May 11, 1948. R. B. SCHATTLE 2,441,210

BRUSH ASSEMBLY

Filed Jan. 24, 1945

Fig. 3.

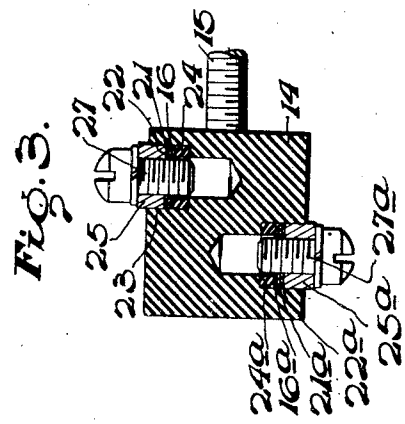


Fig. 4.

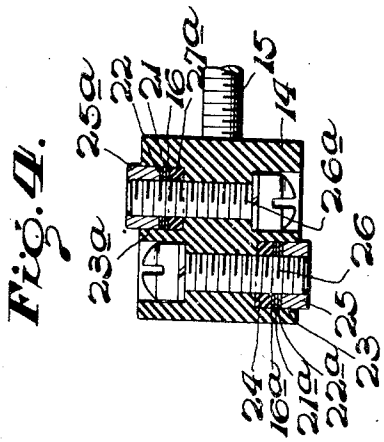


Fig. 1.

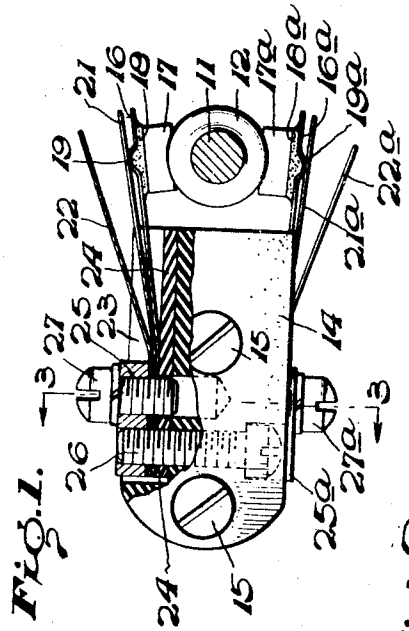
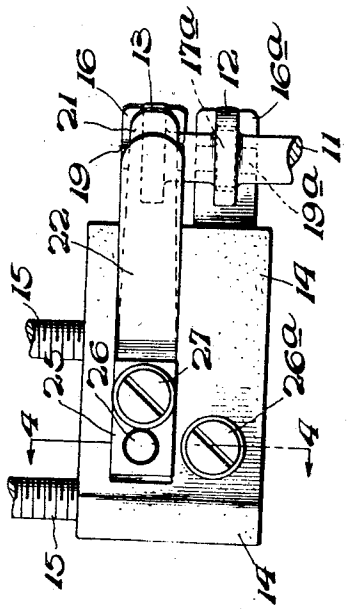


Fig. 2.



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BRUSH ASSEMBLY

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7 Claims. (Cl. 171—323)

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The present invention relates to brush assemblies, and is more particularly concerned with brush assemblies employed in electrical apparatus embodying slip rings, although it is not limited to such use.

I have discovered that by soldering a carbon or other brush element to a flexible conductive plate having a transverse corrugation located opposite the center of brush pressure, and backing up the brush assembly with a spring, acting in line contact with the corrugation, a brush assembly is provided in which efficient brush-engaging pressures are applied, the brush carrier being sufficiently flexible to permit the brush to bodily rock through minor angles about the corrugation as an axis and secure full surface engagement of the brush with the slip ring or commutator segment. During manufacture the corrugation also functions to feed the solder or other securing medium by capillary action into intimate bonding engagement with the brush and brush carrier. I have also found that by mounting two of the brush assemblies just described upon a single block-like support in opposing relationship, a superior brush assembly is secured.

It is accordingly the major object of this invention to provide a novel brush assembly embodying brush elements rigidly secured to resilient plate-like brush carriers and which are backed up by springs applying pressure to localized portions of the brush carriers opposite the centers of pressure of the brushes, whereby the brushes may rock through minor angles into self-centering engagement with the slip-rings or commutator.

A further important object is to provide novel dual brush assemblies in which the two brushes are disposed in opposed staggered relationship on a support, the latter embodying resilient blade-like members adopted operable to apply self-centering forces to the brush carriers.

Another object is to provide a multiple brush assembly embodying novel means for supporting the brushes; resiliently backing up the brushes; limiting outward travel of the brushes; and making the necessary electrical connections to the brushes.

Further objects will become apparent as the specification proceeds in conjunction with the annexed drawings and from the appended claims.

In the drawings—

Fig. 1 is a side elevational view, with parts in section, of a brush assembly embodying the invention.

Fig. 2 is a top plan view of the brush assembly shown in Fig. 1.

Fig. 3 is a vertical sectional view taken along the line 3—3 of Fig. 1, and

Fig. 4 is a vertical sectional view taken along the line 4—4 of Fig. 2.

With continued reference to the drawings, in which like reference characters have been employed to designate similar parts throughout the several views, the invention has been illustrated as being applied to a rotating device 11 carrying slip rings 12 and 13, although it is to be understood that it may also be applied to commutator structures.

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The entire brush assembly is carried by an insulating block 14 which is secured to any suitable support by screws 15, parallel to the axis of structure 11.

