March 11, 1941. M. R. HANNA 2,234,695

BRUSH HOLDING DEVICE

Filed Dec. 19, 1939

Fig. 1.

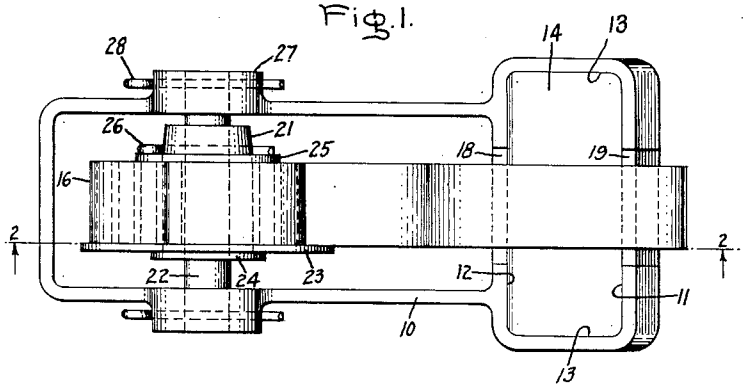


Fig. 2.

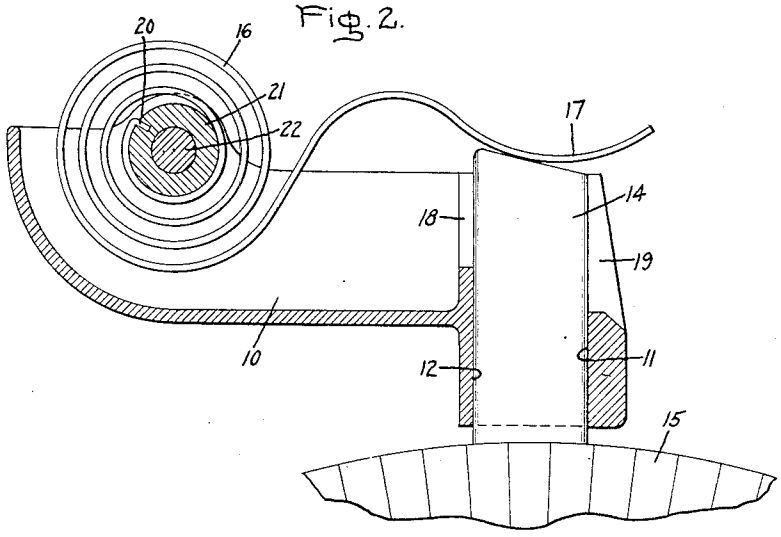
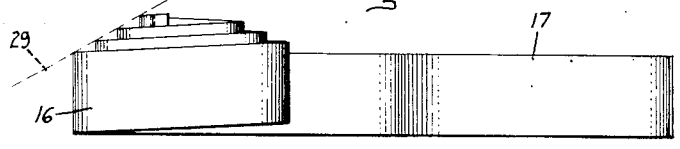


Fig. 3.



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BRUSH HOLDING DEVICE

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6 Claims. (Cl. 171—324)

My invention relates to a brush holding device and particularly to an arrangement for preventing sidewise movement and chattering of the brush biasing spring.

In order to obtain the most desirable commutating conditions, it is desirable that a commutator brush should follow as nearly as possible the surface of the commutator bars, and while the peripheral surface of most commutators is substantially smooth, certain small irregularities are apt to cause a brush to vibrate to a certain extent. In order to assist the brush in following any small irregularities in the surface of a commutator, it is customary to provide an arrangement for biasing the brush through a brush holder into contact with the commutator segments. In certain types of commutators, this biasing force is transmitted directly from a coil spring to the brush through an end of the spring which is adapted to engage the outer end of the brush. With this type conventional spring, the vibrations of the brush are apt to cause the contact end of the biasing spring to chatter and to move sidewise over the upper surface of the brush. This provides a noisy brush and also reduces the efficiency of the biasing effect of the spring.

An object of my invention is to provide an improved brush holding device which will prevent chattering and sidewise movement of a biasing coil spring.

Another object of my invention is to provide an improved brush biasing arrangement utilizing a spring mounting which is adapted to insure against chattering and sidewise movement of the biasing spring.

Further objects and advantages of my invention will become apparent and my invention will be understood from the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

In the drawing, Fig. 1 is a plan view of a brush holding device incorporating my invention; Fig. 2 is a sectional view taken along line 2—2 of Fig. 1 and illustrating the relative arrangement of a brush and commutator with respect to the brush holding device; and Fig. 3 is a plan view of my improved spring construction before assembly on the brush holding device.

