

May 6, 1924.

1,493,402

J. W. STRAWBRIDGE

COMMUTATOR BRUSH

Filed Sept. 16, 1922

2 Sheets-Sheet 1

Fig. 1

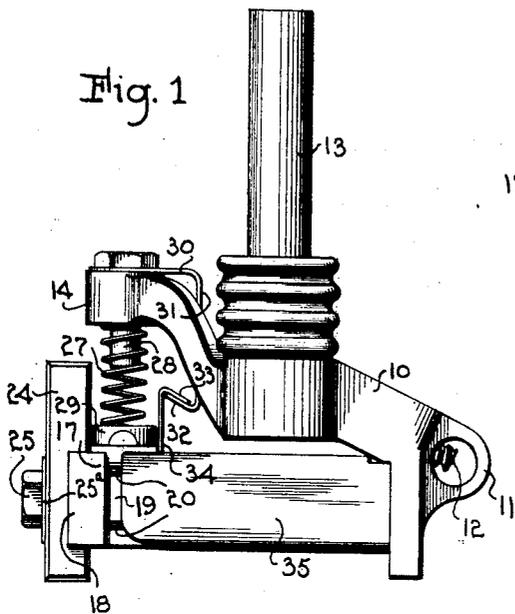


Fig. 3

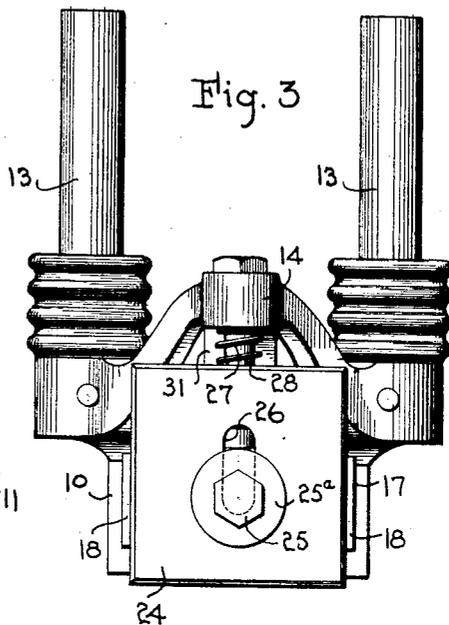


Fig. 2

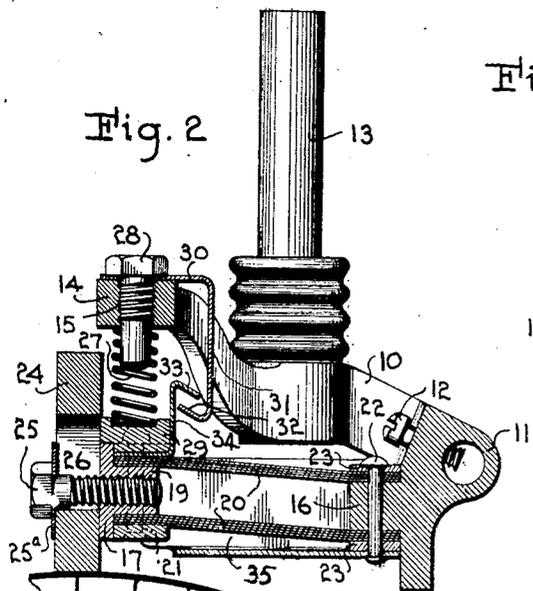
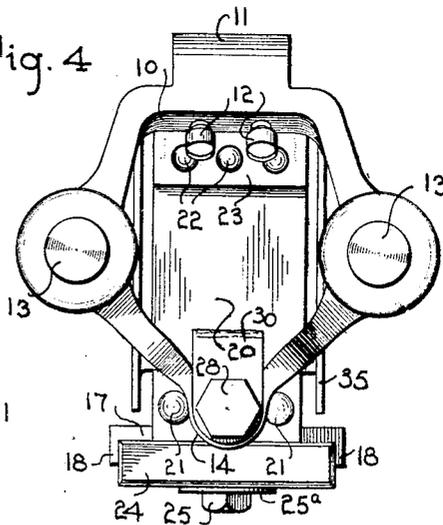


Fig. 4



WITNESSES

Frank B. Cook

John W. Strawbridge  
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2 Sheets-Sheet 2

