housing 12 and extends the greater part of the length of this housing. The sleeve 21 has an inwardly directed radial flange 23 at the outer end thereof, which flange is pressed by the electrically conducting portion of cap 18 against the end of brush housing 12.

A sleeve 24 of insulating material is fixed upon conducting sleeve 21 and extends from the cap 18 to a point near the inner end of sleeve 21. The inner end portion of sleeve 21 which is not covered by insulating sleeve 24 is adapted to be inserted into a motor or dynamo contact ring 25 having a terminal 26 thereon for connection to the current supply lead 27.

In use, with the inner end of brush 10 engaging the commutator of a motor or other machine, current is supplied from lead 27, through ring 25, sleeve 21, cap 18, contact button 16 and flexible lead 17 to brush 10. As the brush 10 wears away in use, the spring 14 automatically takes up such wear so that the brush is held against the commutator with the desired pressure. Since the brush housing 12 is of insulating material, there is no possibility of current flow taking place between this housing and the sides of the brush, and hence there is no arcing between the housing and the brush which would result in rapid deterioration of the latter. Also, since the insulating material of housing 12 is not so hard as metallic holders, this housing does not abrade or injure the brush in use.

In the form of the invention shown in Figs. 4 and 5 means is provided for definitely limiting the feeding movement of the brush toward the commutator in use, thereby positively preventing the possibility of a worn brush from becoming jammed between the commutator and the brush holder and insuring uniform brush action throughout the life of the brush. Parts of Figs. 4 and 5 that are similar to corresponding parts of the preceding figures are similarly numbered. In Figs. 4 and 5 the brush housing 12' has an internal cylindrical receiving recess 29 which extends for the greater part of the length of the brush housing. The inner end portion of this brush housing has a brush conforming and guiding aperture 30 which is of the same cross section as the brush 31. Aperture 30 communicates with the cylindrical recess 29. Aperture 30 slidably receives the brush 31 which is illustrated as of square cross-section and has an end portion 32 with rounded corners.

The end portion of compression spring 14 snugly engages the end portion 32 of brush 31 so that these members are thus held together by the frictional grip of the spring coils upon end portion 32. As especially shown in Fig. 5, the diameter of spring 14 is greater than the thickness of brush 31 so that as the brush 31 wears in use, the inner end coil of spring 14 will approach the shoulder 34 formed at the point of juncture of recess 29 with aperture 30. Finally, portions of the inner end coil of the spring will engage shoulder 34, thereby preventing further feeding movement of the brush. This construction therefor insures that the brush will always be firmly held within its holder, will be guided axially of the holder and eliminates the possibility of the brush becoming jammed between the holder and the commutator. Also, the brush will always be pressed against the commutator in use with a desired suitable pressure.

In the form of the invention shown in Figs.

6 and 7, the brush 35 is provided with a circular flange 36 which slidably engages the wall of recess 29 and assists in guiding the brush longitudinally of its housing. The brush 35 is shown as provided with a circular boss 13' similar to boss 13 for receiving the end of spring 14. Flange 36 upon engaging shoulder 34 serves to limit the inward feeding movement of the brush. These figures also illustrate the use of a screw cap 37 made entirely of insulating material, which screw cap is threaded at 38 upon the insulating sleeve 24. A metallic disk 39 is contained within screw cap 37 and is pressed by this cap against the flange 23 of conducting sleeve 21. The contact button 16 engages directly against the disk 39. In use the current flows through sleeve 21, disk 39, contact button 16, and lead 17 to brush 35.

In the form of the invention shown in Fig. 8, the insulating brush housing is omitted and the brush 41 is illustrated as having an insulating sleeve 42 secured thereto. For example, the sleeve 42 may be of phenolic condensation material directly molded upon the brush 41. The insulating sleeve 42 of brush 41 is adapted to slide directly within the electrical conducting sleeve 43. The insulating sleeve 42 serves to space the conducting portion of brush 41 away from the electrical conducting sleeve 43, thereby making it impossible for currents to pass from conducting sleeve 43 through the sides of brush 41. In this form of the invention the insulating screw cap 37 and the metallic disk 39, described in connection with Fig. 6, are used, but it will be apparent that the screw cap 18, shown in the earlier figures, could be employed, if desired. Also, the screw cap 37 and its associated conducting disk 39 could be as readily used in the earlier figures in lieu of the screw cap 18. The conducting sleeve 43 is illustrated as formed with an intumed bead 44 at its inner end to thereby provide a shoulder for limiting the inward movement of the brush 41 towards the commutator in use. In this form of the invention, the current flows from the contact ring 25 through conducting sleeve 43 to disk 39 and from disk 39 through contact button 16 and lead 17 to the brush 41.

