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V-TYPE BRUSH HOLDER FOR DYNAMOELECTRIC MACHINES

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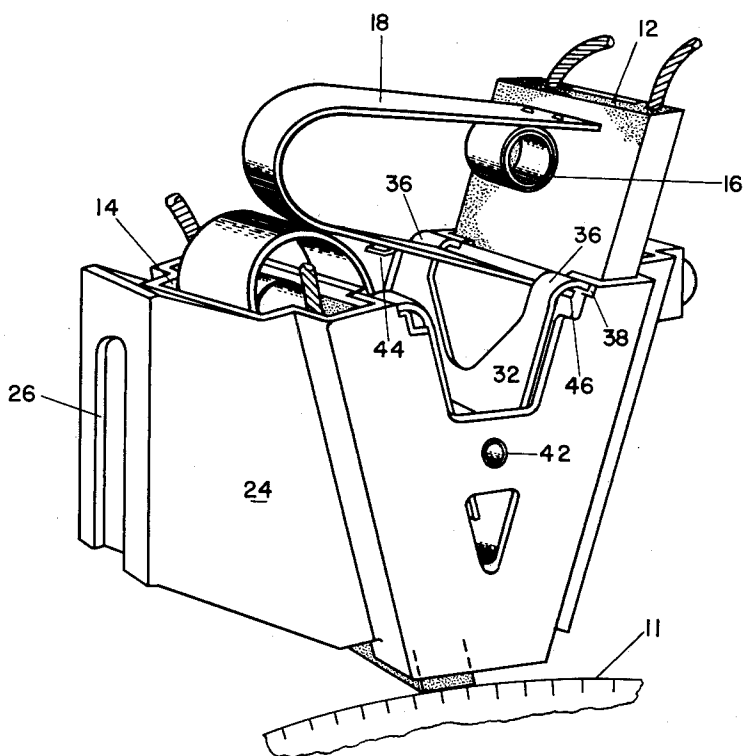


FIG. 1

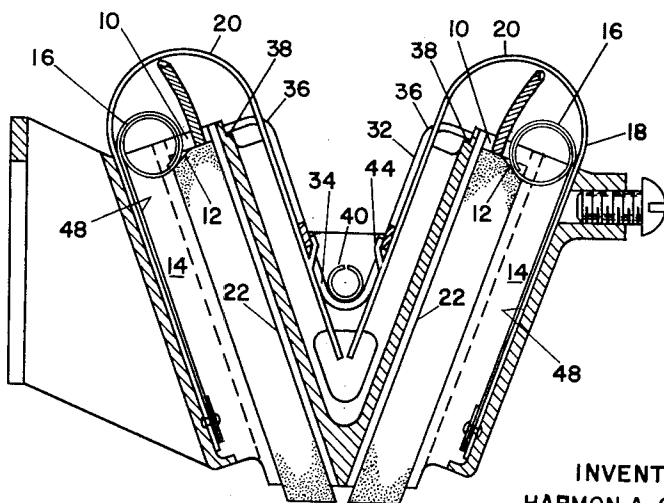


FIG. 2

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V-TYPE BRUSH HOLDER FOR DYNAMO-ELECTRIC MACHINES

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The invention described herein relates to dynamoelectric machines and more particularly to a carbon brush holder of V-type configuration adapted for use with large motors and generators.

Developments in brush holders have not kept pace generally with the advanced designs of dynamoelectric machines which have resulted in improved performance and operating characteristics. Known brush holders used with large machines are generally of a V-type configuration and are stacked or aligned axially along the commutator and at various locations around its periphery to facilitate proper collection of current. These prior art brush holders generally comprise a casing having brush receiving channels therein and biasing springs for urging the brush into contact with the commutator. The biasing springs are mounted in the opening provided by the V of the casing and are mounted on shafts having individual levers for adjusting the spring tension and therefore the force on the brush as it wears during use. Since the tension in the biasing springs does not remain constant throughout the life of the brushes, wear not only takes place at an accelerated rate, but when the tension is small, the brush becomes loose, thus generally resulting in improper commutation, sparking, threading and other adverse effects.

The requirement for continually adjusting the tension in the springs is a nuisance from a maintenance standpoint, and since a plurality of operating parts is necessary, frequent replacement of the parts and the brushes is necessary. Also, the usual brush holder is of a relatively small construction, thus requiring the use of short brushes which also must be replaced at frequent intervals. Moreover, because of the many movable and separate parts, the initial cost of manufacture and subsequent maintenance is relatively great. In spite of the above noted disadvantages, however, current brush holders will nevertheless provide acceptable service, but the need exists for a more versatile brush holder incorporating improved features capable of more efficiently serving the other components of the machine.

