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BRUSH GUARD FOR BRUSH HOLDER UNITS

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Fig. 1

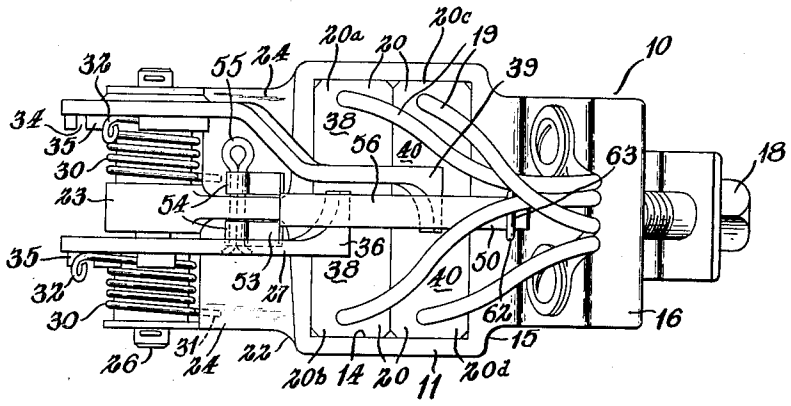
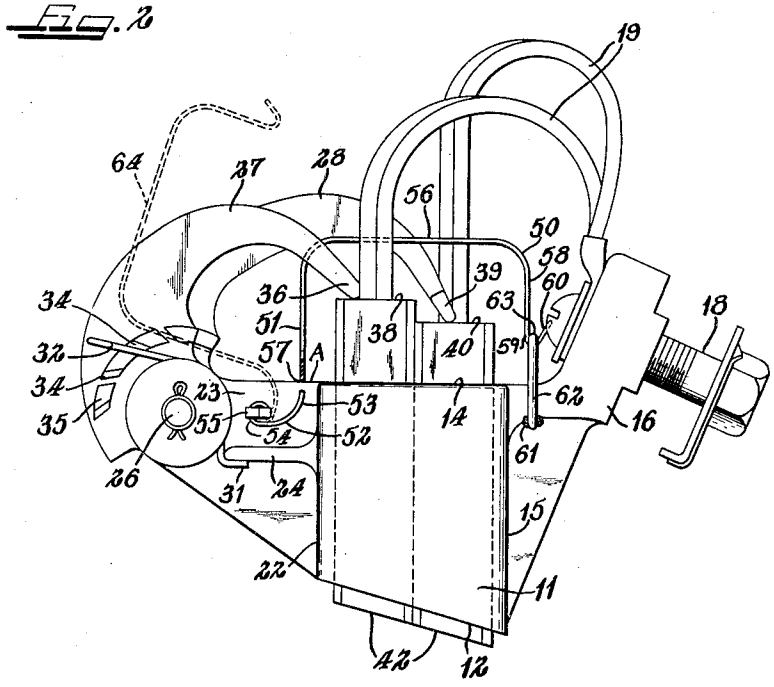


Fig. 2



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BRUSH GUARD FOR BRUSH HOLDER UNITS

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This invention relates to brush holder and brush units for electrical machines and the like, and has particular reference to the provision in such units, of brush guard means for preventing accidental separation of the brush element or elements from the holder.

The present invention is concerned with electrical machines of commutator and collector ring types, intended for use in environments in which the machines are or may be subjected to appreciable shock and vibrations of appreciably great amplitudes. Where these machines embody brush holder units of conventional form, as of a form providing a boxlike holder body with one or more brush elements received therein, and spring-loaded tensioning means engaging the rear end of the brush element or elements to urge the latter into electrical contact with the machine commutator or collector ring, the brushes may and do at times separate from or "jump out" of the holders in response to the reaction of the machine to shock the vibration conditions as indicated. When such occurs, continued effective operation of the machine will be impaired, while physical and electrical damage to the machine may eventuate in consequence of one or more separated brushes or broken parts thereof.

Accordingly, the principal object of the present invention is to afford an effective guard provision for brush holder units in machines subject to shock and vibration conditions of the order indicated, which will prevent brush separation from the holders in consequence of either shock and vibrations, or of breakage of the spring in the brush tensioning means.

Another object is to provide in a brush holder unit, a brush guard which is releasably positionable in an effective position relative to the brush means, as for the purpose indicated, and which is retained in such position by spring-tension effected in the guard.