Fig. 5

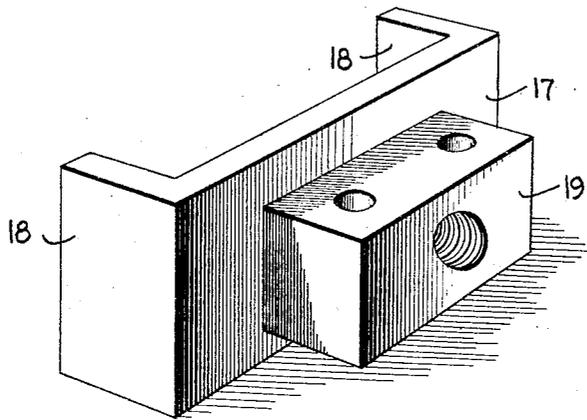
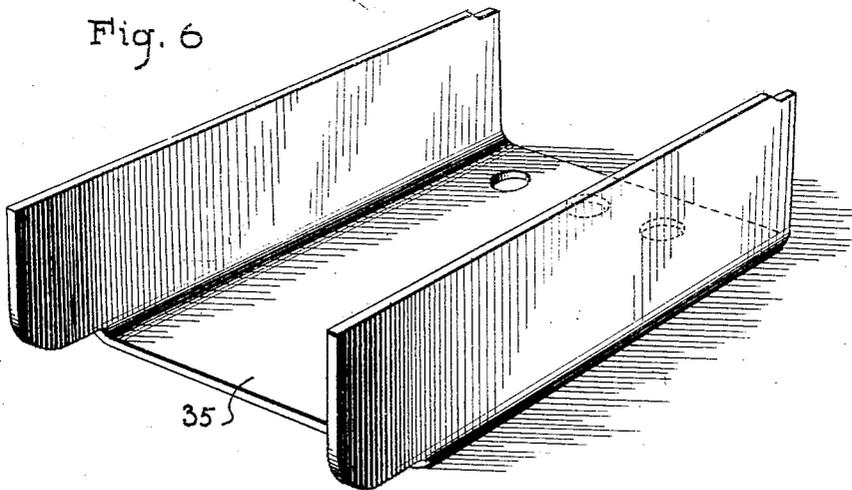


Fig. 6



WITNESSES

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# UNITED STATES PATENT OFFICE.

JOHN WESLEY STRAWBRIDGE, OF WILLIAMSPORT, PENNSYLVANIA.

## COMMUTATOR BRUSH.

Application filed September 16, 1922. Serial No. 588,646.

*To all whom it may concern:*

Be it known that I, JOHN W. STRAWBRIDGE, a citizen of the United States, residing at Williamsport, in the county of Lycoming and State of Pennsylvania, have invented new and useful Improvements in Commutator Brushes, of which the following is a specification.

This invention relates to commutator brushes for dynamos and motors, and has for its object the provision of a novel brush construction in which the brush, which is in the form of a block, is stationarily mounted upon a holder which is movable and spring-pressed to hold the brush in close engagement with the commutator and insuring perfect contact.

In the ordinary types of brushes, the holders are formed with guides through which the carbon blocks are slidably mounted, the blocks being engaged by spring-pressed levers or fingers which operate to force them into engagement with the commutator. The disadvantage of this well known type is that the carbon block wears where it engages the guide, and consequently becomes loose in time so that its efficiency is greatly impaired.

To overcome this objection, I have designed the present device, which is so constructed as to eliminate all wear on the brush proper, that is the carbon block, except that which naturally occurs at the point of contact with the commutator, the contact being, moreover, made more certain owing to the provision of direct coiled spring means engaging the brush holder for forcing the brush proper or block against the commutator.

Another object is the provision of a device of this character in which the brush block is adjustably carried by the holder so that it may be regulated as the end is worn away.

A further object is the provision of a shield associated with the holder for the purpose of protecting it from arcing occurring at the point of contact of the brush with the commutator.

Another object is the provision of stop means for limiting the swinging movement of the holder under spring pressure so that in case the carbon block wears excessively and is not subsequently adjusted, or if it becomes broken off from any cause, the holder will be prevented from engaging and scoring the commutator.

To the attainment of the foregoing objects and advantages, the invention consists in the details of construction and arrangement to be hereinafter fully described and claimed and illustrated in the drawings, it being understood, however, that the specific structure is merely an exemplification of a preferred and convenient form and the right is reserved to resort to all changes and variations which will widen the field of utility and adaptability of the device, provided that such modifications do not depart from the salient features of the invention or the scope of the appended claims.

In the drawing:

Figure 1 is a side elevation of my device;

Figure 2 is a longitudinal section;

Figure 3 is a front elevation;

Figure 4 is a top plan view;

Figure 5 is a detail perspective view of the holder element; and

Figure 6 is a detail perspective view of the shield, both figures being on a larger scale.

