No. 732,240. PATENTED JUNE 30, 1903.

L. E. UNDERWOOD.

BRUSH HOLDER.

APPLICATION FILED MAY 19, 1902.

NO MODEL.

Fig. 1.

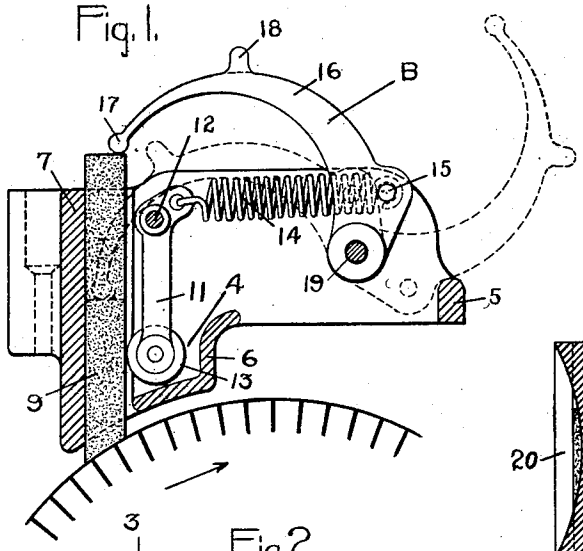


Fig. 3.

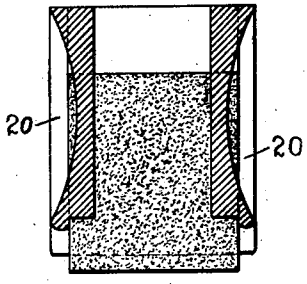
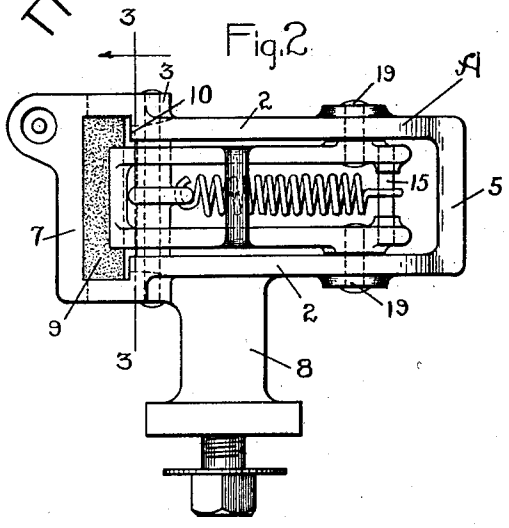


Fig. 2.



Witnesses.

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No. 732,240. Patented June 30, 1903.

UNITED STATES PATENT OFFICE.

LOUIS E. UNDERWOOD, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

BRUSH-HOLDER.

SPECIFICATION forming part of Letters Patent No. 732,240, dated June 30, 1903.

Application filed May 19, 1902. Serial No. 107,914. (No model.)

To all whom it may concern:

Be it known that I, LOUIS E. UNDERWOOD, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Brush-Holders, of which the following is a specification.

My invention relates to brush-holders for dynamo-electric machines, motors, and the like apparatus, and has more particular reference to brush-holders of the reaction type.

The object of my invention is to provide an improved and compact construction of the brush-holder in which the pressure upon the brush in the direction of commutation and the pressure in the direction transverse thereto to hold it against its guide-surface shall maintain a definite relation to each other regardless of the amount of such pressure and also maintain a uniform resultant pressure of the brush on the commutator.

To this end my invention consists in an improvement upon the device of E. W. Rice, Jr., patented April 29, 1890, No. 426,471, wherein the holder is carried by a spring-pressed lever and the brush is pressed in the direction of commutation by a spring thrusting against its end and the under side of the lever and in transverse direction against its guide-surface by a roller carried upon a spring extension of said lever; but in this construction the transverse pressure is substantially uniform, while the pressure upon the end of the brush is kept only partially uniform by the two springs. I provide two independent levers, one to apply the transverse pressure and the other the longitudinal pressure to the brush, and connect them by a single spring, which allows one of the levers to move while the other remains substantially stationary, and by locating the point of attachment of the spring to the lever exerting the longitudinal pressure so that the arm of the movement shall increase as the spring contracts with the shortening of the brush a uniform resultant pressure is maintained between brush and commutator.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of a brush-holder embodying my improvements. Fig. 2 is a plan of the same, and Fig. 3 is a vertical section on line 3 3 of Fig. 2.

