No. 676,298. Patented June 11, 1901.

A. F. BATCHELDER.

BRUSH HOLDER.

(Application filed Feb. 28, 1901.)

(No Model.)

Fig. 1

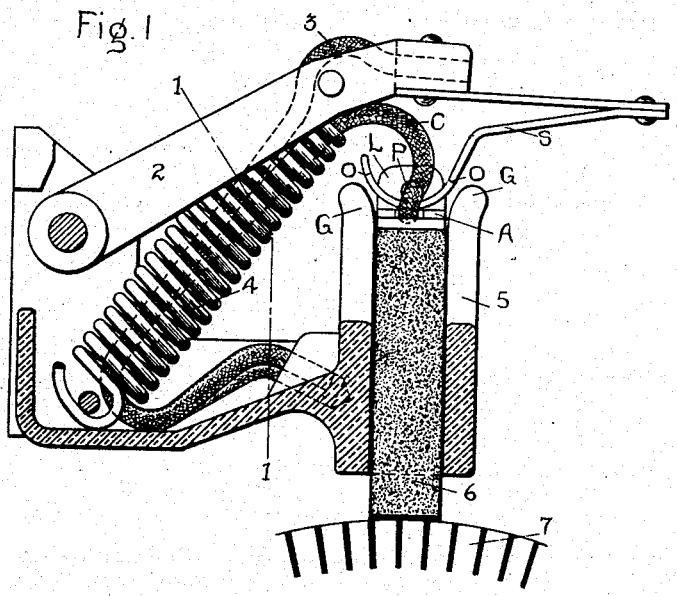


Fig. 2.

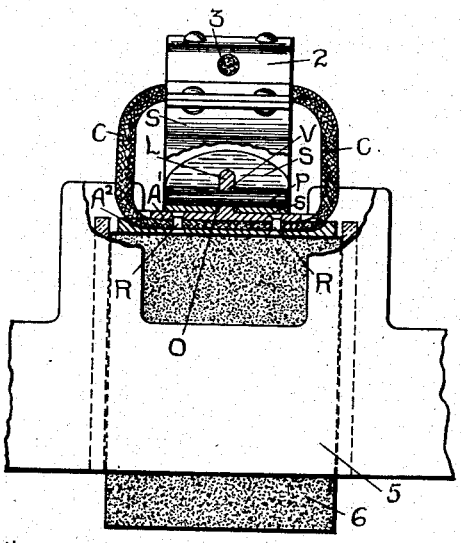
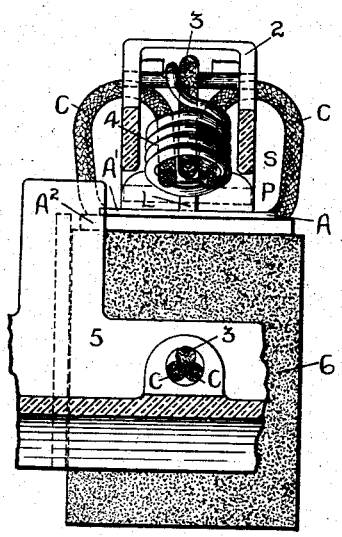


Fig. 3.



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UNITED STATES PATENT OFFICE.

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BRUSH-HOLDER.

SPECIFICATION forming part of Letters Patent No. 676,298, dated June 11, 1901.

Application filed February 28, 1901. Serial No. 49,198. (No model.)

To all whom it may concern:

Be it known that I, ASA FRED BATCHELDER, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Brush-Holders, (Case No. 1,695,) of which the following is a specification.

This invention relates to improvements in brush-holders for electric machines; and it consists in providing an independent contact-plate which has an extended surface in contact with the brush, but which is not secured or attached thereto in any manner whatsoever. This plate is adapted to be pressed against the brush by the brush-holder spring to force the brush against the commutator and to maintain good contact between the brush and the plate. Furthermore, the plate is carried by some movable part of the holder, such as the spring, so that it is readily removed from the top of the brush when the tension of the spring is released. Contact-plates have hitherto been soldered or integrally united with the brush and spring-clips have gripped the brush, thus obtaining good electrical contact with the brush. In the present case the contact-plate is entirely independent of the brush and relies absolutely upon the brush-holder spring to maintain it in good contact with the brush.

Of the drawings, Figure 1 is a vertical section, partly in elevation, of the brush-holder to which the invention is applied. Fig. 2 is a front view of the same looking from the right toward Fig. 1, in which figure detail parts of the construction are shown in section; and Fig. 3 is a vertical section of Fig. 1 along the line 1 1.

The brush-holder shown in the drawings is constructed in general accordance with the patent to Priest, No. 648,052; but it is contemplated that the invention may be applied to any other desired brush-holder.