Referring to Figs. 1 and 3, the upper brush structure is made up of a flexible brush carrier 16, to which brush 17 is secured by soldering or the like. In the embodiment illustrated, brush 17 is constructed of carbon and is provided with a metalized base, whereby it may be secured to plate-like carrier 16 by means of a body of solder 18, sufficient solder being used to provide a substantial fillet around the brush base as shown, and the brush carrier being provided with a transverse corrugation 19 for the purpose of introducing solder between the brush and its support, and also for the purpose of affording a localized zone to which the brush engaging pressures may be applied in line contact therewith, as will be now set forth.

The brush engaging pressures are exerted by a leaf spring 21, which overlies the brush carrier and engages corrugation 19. It should be particularly observed that since the brush engaging pressures are applied solely to corrugation 19, and the latter is disposed opposite the center pressure of the brush, and as brush carrier 16 is comparatively flexible, the brush may rock through minor angles about corrugations 19 as an axis and undergo a self-centering action, to bring it into full surface engagement with its slip ring, in the event of slight inaccuracies in manufacturing and for assembling the parts.

Also overlying the blade support is a blade-like stop member 22, which is comparatively stiff and functions to limit movement of the brush assembly away from the slip ring and thereby prevent carrier 16 and spring 21 from being stressed or distorted beyond their elastic limits.

The entire assembly just described sits in a recess 23 provided in block 14, an insulating or other suitable pad 24 being located in the bottom of the recess. The parts are firmly clamped in "stacked" assembled position by means of a terminal plate 25 which fits upon stop member 22. A screw 26 passes upwardly through the block and the brush components and is threaded into plate 25. A single screw therefore securely holds the entire assembly in place in recess 23, since the side walls of recess 23 restrain it against lateral displacement.

Electrical connection to the brush assembly is made by means of a terminal screw 27, which is threaded into plate 25. Inasmuch as the other brush assembly is of identically the same con-

struction as the one just described, the same reference characters, with the subscript "*a*" have been employed to designate corresponding parts.

It should be observed that the resulting construction provides a unit in which both brushes are urged into resilient, self-centering engagement with their slip rings and that should there be any eccentricity in the slip ring assembly, brush assemblies may rock slightly during operation about corrugation 19 and 19*a* as axes, to maintain brushes 17 and 17*a* continuously in full surface engagement with the slip rings, in view of the fact that springs 21 and 21*a* apply pressure in line contact with the brush carriers at regions located substantially opposite the centers of pressure of the brushes, or in bisecting relationship thereto.

From the foregoing detailed disclosure, it is apparent that the invention provides a novel multiple brush assembly which is of extremely simple but yet efficient, durable design and in which the brushes are resiliently urged into stable self-centering engagement with the sliprings, the springs are backed up by stop members, and there is no tendency of the spring pressures to rock the brushes out of full surface engagement with their sliprings. The recessed block and brush component moreover provides a compact unitary structure of advantageous form. Also, when brushes 17 and 17*a* become so worn, as the result of long service to require replacement, it is only necessary to disassemble the parts and replace members 17, 17*a*, 16 and 16*a*, to completely restore the original efficiency.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced thereby.

What is claimed is:

1. In a brush assembly, a flexible, blade-like brush support adapted to be mounted substantially tangentially with respect to the rotating element to which current is to be transmitted; a brush having a metallized base adapted to receive molten metal to establish a permanent junction between brush and one face of said support in cooperative relationship to said rotating element; a pressure spring mounted adjacent the other face of said support; means for transmitting forces from said spring to said other face of said support at a localized region opposite the center of pressure of said brush, said brush support being sufficiently flexible to permit said pressure spring to flex said support and bring said brush into full surface engagement with said rotating element, in the event of minor misalignment of the parts.

2. The brush assembly defined in claim 1, wherein said force-transmitting means comprises a projection on said brush support bearing against said pressure spring, in line engagement therewith.

3. In a brush assembly, a blade-like brush support and a leaf spring disposed in closely adjacent superimposed relationship; said support having a transversely disposed, force-transmitting formation thereon against which said spring is adapted to seat; and a brush having a metallized base adapted to receive molten metal to establish a permanent junction between said brush and the other face of said support and so located that a normal bisecting said brush passes through said force-transmitting formation, whereby said leaf spring is operable to apply balanced pressures to said brush.

4. In a brush assembly, a flexible blade-like brush carrying member; a resilient blade-like spring element overlying said member; means for transmitting forces from said spring element to said brush carrying member at a localized pressure region thereof; a relatively stiff blade-like stop member overlying said spring element and spaced a predetermined distance therefrom adjacent said localized pressure region serving as a stop member for said spring element and said brush carrying element; and means for rigidly clamping said members and elements together remote from the brush carrying end thereof and adapting the assembly to securement to a support.

5. The brush construction defined in claim 4, wherein said brush-carrying member is provided with a transverse corrugation having its convex side bearing against said spring element and said member has a brush soldered thereto adjacent said corrugation, said corrugation serving to facilitate the flow of metal between said brush-carrying member and said brush during the soldering process.

6. In a brush construction, an elongated body made of insulating material and being adapted to be mounted adjacent a rotative conductive device, with the axis of the former substantially intersecting the axis of said device; a longitudinal open-sided recess provided in said body; a brush assembly disposed in said recess and projecting to one side of said body, and comprising a blade-like brush-carrying member seating in the bottom of said recess and a blade-like spring element overlying said brush member and applying pressure to the brush-carrying portion thereof along a line running obliquely to the axis of said device, said element and member closely fitting within, and being restrained against transverse movement by the walls of said recess; and means for rigidly clamping said member and element together and maintaining them seated in the bottom of said recess.

7. The brush construction defined in claim 6, wherein said last-named means comprises a clamping member overlying said brush-carrying member and said spring element and a screw passing through an aperture in said body, which opens into said recess, and aligned apertures in said brush member and spring element, said screw being threaded into said clamping element.

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