Referring to the drawing, I have shown a brush holding device provided with a brush holder 10 having brush guiding surfaces 11 and 12 at the front and back thereof and two side guiding surfaces 13. These guiding surfaces are adapted to guide a brush 14 in a substantially radial direction towards the outer periphery of segments 15 of a commutator. As has been stated, it is desirable that the brush 14 should follow as nearly as possible the periphery of the commutator segments 15, and in order to obtain this result, the brush 14 is biased towards the commutator through the brush holder by a coil spring 16, one end 17 of which is arranged adjacent slots 18 and 19 in the brush guiding surfaces 12 and 11, respectively, and adapted to engage the outer end of the brush 14. The inner end 20 of the coil spring is secured in a notch formed in a sleeve 21 mounted upon a supporting pin 22, so that the biasing force of the spring may be adjusted by changing the relative position of the sleeve 21 with respect to the pin 22. With this arrangement, the outer end 17 of the spring is adapted to bias the spring through the brush holder for a considerable portion of its useful life, as the slots 18 and 19 permit the end 17 of the spring to move downwardly for a considerable distance further than the upper edges of the guiding surfaces 11 and 12. The convolutions of the coil spring are held in position between a relatively large washer 23 which engages a shoulder 24 formed on the sleeve 21 and a relatively small washer 25 which is held in position on the sleeve 21 by a cotter pin 26. This washer 25 is relatively small so that it does not cover much more than the first convolution of the spring in order to provide open access to the space between the convolutions to allow any foreign substance which may enter therein to be freely removed. The pin 22 is mounted in bosses 27 formed in the sides of the brush holder 10 and is held in position by cotter pins 28. This spring is formed of flat material as in the conventional arrangement in order to provide the desired resiliency and in order to provide a relatively large contacting surface between the end 17 of the spring and the brush 14. With conventional springs, it has been found that considerable wear is developed by the chattering and sidewise movement of the end 17 of such a spring when the machine is in operation. In order to obviate this difficulty, the coil spring is initially formed with the convolutions thereof axially displaced with respect to each other with the edges of successive convolutions forming a conical outline as shown at 29 in Fig. 3. When the brush holding device is assembled, the spring is mounted between the washers 23 and 25, so that the

convolutions thereof are secured on the sleeve 23 and are biased axially toward each other so that the edge on each side of the spring engaged by one of the washers 23 or 25 is substantially in a single plane as shown in Fig. 1. This provides an initial sidewise biasing force against the large washer 23 which, I have found, effectively insures against sidewise movement and chatter of the spring.

While I have illustrated and described a particular embodiment of my invention, modifications thereof will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not to be limited to the particular arrangement disclosed and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent in the United States, is:

1. A brush biasing means including a spiral spring the convolutions of which are initially axially displaced with respect to each other with the edges of successive convolutions forming a conical outline, a mounting for said spring, and means engaging the outer edges of said spring for securing said spring on said mounting with the convolutions thereof biased axially toward each other with the edge on each side substantially in a single plane to insure against spring chatter.

2. A brush biasing means including a spiral spring of substantially flat material the convolutions of which are initially axially displaced with respect to each other with the edges of successive convolutions forming a conical outline, a mounting for said spring, and means for securing said spring on said mounting with the convolutions thereof biased axially toward each other with the edge of each side thereof substantially in a single plane to provide an initial biasing force toward one side to insure against spring chatter, said means being constructed and arranged to provide open access to the space between the convolutions of said spring to allow free removal of foreign substances therefrom.

3. A brush holding device including a brush holder arranged to receive a brush, a brush biasing means including a spiral spring the convolutions of which are initially axially displaced with respect to each other, a mounting for said spring, and means for securing said spiral spring with respect to said brush holder to provide for biasing a brush therethrough and being arranged to secure said spiral spring with the convolutions thereof biased axially toward each other with the edge on each side thereof substantially in a single plane.

4. A brush holding device including a brush holder arranged to receive a brush, a brush biasing means including a spiral spring of substantially flat material the convolutions of which are initially axially displaced with respect to each other with the edges of successive convolutions forming a conical outline, and means including a pin and a washer arranged on said pin on each side of said spring for mounting said spring to provide for biasing a brush through said brush holder and being arranged to secure said spring with the convolutions thereof biased axially toward each other with the edge on each side thereof substantially in a single plane.

5. A brush holding device including a brush holder arranged to receive a brush, a brush biasing means including a spiral spring the convolutions of which are initially axially displaced with respect to each other, and means including a pin and a washer arranged on said pin on each side of said spring for mounting said spring to provide for biasing a brush through said brush holder and being arranged to secure said spiral spring with the convolutions thereof biased axially toward each other with the edge on each side thereof substantially in a single plane, one of said washers being constructed and arranged to provide for open access to the space between the convolutions of said spring to allow free removal of foreign substances therefrom.

6. A brush holding device including a brush holder having a brush guiding surface and arranged to receive a brush therein, a slot in said brush guiding surface, a brush biasing means including a spiral spring of substantially flat material, the convolutions of said spiral spring being initially axially displaced with respect to each other with the edges of successive convolutions forming a conical outline, an end of said spring being arranged to extend adjacent said slot in said guiding surface and adapted to engage a brush in said brush holder, and means for mounting said spiral spring with respect to said brush holder to provide for biasing a brush therethrough and being arranged to secure said spiral spring with the convolutions thereof biased axially toward each other with the edge on each side thereof substantially in a single plane to provide an initial biasing force toward one side to insure against spring chatter and sidewise movement thereof.

MAX R. HANNA.