May 6, 1930. A. C. WOOD 1,757,696

COMMUTATOR BRUSH

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Fig. 1

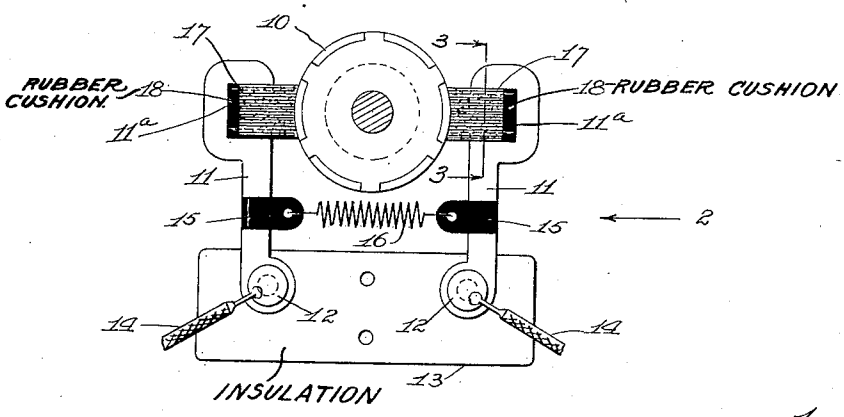


Fig. 2.

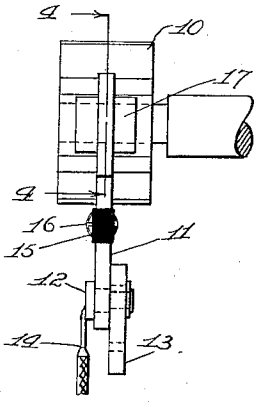


Fig. 3

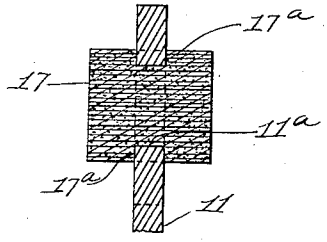
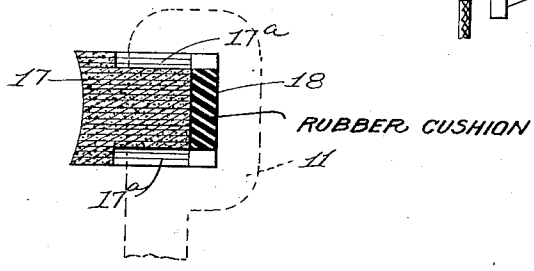


Fig. 4.



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Fig. 5

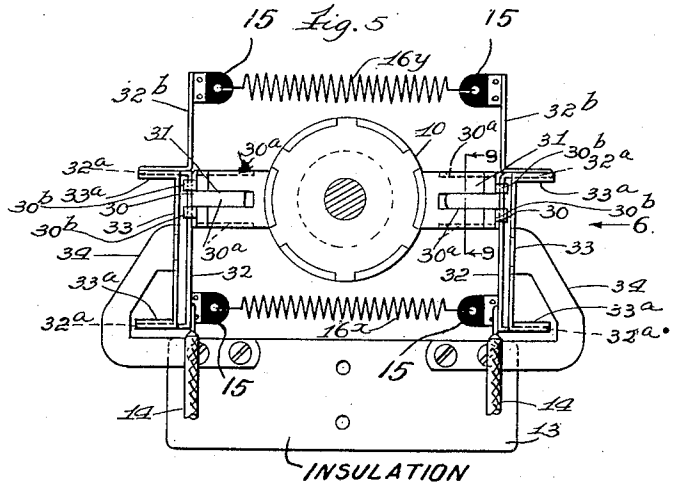


Fig. 6

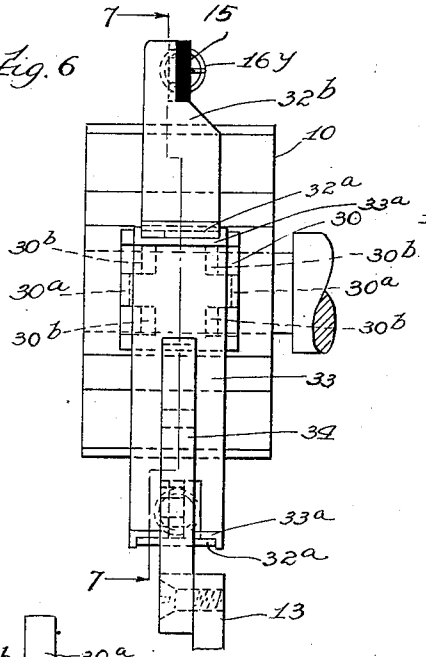


Fig. 7.