Referring more particularly to the drawings, the numeral 10 designates the body, which is formed preferably as a casting, and which is formed of an open frame provided at one end with a boss 11 for the reception of the take-off cables, the ends of which are inserted into the hole in the boss and secured by the usual set screws 12. At its intermediate portion, the body or frame 10 carries the pins or extension pieces 13 for the purpose of mounting the brush holder to the motor frame. At the end opposite the boss 11, the sides of the frame converge and merge into a boss 14, provided with a threaded hole 15, while the inside of the frame is formed at the end where the boss 11 is provided, with an inward extension or projection 16 for a purpose to be described.

The brush holder 17 consists of a metal plate, having a flat surface and its opposite ends formed with retaining flanges 18, and provided at its rear side with a reduced extension 19, against the top and bottom of which are disposed laminated leaf springs 20, which are riveted at one of their ends to the extension as shown at 21, and at their other ends are disposed against the top and bottom of the extension 16, and secured thereto by rivets 22, which also pass through reinforcing plates 23, engaged against the upper and lower sides of the springs as

shown. It is not imperative that the members 20 be springs as they may in actual practice be merely laminated bars, preferably of copper.

5 Carried by the holder is the brush proper which usually consists of a block of carbon 24, and this block fits between the flanges 18 of the holder so as to be prevented from lateral displacement with respect thereto. Ad-  
10 justment of the block is possible owing to the fact that the block is retained in position upon the holder by means of a bolt 25, which is screwed through the holder 17 and which passes through an elongated slot 26  
15 in the block, a washer 25<sup>a</sup> being arranged below the head of the bolt.

I provide spring means for forcing the holder, and consequently the block, toward the commutator B, and this means consists  
20 of a coiled spring 27, which has one end engaged about a stud 28 threaded through the hole 15 in the boss 14, and which has its other end fitting within a socket in a plate 29, engaged over the uppermost leaf spring  
25 20 and held by the rivets 21.

It is highly desirable to limit undue movement of the holder under the influence of the spring 27 to prevent the holder from engaging and cutting or scoring the commu-  
30 tator, in the event that the block 24 wears down and is not adjusted at the proper time, or if for any reason the block breaks off or should slip. To accomplish this, I make use of a safety catch which includes an angular  
35 strip 30, preferably of brass, secured by the bolt 28 and having a downwardly extending arm 31 terminating in a lip 32, which cooperates with a lip 33 on an angular strip 34, which is secured between the plate 29  
40 and extension 19. This provides for a limited range of movement of the brush holder.

Held by the rivets 22 is a trough-shaped shield 35 which extends beneath the bars or leaf springs 20 for protecting them from  
45 the arcing or flashing which may occur at the commutator.

In the operation, the spring 27 urges the holder and consequently the block toward the commutator, the block bearing thereon  
50 and making the necessary contact. As the spring is located directly at the holder, it is apparent that the pressure will be direct instead of either torsional or lever commu-  
55 nicated, as ordinarily. The yielding nature of the laminated bars or leaf springs 20 provides the necessary flexibility for insuring smooth and free action. In the course of time the carbon block naturally wears away at its commutator-engaging end, but  
60 such wear is easily compensated for by adjusting the block along the face of the holder by means of the bolt and slot connection. The slot 26 being located in the center of the block with an equal amount  
65 of carbon at each end of the slot, it follows

that when one end is worn to the limit, the block may be reversed and the other end used for the same length of time. In the event that adjustment is not made when it  
70 should be, or in case the brush is broken off, the stop lips 32 and 33 will engage each other and prevent the holder from swinging into engagement with the commutator, this feature being advantageous inasmuch  
75 as scoring or cutting of the commutator will thus be prevented.

From the foregoing description and a study of the drawings, it will be apparent that I have thus provided a simply constructed and highly efficient brush structure  
80 for use in connection with motors, dynamos and the like, ample means being provided for taking care of all contingencies which may arise, and the construction being such that the only wear upon the brush block  
85 will be at the active end thereof. Owing to the elimination of hinge joints, levers, pawl and ratchet mechanism and other elements commonly employed in devices of this character, it is evident that undesired  
90 looseness from wear or other causes will be avoided and that likelihood of derangement will be reduced to the minimum.