The foregoing and other objects and advantages of the present provision will appear from the following description of a presently preferred guard embodiment as exemplified in the accompanying drawing, wherein:

Fig. 1 is a top plan view of a brush holder unit having the guard provision of the present invention, embodied therein, and

Fig. 2 is a view in side elevation of the unit, showing the guard device in effective position relative to the brush means.

Referring to the drawing, the holder unit 10 may be of well known or conventional form, and as shown, provides a boxlike brush-receiving body portion 11 open at its forward and rear end 12 and 14, respectively. At one side 15 of the body is a holder mounting extension 16 including bolt 18, for holder mounting on a suitable part of the associated electrical machine (not shown) in a position for brush contact with the machine commutator or collector ring (not shown). The extension 16 in the holder example illustrated, also serves as a terminal block for the brush leads 19 of the brush elements 20 (four brushes being shown) in the holder body. At the opposite side 22 of the holder body is

an extension 23 laterally flanged at 24, which supports a pivot rod 26 for a pair of brush-tensioning fingers 27 and 28 pivotally carried thereon. Associated with each finger is a coil spring 30 having one end 31 engaged under the adjacent flange 24 and its opposite end 32 selectively engaged in one of a series of notches 34 in a side extension 35 of the finger. The finger 27 has its free end 36 in engagement with the rear ends 38 of the brushes 20*a* and 20*b*, while the free end 39 of finger 28 engages the rear ends 40 of brushes 20*c* and 20*d*. Under the bias loading of the springs 30, the fingers urge the brushes in the direction to effect electrical contact of the forward brush ends 42 with the machine commutator or collector ring (not shown).

As before stated, the reaction of the electrical machine to shock and vibration conditions as indicated, may be and at times is sufficient to cause the brushes 20 to separate from or "jump out" of the holder body, even against the opposing force of the spring-loaded fingers 27 and 28. Also, breakage of the finger springs 30 would free the brushes for holder separation either in response to gravity fall-out (in the instance of holder units located below the commutator, for example), or to shock and vibration conditions transmitted to the holders and brushes. Therefore, the present invention is directed to preventing brush separation from the holder under any of the foregoing conditions, by the inclusion in the holder unit of a brush guard now to be described.

The brush guard member indicated generally by the numeral 50, comprises a unitary strip of resilient material, as spring-steel, formed to have a substantially U-shape as shown. The legs of the U-shape member are of unequal length, the longer legs 51 being of greater width in its end portion and bifurcated to embrace the holder extension 23. The bifurcated end portion is turned outwardly, as at 52, and provides circular pivot-eye portions 54 on the furcate elements 53, to receive a pivot pin or cotter 55 carried in the holder extension 23. Thus, the guard member is pivotally supported on the holder through its longer leg 51, in a position thereon such that bridge portion 56 of the member will span the rear-end 14 of the holder body 11 centrally thereacross, in the effective position of the member as shown. Moreover, the guard in such effective position has the marginal edge 57 defining the bottom of the slot formed by the furcate elements 53, in contact with the holder extension 23 as for a purpose to appear.

The shorter leg 58 of the guard member is reversely bent at its end, to provide a hook-like portion 59 including the reversely directed terminal end portion 60 which serves a purpose presently to appear. Rigidly secured to the holder mounting extension 16, as by weld at 61 (Fig. 2), is a catch element 62, the element comprising a U-shape rod having its bight 63 spaced outwardly from the rear end 14 of the holder body. The bight 63 provides the catch part engaged by the hook end 59 of the guard member when in its effective position.

When the guard member is in a released position, such as that indicated in dotted lines at 64 wherein the guard is clear of the rear end 14 of the holder body 11 (as to permit insertion or removal of the brushes), the guard then is in an unstressed condition. Given the unstressed span of the guard (the distance between the axis of its pivot-eye portions 54 and the hook end portions 59), the relative spacing of the pivot pin 55 and the catch bight 63 is determined as by proper mounting location of the catch element 62, so that in pivotal movement of the guard to its effective position, the hook end 59 of the shorter leg 58 will snap-over the catch bight 63 and engage the latter, while the edge 57 then will be in pressure contact with the extension 23. The guard then

will be in a condition of spring-tension against the bight 63. Such snap-over engagement of the hook end with the catch bight is facilitated by pressing the short leg 58 inwardly toward the long leg 51 and by the camming action of the terminal end 60 in riding over the bight 63.