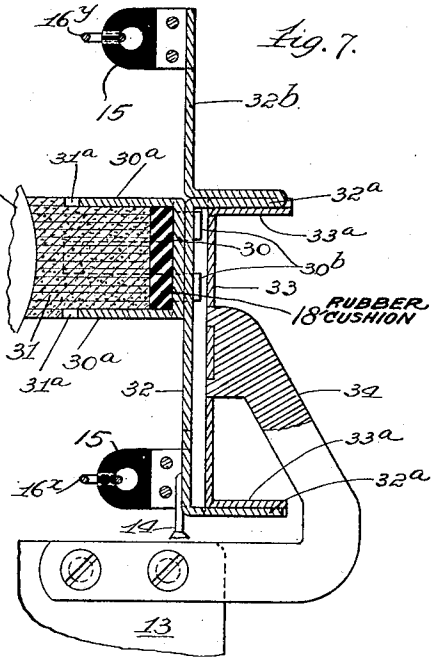


Fig. 8.

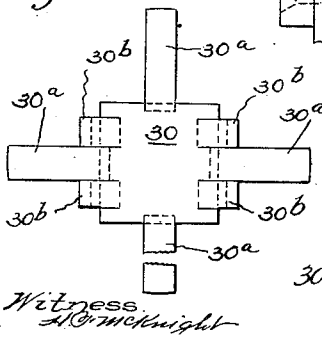
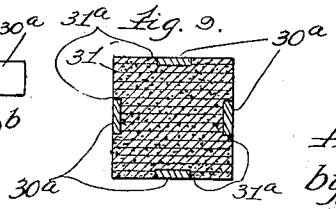


Fig. 9.



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UNITED STATES PATENT OFFICE

ANDREW C. WOOD, OF CHICAGO, ILLINOIS, ASSIGNOR TO STEWART-WARNER CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF VIRGINIA

COMMUTATOR BRUSH

Application filed July 6, 1926. Serial No. 120,679.

The purpose of this invention is to provide an improved form of commutator brush less liable than the forms which have been heretofore generally employed to become misaligned with respect to the axis of the commutator, and thereby caused to seat imperfectly on the commutator. A second purpose is to prevent the transmission from the brush to the brush holder and thence to the frame structure on which the brush holder is mounted, of vibration resulting from the friction of the brush on the commutator rotor, which, amplified by being communicated to and through the resonant material of the brush holder and supports, tends to render the operation of the commutator undesirably noisy. The invention consists in the elements and features of the construction shown and described for accomplishing these results as indicated in the claims.

In the drawings:—

Figure 1 is a transaxial section of a commutator equipped according to this invention, showing the brushes and brush-carrying levers in side elevation.

Figure 2 is an elevation looking in the direction of the arrow, 2, on Figure 1.

Figure 3 is a section at the line 3—3 on Figure 1.

Figure 4 is a section at the line 4—4 on Figure 2.

Figure 5 is a view similar to Figure 1, showing a modified form of the invention.

Figure 6 is an elevation looking in the direction of the arrow, 6, on Figure 5.

Figure 7 is a section at the line 7—7 on Figure 6.

Figure 8 is a plan view of a blank from which the brush holder is formed.

Figure 9 is a section at the line 9—9 on Figure 5.

Referring to the form shown in Figures 1 to 4 inclusive, in these several figures, 10 represents the commutator rotor. 11, 11, are metal levers fulcrumed on the studs, 12, 12, which are mounted on a bar, 13, of electrically insulating material as bakelite, the conductor wires, 14, 14, being suitably attached to these studs or to the levers respectively. 15, 15, are clasps of electrically insulating material such as "Conite," which are clasped about the levers, 11, 11, respectively, for connecting said levers by means of a stretched spring, 16, whose ends are attached to said clasps respectively, and which react for drawing, with equal pressure against the commutator rotor, 10, the brushes, 17, 17, which are carried by the levers, 11, 11, respectively, at the outer ends of the latter.