In the form of the invention shown in Fig. 9 the conducting sleeve surrounding the insulating housing is omitted and a contact clip 47 is held directly upon the outer end of an insulating brush housing 48 by the screw cap 18. The clip 47 has an aperture therein through which the annular portion 19 of screw cap 18 projects. As shown in Fig. 9 the contact button 16 of the preceding figures may be omitted together with the conducting lead 17. In this figure, the coil compression spring 49 not only serves to hold the brush 46 in engagement with a commutator, but also serves to conduct current from metallic screw cap 18 to the outer end of the brush.

The current supply lead 50 is shown connected directly to clip 47 by means of an opening 51 in this clip. In use, current flows from lead 50, through clip 47, cap 18, spring 49 to the outer end of brush 46 for passage axially through this brush to the commutator. It will be apparent that the exposed portions of clip 47 may be covered with insulating material, if desired, so as to produce a shock proof unit.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, as defined by the following claims, it is intended that all matter contained in the above descrip-

tion or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

- 5 1. In an electrical brush and holder therefor, a tubular electrically conducting member, a brush movable longitudinally within said tubular member, electrical conducting means connecting said brush to one end of said tubular member, said
10 tubular member being arranged to receive electric current at the other end thereof for transmission through said tubular member to the first named end thereof and from thence through said electrical conducting means to said brush for
15 passage axially through said brush to a rotating device, and an insulating member included between said tubular member and said brush, thereby preventing the direct passage of current from said tubular member to the sides of said brush.
- 20 2. In an electrical brush and holder therefor, a tubular electrically conducting member, a brush movable longitudinally within said tubular member, electrical conducting means connecting the
25 outer end of said brush to the outer end of said tubular member, said tubular member being arranged to receive electric current at the inner end thereof for transmission through said tubular member to the outer end thereof and from
30 thence through said electrical conducting means to the outer end of said brush for passage axially through said brush to a rotating device engaging the inner end of said brush, an insulating member included between said tubular member and said brush, said insulating member being
35 fixed to said brush and movable therewith for preventing the direct passage of current from said tubular member to the sides of said brush, and a projection formed on the inner end portion of said tubular member for engaging said insulating
40 member to thereby limit the longitudinal movement of said brush toward the rotating device.

3. In an electrical brush and holder therefor,

a tubular electrically conducting member, a brush movable longitudinally within said tubular member, electrical conducting means connecting the outer end of said brush to the outer end of said tubular member, said tubular member being arranged to receive electric current at the inner end thereof for transmission through said tubular member to the outer end thereof and from thence through said electrical conducting means to the outer end of said brush for passage axially through said brush to a rotating device engaging the inner end of said brush, an insulating member included between said tubular member and said brush, said insulating member being arranged to prevent the flow of current from said tubular member directly to the sides of said brush, spring means contained within said tubular member for urging said brush longitudinally toward the rotating device, and stop means contained within said tubular member for limiting the movement of said brush toward the rotating device.

4. In an electrical brush and holder therefor, a tubular electrically conducting member, a brush movable longitudinally within said tubular member, electrical conducting means connecting the outer end of said brush to the outer end of said tubular member, said tubular member being arranged to receive electric current at the inner end thereof for transmission through said tubular member to the outer end thereof and from thence through said electrical conducting means to the outer end of said brush for passage axially through said brush to a rotating device engaging the inner end of said brush, an insulating member included between said tubular member and said brush, said insulating member being fixed to said brush and movable therewith for preventing the direct passage of current from said tubular member to the sides of said brush.

RALPH L. HENRY.

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