As appears in Fig. 2, the point of pivotal support, as pin 55, of the guard member is at one side of a plane extending transversely of the holder and normal to the longitudinal axis of the boxlike holder body 11, as the plane A (Fig. 2) of the holder rear end 14. Moreover, such pivotal point is at that side of the plane which is remote from the guard bridge portion 56, while the catch bight 63, on the other hand, is at the opposite side of the indicated plane. Consequently, the guard when in spring-tensioned engagement with the catch element, is under a turning moment in the counter-clockwise direction as viewed in Fig. 2, generally about pivot 55 but more particularly about the edge 57 in pressure contact with the holder extension 23. This condition constrains the hook portion 59 to positive engagement with the catch bight 63. The guard is thus retained in its effective position by the indicated spring-tension and turning moment forces, and can be released therefrom only by manually moving the guard inwardly the holder body while pressing the shorter leg toward the longer leg to clear the hook end from the catch bight, and then pivotally retracting the guard as to its unstressed position of release at 64.

In the example shown, the guard when in its effective position, has the bridge portion 56 thereof extending transversely of the holder body rearwardly over the central region of the rear end 14 of the latter, and out of contact with but overlying rear end portions of the brush elements 20. The clearance of the guard bridge relative to the brushes, is sufficient to allow longitudinal adjusting movements of the brushes, while precluding brush displacement rearwardly in the holder to any substantial extent. The guard member thus effectively prevents accidental separation of the brushes from the holder body, even under shock and vibration conditions of the order hereinbefore pointed out.

Having now illustrated and described a presently preferred embodiment of the invention, it is to be understood that variations and modifications thereto may be made without departing from the spirit and scope of the invention as hereinafter defined.

What is claimed is:

1. In a brush holder having a brush-receiving body portion, a brush element received in the body portion, brush tensioning means on the holder and engaging the rear end of the brush element, a catch element on the holder, a resilient member having one end in pivotal connection to the holder and its opposite end adapted for engagement with said catch element, said member upon pivotal movement to an effective position wherein its said opposite end is in engagement with said catch element, having a portion thereof intermediate its ends extending transversely of the brush element in spaced relation to the rear end of the latter, and means on said member having pressure contact with the holder in said effective position of the member, establishing a spring-tension condition of the member serving to maintain engagement of its said opposite end with said catch element.

2. In a brush holder providing a boxlike body portion, brush means extending in the body portion, brush tensioning means carried by the holder and engaging the rear end of the brush means, a resilient brush guard member of generally U-shape providing leg portions and a leg connecting bridge portion, pivot means on the holder in connection to one leg portion of said member, pivotally supporting the member for movement to a brush guard position in which said bridge portion extends transversely of the brush means in spaced relation to the rear end of the latter, catch means on said holder engaged by the other leg of said member to said brush guard position of the member, and means on said member having pressure contact with the holder in said brush guard position of the member, effective to place said member in spring-tension constraining the member to engagement of its said other leg with said catch means.

3. In a brush holder and brush assembly for commutator-engaged support of brush means, the improvement therein comprising a brush guard provided by a one-piece resilient strip member carried by the brush holder and movable to a guard position overlying the rear end of the brush means in spaced relation thereto, catch means on the holder releasably engaged by said member when in said guard position, and means integral with said member having pressure contact with the holder in said guard position of the member, effective to place said member in spring-tension constraining the member to engagement with the catch means.

4. In a brush holder and brush assembly for commutator-engaged support of brush means, wherein the holder provides a boxlike body for receiving the brush means, the improvement therein comprising a resilient brush guard member of U-shape providing legs of unequal length and a bridge portion connecting the legs, a pivotal connection between the longer leg of said member and the holder body at one side of the latter, the longer leg having an edge portion for engagement with the holder, said pivotal connection being at one side of a plane through the holder body and normal to the axis of the latter, and means on the opposite side of the holder body providing a catch element at the opposite side of said plane, said member having its shorter leg adapted for engagement with said catch element in pivotal displacement of the member to a guard position wherein said bridge portion thereof overlies the rear end of the brush means in spaced relation thereto, said edge portion of the longer leg being in pressure engagement with the holder in said guard position of the member, and thereby effective to place said member in spring-tension between the catch element and said edge portion, tending to cause pivotal displacement of the member in the direction away from the rear end of the brush means, whereby to constrain the member to engagement of its shorter leg with the catch element.

5. In a brush holder assembly for commutator type electrical machines, providing a holder and brush means therein in biased commutator engagement, a resilient guard member having a hook end, and means comprising an element on the holder engaged by said hook end, and an element on the member in pressure contact with the holder, said elements cooperating in supporting the member in a condition of spring-tension in an effective position overlying the rear end of the brush means out of contact therewith.

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