For seating the brushes in the levers so that their alignment with respect to the axis of the commutator rotor, 10,—which should be radial or at a predetermined angle to radial direction,—will not be liable to be disturbed, and so that new brushes of the same construction may be substituted for worn out or damaged brushes with certainty of obtaining the correct alignment at once, each of the levers, 11, is made of flat metal bar pivoted for movement in the plane of its flat form, and is provided with a notch, 11^a, at the upper end portion, which may be referred to as the brush holder, in the edge which faces toward the commutator rotor, that is, in the direction in which the lever is stressed by the spring, 16; and the brush, 17, is provided with grooves, 17^a, 17^a, at directly opposite positions in its opposite parallel sides, dimensioned as to width to fit the thickness of the flat lever and as to depth so as to reduce the dimension of the brush in the plane and at the zone of the grooves to the width of the notch, 11^a, in the lever.

For the second purpose of the invention there is provided a cushioning filler, 18, of rubber or like yielding and non-resonant material, formed substantially in conformity to a section of the brush transversely of the grooves, and thereby adapted to be entered therein, and thereby become interposed between the brush and back or bottom of the notch, so that the stress of the spring, 16, which holds the brush against the commutator rotor tends to press the brush against this rubber filler or cushion, which operates to prevent transmission of the vibration which the harder material of the brush may derive from the friction between said brush and the commutator rotor, from being transmitted to the metal lever, and thence through

the hard material of the mounting bar, 13, to the metal frame structure, and thereby operates to render the operation of the commutator quiet.

A modified form of the invention is shown in Figures 5 to 9 inclusive. In this form the brushes are carried by directly moving parts instead of by levers as in the previously described form, and instead of the notched terminal or fork of the lever for sliding engagement, there is provided a brush holder having fingers engaging grooves in all four sides of the brush for positioning and sliding engagement of the brush.

Figure 8 shows a plan view of the blank, 30, from which this brush holder is formed, comprising a rectangular body having fingers, 30^a, projecting from the middle point of each of its four sides. These fingers are folded at right angles to the plane of the body toward the same side thereof for projecting parallel to each other, and the brush, 31, has a groove, 31^a, in each of its four sides, dimensioned for sliding fit therein of the fingers, 30^a. This brush holder is mounted upon a U-shaped carrier, 32, formed by folding a metal strip as may be clearly seen in Figure 5, the brush holder, 30, being clinched to the back side of the U-form at the upper end thereof. The brush carrier, 32, is mounted for slight range of direct horizontal movement toward and from the commutator rotor by the sliding fit of its arms, 32^a, in slide-ways, 33^a, formed upon a support, 33, which is supported rigidly from the base, 13, by a bracket member, 34. The above description applies to both brushes and their mountings; and the two carriers, 32, 32, are connected at their lower corners by a stretched spring, 16^x, for causing the brushes to be stressed with equal pressure against the commutator rotor. For avoiding possible cramping of the carriers, 32, in the slide-ways of the mounts, 33, provision may be made for applying a second spring for balancing the stress of the first mentioned spring, by extending arms, 32^b, from the upper corners of the U-shaped carriers, 32, a second spring, 16^y, being stretched between said upwardly projecting arms. These arms may conveniently be formed integrally with the carriers, 32, by making said carriers each from a metal strip long enough to provide for reflexing the strip upon itself from the end of the upper sliding arm back to the corner of the U-shape and then bending the same directly upward as seen in Figure 5. The springs, 16^x and 16^y, are of course attached insulatedly to the carriers which they connect, as indicated by the attaching "Conite" clips, 15.

I claim:—

1. In a commutator, in combination with the rotor thereof, a fixed support, a brush, a brush holder, a carrier for the holder and spring means stressing the carrier in the direction for thrusting the brush into contact with the rotor; the brush being mounted in the holder slidably in the direction of said thrust, and the brush and holder having cooperating features preventing the brush from turning in the holder, and the carrier being mounted in the support slidably in said direction of thrust, the slidable mounting of the brush in the holder and of the carrier in the support being independent of each other; whereby the movement of the brush for pressing upon the rotor and being retracted therefrom is independent of any sliding movement of the brush in the holder.

2. In a commutator, in combination with the rotor, a brush holder having a parallel sided socket for receiving the brush, and a parallel sided brush for longitudinal insertion thereinto, the brush and socket having mutually engaged longitudinally extending grooves and guides for positioning the brush against displacement relatively to the curve of the rotor periphery, and a carrier for the brush holder and a support in which said carrier is mounted slidably in the direction of thrust and withdrawal of the brush with respect to the rotor, and spring means reacting on the carrier for stressing it yieldingly toward the rotor.

In testimony whereof I have hereunto set my hand at Chicago, Illinois, this 28th day of June, 1926.

ANDREW C. WOOD.