The parts comprising the present embodiment of the invention are designated by the letters A, C, S, O, L, P, and G, while the parts of the brush-holder as hitherto constructed, which are about to be described, are designated by the numerals. Pivoted to the main body of the brush-holder is an arm 2, having secured in its front end a braided-wire cable 3, which is connected at its other end with the main body of the holder. A leaf-spring S is secured to the front end of the arm 2 and was formerly adapted to bear directly on the top of the brush. The brush 6 is shown in engagement with its commutator 7. A helical spring 4 serves to draw the arm toward the box 5, in which the brush 6 is guided and held. This brush-holder was especially adapted to be used in connection with railway-motors, and, as well known, brush-holders used in this class of work are subjected to peculiarly severe duty and hardship. The objections to this brush-holder were that all the current flowed through the spring S, thereby necessarily affecting its resiliency, and, furthermore, there were several joints to be traversed by the current, which made an imperfect electrical circuit. Furthermore, there was considerable friction and consequent wear between the top of the brush and the end of the spring S, due to the continual vibration of the end of the spring across the surface of the brush. The greatest evil, however, was that the heat developed at the small contact between the brush and spring frequently caused the brush to disintegrate. To obviate these difficulties, the cable 3 might have been secured in a plate formed integral with the brush, as shown in the patent to Rohrer, No. 661,669; but the objections to such construction for this class of work were that as the brush must frequently be removed or renewed the cable connections were liable to be broken and the joint between the plate and brush was liable to be broken by the jarring of the entire equipment. Furthermore, if the cable 3 were secured to a contact-plate formed integral with the brush or with a spring-clip which gripped the brush there would be considerable difficulty in removing the brush from the box 5, and in any event the cable would have to be of considerable length in order to permit the brush to be removed at all. In accordance with this invention the flexible cable C is secured to a contact-plate A in good conducting relation with respect thereto; but this plate is not secured or attached to the brush. This plate A has an extended surface area in contact

with the top of the brush much greater than that which the spring S formerly had, so that little heat is generated. The plate being coextensive with the top of the brush is held immovable within the box 5, so that there is no friction and wear between the plate and the brush. Since current flows directly through the plate to the cable C, there is little flow of current through the spring S, and this is collected, as formerly, by the cable 3. The plate A may be independent of the rest of the brush-holder, and preferably is carried by the end of the spring S, so that when it is desired to remove the brush and the arm 2 is lifted up against the tension of the helical spring 4 the plate is carried upward also and the brush can be removed from the box 5 without any difficulty, such as would be attendant upon its removal if the cable C were permanently connected to the brush by a plate secured or attached to the latter. The importance of the improvement will be more clear when it is noted that the permanent connections of the cable C are all made with respect to the brush-holder and not with respect to the brush, the former being the permanent part of the apparatus and the latter being the part which is subject to wear, destruction, and replacement. Since the plate A is pressed against the brush with considerable energy, substantially as good contact is obtained as if the plate were integrally united with or securely attached to the brush.

It is evident that the plate A and the cable C are essentially independent of the brush and brush-holder, in the sense that they are not limited in their application to any special type of holder. Furthermore, in case the plate A is carried to move with the arm 2 it is not essential that it should be carried by the spring S, for it might be carried by any other part of the movable arm 2, or, in fact, any other movable part of the holder. The special construction herein shown in connection with the spring S might be replaced by any other desired spring if a different spring were used to bear on the plate—as, for instance, if the helical spring 4 were used to bear upon the plate A to press it against the brush.

In the specific construction herein shown with respect to the spring S the latter is slotted, as shown at O, and passing upwardly through the slot is a lug L, formed on the upper portion of the plate A. By this means the end of the spring S is permitted to move freely over the upper surface of the plate A, while at the same time the plate A is held from movement by the walls of the box 5. Thus the wear of the movable end of the spring S is taken on the top of the plate A instead of, as formerly, on the end of the brush itself. The plate is attached to the spring S in the following manner: A hole is formed in the lug L, and in this hole is inserted a pin P, which rests on the top of the spring, and hence causes the plate A to be lifted with the spring S when the arm 2 is raised. In order to secure the pin in position, it is provided with a groove V, and after it is inserted in the hole in the lug L the upper wall of this hole is forced down into the groove V.