The modification shown in the drawings comprises a guide-box A, the side portions 2 of which have offsets 3 near one end and depending extensions 4 at their lower edges to provide additional width at the brush end. The upper rear corners of the side portions are cut away, and a bar 5 connects their lower corners. A shield 6 connects the rear corners of the depending side extensions 4 and serves to protect the antifriction-roll against sparking, and the long bearing-plate 7 connects the front ends of said side portion 2. A lug or projection 8 from one of the side portions is provided with means whereby the brush-holder may be attached to a suitable support.

My improved brush-holder may be used for holding radial brushes or angular brushes of the character shown at 9. With the construction illustrated in Fig. 1 the brush-holder operates satisfactorily, whether the commutator rotates in one direction or the other.

In order to admit brushes which differ slightly in thickness and also to compensate for slight irregularities in the brushes, the recess between the shoulders 10 of the offsets 3 and the bearing-surface of the end 7 is made wider than the thickness of the brush. The transversely-operating lever 11 for holding the brush 9 normally in contact with the bearing-plate 7 is pivoted upon a shaft 12, carried in the side portions 2 near their upper edges and in proximity to the shoulders 10 and carries at its lower end a contact device, preferably taking the form of an antifriction-roll 13, which bears against the side of the carbon brush 9 and is held in engagement therewith by the action of the spring 14, engaging the upper end of the lever. The other end of the spring 14 engages the cross-bar 15 at the rear end of the arc-shaped arms 16 of the lever B, which operate to press the brush longitudinally into contact with the commutator. The arms 16 are connected at their front ends by a bar 17, which rests upon the upper end of the brush, and are also connected at a point intermediate their ends by

the handle-bar 18. The main longitudinally-acting lever B is pivoted to the inner faces of the side portions 2 by rivets or stub-shafts 19, extending through said side portions and the rear ends of the arms 16. The rivets or stub-shafts 19 are so positioned with relation to the rear bar 5 that the cross-bar 15, to which the spring is attached, will be carried beyond the dead-center when the lever is thrown back against the bar 5, as indicated in the right-hand dotted-line position, Fig. 1, and thereby the lever B may be securely held out of the way when renewing the brush. Moreover, the cross-bar 15 is positioned with relation to the pivot-points 19 so that when the lever B is pressing upon a long brush the said bar 15 stands beyond the pivots 19, and the line along which the force of the spring acts is correspondingly nearer the pivot-points than when the brush and spring have become shortened. By reason of the arc shape of the lever B the front end is adapted to follow the brush a considerable distance below the axis of the transversely-acting lever 11 without engaging therewith.

It will be observed that in the arrangement herein described there is no tendency for the brush to stick upon its guide by reason of the transverse pressure thereon being too great relatively to the pressure acting longitudinally thereon. When the tension of the spring is varied, as by movement of lever B to innermost position, both levers are affected alike, and the ratio of their pressures remains unchanged.

In order that a worn-out brush may be removed from the holder, I provide slots 20 in both of the offset portions 3, which extend into the brush-recess, as shown in Fig. 3, whereby the edges of the brush are exposed, so as to be grasped by the fingers and raised.

I wish it understood that my invention is not limited to the specific construction shown.

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

1. In a brush-holder, the combination of a guide-box, a main lever for pressing the brush longitudinally pivotally mounted within said box, a second lever having an antifriction-roll adapted to engage and press the brush transversely, and a spring connecting said levers.

2. In a brush-holder, the combination of a guide-box, a lever pivoted within said box and adapted to bear upon the brush in a longitudinal direction, a second lever pivoted upon said box beneath the first lever and adapted to bear upon the brush in a transverse direction, and means for maintaining a uniform ratio of pressure upon said levers.

3. In a brush-holder, the combination of a guide-box, a lever pivoted within said box and adapted to force the brush toward the commutator, a second lever pivoted within said box and having an antifriction-roll adapted to bear upon the side of the brush, and a spring connected at its respective ends to said levers and operating to maintain a uniform ratio of pressure upon said levers.

4. In a brush-holder, the combination of a box having a guideway at one end in which the brush may move in a longitudinal direction, a lever pivoted near the opposite end of said box and adapted to bear upon the end of the brush, a second lever pivoted near the guideway and adapted to bear upon the side of the brush, and a spring connecting said levers.

5. A brush-holder box having finger slots or recesses extending through its side walls into the guideway for the brush.

6. A brush-holder box having a substantially inclosed guideway for the brush, and elongated finger slots or recesses 20 extending through the sides into said guideways.

7. In a brush-holder, the combination of a box, a lever pivoted upon said box, and having its free end extended into proximity to the commutator, and adapted to bear upon the side of the brush, and a protecting-shield on the box between the lever and the commutator.

In witness whereof I have hereunto set my hand this 16th day of May, 1902.

LOUIS E. UNDERWOOD.

Witnesses:

ALEX. F. MACDONALD,

DUGALD McK. McKILLOP.