The primary object of my invention, therefore, is to provide an improved brush holder of V-type configuration, of larger size, and capable of being manufactured at lesser cost than conventional brush holders, while having features requiring little or no maintenance except for the replacement of the brushes as they wear during use.

In carrying out my invention, I provide a V-shaped casting having channels converging in a direction towards the commutator such that when brushes are placed therein, the commutator ends thereof are spaced a distance just sufficient to permit a circumferential clearance therebetween. The brushes are held in firm engagement with the commutator by a U-shaped spring holder having a constant tension spring on one leg providing equal force on the brush throughout its life. The other leg is adapted for engagement with a spring clamp which is fitted into the opening provided by the V of the brush holder and is designed in a manner to be held in a locked position in the brush holder when the spring is urging the brush into contact with the commutator. Removal of the brush is facilitated by moving the spring holder out of its locked position where it then can be pivoted about the upper

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point of the casing where it is held captive thereon, thus permitting easy removal and replacement of the brush.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which I regard as my invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawing in which:

FIGURE 1 is a perspective view of a brush holder showing one of the spring holders in a disengaged position; and

FIGURE 2 is a view in elevation, partly in section, of the brush holder in FIGURE 1.

Referring now to the drawings wherein like reference characters designate like or corresponding parts throughout the several views, there is shown a brush holder casing of V-type configuration made of bronze or alloyed materials. Preferably, the elements forming the bronze composition should be selected to provide smooth surfaces on the casting such that no additional milling or machining of parts is required. The casting shown in FIGURE 1 was made by a single casting process wherein the dies used form all of the surfaces shown. Since the brush holder in effect constitutes two separate brush holders, it was found after design and experimentation that a single V-type holder could be made which would satisfy the requirements mentioned above. Accordingly, each of the individual brush holders shown is more fully described in applicant's prior patent No. 2,836,745 entitled "Brush Holder for Dynamoelectric Machines" and assigned to the same assignee as the present invention.

The configuration of the parts comprising the brush holder of the Gillie patent requires extensive design of sand molds to form a V-type holder, when two of the single brush holders are joined, thus increasing the cost of manufacture. Also, other conventional casting methods are not satisfactory because of the intricacy of design. The separate brush holders forming the V-type construction disclosed herein are identical and each comprises a channel 10 of a size sufficient to accept a carbon brush which preferably is shaped at an angle on its commutator end for providing proper angular contact with the commutator 11 while its upper end is equipped with a slanted surface 12 designed for contact by a spring. The channel 10 merges into a groove 14 which is of a size to accept the constant tension spring 16 attached to one leg 18 of a U-shaped spring holder 20. Obviously, the groove 14 may be enlarged to accommodate a wider spring.

When the brush and its corresponding spring holder are placed in position in the casing, as shown on the left side in FIGURE 1, it will be seen that the constant tension spring 16 is caused to unwind and have the lower surface of the volute bear on the slanted part 12 of the brush to urge the brush in a downward direction against the commutator. It also urges the brush in a direction toward an inside wall 22 of channel 10 which constitutes a reaction surface effective in minimizing the effects of chattering of the brush, sparking and other adverse effects when spring tension is not properly applied in the correct amount and at the proper direction on the brush. As illustrated, the brush holder is equipped with a shank 24 having a slot 26 for receiving a bolt used for firmly anchoring the brush holder on a bracket, not shown, adjacent the commutator. The slot 26 is elongated to permit radial adjustment of the brush holder with respect to the commutator. The requirements for locking the spring holder in a firm position and keeping it captive on the brush holder during brush replacement, in addition to providing non-movability of a minimum number of simple designed parts were met by providing a spring clamp 32 adapted to fit within the opening formed by the

V in the casting. The spring clamp is of V-shape construction and is equipped on each side with a centrally disposed opening 34 and turned-over flanges 36 selected to provide a snug fit with shoulders 38 on opposite sides of the brush holder body. When the clamp is placed in position, its sides constitute walls spaced from the brush holder body. In order to maintain the spring clamp in a fixed position, a hollow expansion pin 40 extends through openings 42 in a side wall of the casing and is shaped to closely fit with the base of the V. When the pin is placed in position, the ends thereof are expanded outwardly into contact with the casting walls, thus firmly locking the spring clamp in position.