The plate A itself may be of any suitable construction or dimensions, so long as it has an extended lower surface in contact with the top of the brush. The braided-wire cable C may be secured to the plate A in any suitable manner, provided that there is good contact between them. The preferable construction is, however, as follows: The plate is formed in two sections A′ and A^2, one of which is grooved for the loop of the cable C, and after this loop is inserted in the grooved portion A^2 the portion A′ is secured to the portion A^2 by rivets R or other suitable means, whereby a considerable portion of the length of the cable is securely clamped between the two portions of the plate. The free ends of the cable C are preferably secured to the main body of the brush-holder, as is the free end of the cable 3, as shown in Fig. 3. It will be noted that all three of the cable-lengths extend through the inside of the helical spring 4, whereby they are protected from injury and are disposed of in a very convenient manner. This arrangement could not be resorted to if the cable C were permanently connected with the brush, as there would not be a sufficient length of the cable free to permit the removal of the brush from the box 5. When a new brush has been inserted in the box 5, the arm 2, which has been held in a raised position to permit such insertion, is permitted to be drawn down by the helical spring 4, and the guides G, formed as the flaring upper edges of the box 5, guide the plate A into its proper position upon the top of the brush.

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

1. The combination with a brush-holder, of an independent contact-plate having an extended surface in contact with the brush, a spring carried by the holder to force the brush against the commutator, and a loose connection between the spring and plate, whereby the spring can move freely over the surface of the plate.

2. The combination with a brush-holder, of an independent contact-plate having an extended surface in contact with the brush, and flaring guides for said plate.

3. The combination with a brush-holder, of an independent contact-plate having an extended surface in engagement with the brush, and a spring carried by the holder which carries said plate and forces it against the brush.

4. The combination with a brush-holder, of an independent contact-plate having an extended surface in engagement with the brush, and a spring carried by the holder which carries said plate and forces it against the brush and is freely movable over the upper surface of the plate.

5. The combination with a brush-holder, of

an independent contact-plate having an extended surface in engagement with the brush, and a spring which carries said plate and forces it against the brush.

6. The combination with a brush-holder, of an independent contact-plate having an extended surface in engagement with the brush, and a spring which carries said plate and forces it against the brush and is freely movable over the surface of the plate.

7. The combination with a brush-holder, of an independent contact-plate, and a spring which carries said plate and forces it against the brush, the connection of the plate and spring being loose to permit the spring to move freely over the plate.

8. The combination with a brush-holder, of a spring-actuated member, and an independent plate carried thereby which has an extended surface in engagement with the brush, and a brush-box on the holder, which has flaring upper sides, to guide the plate upon the brush.

9. The combination with a brush-holder, of a plate having an extended surface in engagement with the brush, a spring pressing the plate against the brush, a slot in the spring, and a lug on the plate which extends through said slot.

10. The combination with a brush-holder, of a plate, a spring forcing the plate against the brush, a slot in the spring, a lug on the plate extending through the slot, a hole in the lug above the spring, and a pin in said hole.

11. The combination with a brush-holder, of a plate, a spring, a slot in the spring, a lug on the plate, a hole in the lug, a pin having a groove and located in the hole in the lug, and the upper wall of the hole in the lug extending into the groove in the pin, to maintain the latter in place.

12. The combination with a brush-holder, of an independent plate having an extended surface in engagement with the brush, a movable member of the holder, which carries said plate, and a flexible non-resilient conductor or cable secured to said plate in good conducting relation with respect thereto.

13. The combination with a brush-holder, of an independent plate, a movable member which carries said plate, and a flexible non-resilient conductor or cable secured to said plate.

14. The combination with a brush-holder, of an independent plate, a spring-actuated member which carries said plate, and a flexible non-resilient conductor or cable secured to said plate.

15. The combination with a brush-holder, of an independent plate, a spring which carries said plate and forces it against the brush, and a flexible non-resilient conductor or cable secured to the said plate.

16. The combination with a brush-holder, of an independent plate having an extended surface in engagement with the brush, a movable member of the holder, which carries said plate, and a flexible non-resilient conductor or cable secured to said plate, and to the brush-holder.

17. The combination with a brush-holder, of an independent plate having an extended surface, a movable member of the holder, to which said plate is mechanically connected, and a braided-wire cable secured to the said plate.

18. The combination with a brush-holder, of an independent plate having an extended surface in contact with the brush, a braided-wire cable secured to said plate, means for forcing the plate against the brush, and a mechanical connection between the plate and a movable part of the holder.

19. The combination with a brush-holder, of an independent plate, consisting of two portions secured together, and a flexible non-resilient conductor or cable clamped between said portions.

20. The combination with a brush-holder, of an independent plate, consisting of two portions secured together, and a flexible non-resilient conductor or cable looped between and clamped by said portions of the plate, and having its two free ends connected to the circuit.

21. The combination with an independent contact-piece having an extended surface adapted to engage the brush, and carried by a movable member of the brush-holder, of a flexible non-resilient conductor secured to said contact-piece in good conducting relation with respect thereto.

In witness whereof I have hereunto set my hand this 25th day of February, 1901.

ASA FRED BATCHELDER.

Witnesses:
BENJAMIN B. HULL,
EDWARD WILLIAMS, Jr.