What is claimed is:—

1. A brush holder for dynamo electric  
95 machines, comprising a supporting body, a flexible member secured to the body, a holder element carried by the free end of the flexible member and carrying a brush block, said holder element having a circular  
100 depression in its upper face forming a spring seat, a fixed abutment on the supporting body above the holder element, and an expansile spring directly engaging between the abutment and the spring seat in  
105 the holder element for urging the latter toward the commutator.

2. A brush holder for dynamo-electric machines, comprising a supporting body, a  
110 flexible member secured to the body, a holder element carried by the free end of the flexible member and carrying a brush block, said supporting body having a projecting portion overhanging the holder element, expansile spring means directly en-  
115 gaging between said overhanging portion and the holder element for urging the latter toward the commutator, a fixed stop depending from the overhanging portion of said supporting body, and a stop member  
120 secured to the holder element and coacting with the fixed stop for limiting the swinging movement of the holder element and block toward the commutator.

3. A brush holder for dynamo-electric  
125 machines comprising a supporting body, a flexible member secured to the body, a holder element carried by the free end of the flexible member and carrying a brush block, spring means directly engaging the  
130

holder element for urging it in one direction, and a safety catch device for limiting swinging movement of the holder element and block toward the commutator, said safety catch device consisting of a pair of plates with overhanging coacting lips, said plates being secured respectively to the body and the holder element.

4. A brush holder for dynamo-electric machines, comprising a supporting body, laminated flexible members spaced apart and secured at one end to the body, a holder element carried by the free end of said flexible member and carrying a brush block, said supporting body having a projecting portion overhanging the holder element, a coiled spring seated on the holder element and acting between the same and the overhanging portion of the body, said spring being substantially at right angles to the flexible members for urging the holder element toward the commutator, and stop members secured to the holder element and the overhanging portion of the body respectively, and having coacting laterally turned ends engageable with each other to limit the movement of the holder element and block toward the commutator.

5. A commutator brush structure, a supporting body, an elongated flexible member secured at one end to the body, a holder element carried at the free end of said member, a brush block carried by the holder element, spring means acting between the body and said holder element for urging the latter toward the commutator, and a pair of plates secured respectively to the body and the holder element and terminating in overhanging coacting lips engageable with each other for limiting the movement of the holder toward the commutator.

6. In a commutator brush structure, a body, an elongated flexible member secured at one end to the body, a holder element carried at the free end of said member, a brush block adjustably carried by said holder element, a coiled spring abutting the body and said holder element for urging the latter toward the commutator, and means for limiting the movement of the holder toward the commutator, said means consisting of cooperating catch members carried by the body and holder element respectively.

7. In a commutator brush structure, a body, an elongated flexible member secured at one end to the body, a holder element carried at the free end of said member, a brush block adjustably carried by said holder element, a coiled spring abutting the body and said holder element for urging the latter toward the commutator, and means for limiting the movement of the holder toward the commutator, said means

consisting of catch members secured respectively upon the body and upon the holder element respectively and provided with lips adapted to engage.

8. In a device of the character described, a body, a pair of spaced laminated flexible members secured at one end to the body, a holder element carried at the free ends of said members, a brush block mounted within the holder element, an arcing shield secured to the frame and extending beneath and enclosing the sides of said flexible members, said supporting body having a portion overhanging the holder element, a coiled spring disposed at substantially right angles to the flexible members and abutting against the overhanging portion of the body and the holder element for urging the latter toward the commutator, and means for limiting movement of the holder element.

9. A commutator brush device for dynamo-electric machines comprising a supporting body, laminated flexible members spaced apart and secured to said body, a holder element carried by the free ends of said flexible members, a brush block adjustably mounted upon said holder element, said supporting body having a portion overhanging the holder element and a coiled spring engaging the overhanging portion of the body and the holder element for swinging the latter toward the commutator, and a trough-like shield secured to the frame where said members are secured and extending beneath said flexible member and closing the bottom of the body and enclosing the sides of said members to serve as a protector against damage by arcing.

10. In a device of the character described, a body, a pair of spaced laminated flexible members secured at one end to the body, a holder element carried at the free ends of said members, a brush block mounted within the holder element, an arcing shield secured to the frame and extending beneath and enclosing the sides of said flexible members, a coiled spring disposed at substantially right angles to the flexible members and abutting against the body and the holder element for urging the latter toward the commutator, and means for limiting movement of the holder element, consisting of a pair of strips, each having a coacting lip arranged to overhang, a bolt connecting one strip to the body, and a plate securing one of the flexible members and the other strip to the holder element, said bolt serving also to hold one end of the coiled spring.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

JOHN WESLEY STRAWBRIDGE.