As previously mentioned, one leg of the U-shaped spring holder fits in a groove adjacent the brush channel. The other leg is equipped with a detent 44 punched out of the spring holder body and the bottom end thereof is furnished with outwardly extending arms 46. With the spring holder placed in position to urge the brush into contact with the commutator, the detent 44 engages the opening 34 in the spring clamp and locks the spring holder immovably on the casing. Since the opening in the U of the spring holder is greater than the distance between the sides of the brush holder, it must be compressed inwardly to permit its insertion in the casing. This inward deflection causes the spring holder to exert an outward force against the wall 48 of the brush holder, thus also precluding outward movement.

When it is desired to replace a brush, the spring holder is pressed inwardly and downwardly to cause the detent to be moved out of engagement with the wall of the spring clamp, thereby permitting the spring 16 to force the spring holder assembly upwardly and out of engagement with the brush. When it has reached its uppermost point of travel, the arms 46 hang up on the flanges 36 and maintain the spring holder captive on the casing. The length of the legs of the spring holder is selected such that when it is in a completely retracted and captive position, there is just sufficient room for the brush to be replaced in the channel 10.

The above-described structure is of simple construction, is larger than prior brush holders and, because of the relatively few parts, can be manufactured at less cost than smaller brush holders heretofore used. The construction permits ease and safety in replacing brushes because only one hand of an operator is necessary to disengage the spring holder from the brush holder body. Since none of the parts are movable, maintenance problems are reduced to the point where they are almost non-existent.

Although a specific construction has been disclosed, it will be evident that other and different arrangements of the parts can be resorted to obtain performance of the same functions as the parts described herein. For example, a spring clamp may be eliminated completely and a wall spaced from the brush holder body and the same as opening 42 could be formed on the brush holder during the casting process. In this instant the flanges 36 are not cast in a turned-over position, but rather remain parallel with the wall. It is then only necessary to bend over these portions of the flanges to provide an area capable of maintaining the spring holder captive on the casing when the holder is installed on a machine. This has proven to be successful and the only disadvantage is that on rare occasions, one of the flanges will break off because of the relative brittleness of the alloy material. Obviously, a change in the elements constituting the alloy would eliminate the problem.

It therefore will be apparent that many modifications and variations are possible in light of the above teachings. It is to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

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

1. A V-type brush holder for a dynamoelectric machine comprising a casing having a pair of brush receiving channels converging in a direction toward a commutator, a groove of smaller size extending the length of the casing and merged with said channels, a spring clamp secured in the V-shaped area formed by the spaced channels, and a spring holder of U-shaped configuration for each of said channels, said spring holder comprising a constant tension spring on one leg arranged for engagement with a brush for urging it into contact with a commutator, and means on the other leg of the spring holder selectively engageable with spaced parts of the spring clamp for respectively locking the spring holder in position when in engagement with the brush and for holding it captive on the holder when in a non-engaging position with the brush.

2. A V-type brush holder for use with dynamoelectric machines comprising a casing having carbon brush channels therein converging toward a commutator when the holder is installed on a machine, a spring holder for each of said channels having a spring on one end adapted for contact with a brush for urging it against a reaction surface in the casing and towards said commutator, said spring being arranged for movement toward the commutator in a line substantially parallel with the brush as it wears during use, a V-shaped spring clamp mounted in the space formed between the channels, an opening formed in the wall of said clamp for receiving an outwardly protruding member on the other end of the spring holder for firmly locking the spring holder on the casing during machine operation, and means disposed on the top of the brush holder for maintaining the spring holder captive when in a brush non-engaging position.

3. A V-type brush holder for use with a dynamoelectric machine comprising a casing having carbon brush receiving channels therein converging in a direction toward a commutator when the brush holder is mounted on a machine, a spring holder associated with each of said channels in the casing and having a spring on one end thereof engageable with the upper surface of the brush for urging it with a constant force into contact with a commutator, a V-shaped spring clamp positioned between said channels and secured therein by a member bridging opposite walls of the brush holder, each side of said spring clamp including an opening formed in a wall thereof and of a size sufficient to receive a protruding member on the other leg of the spring holder for locking the spring holder in a fixed position on the casing, and a pair of spaced flanges in engagement with an upper portion of the casing and engageable by outwardly extending arms on the spring holder for maintaining the latter captive on the brush holder when the spring holder is moved to a non-engaging brush position.

References Cited in the file of this patent

UNITED STATES PATENTS

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