

(No Model.)

3 Sheets—Sheet 1.

S. H. SHORT.
BRUSH HOLDER.

No. 568,413.

Patented Sept. 29, 1896.

Fig. 1.

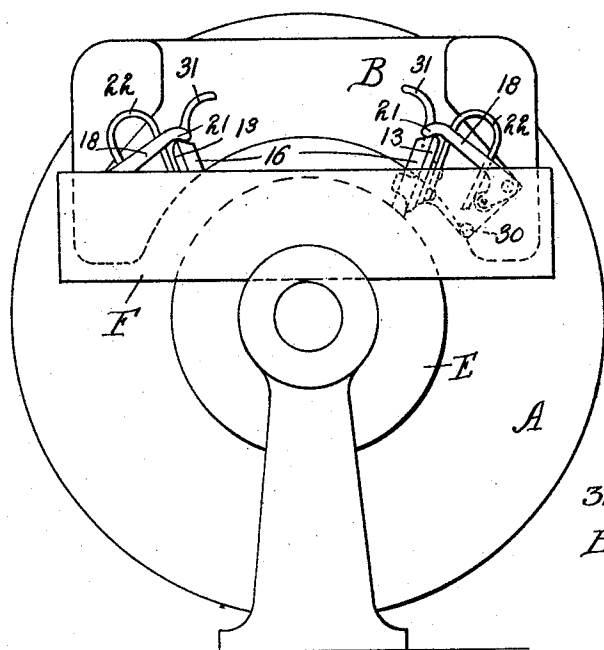


Fig. 11.

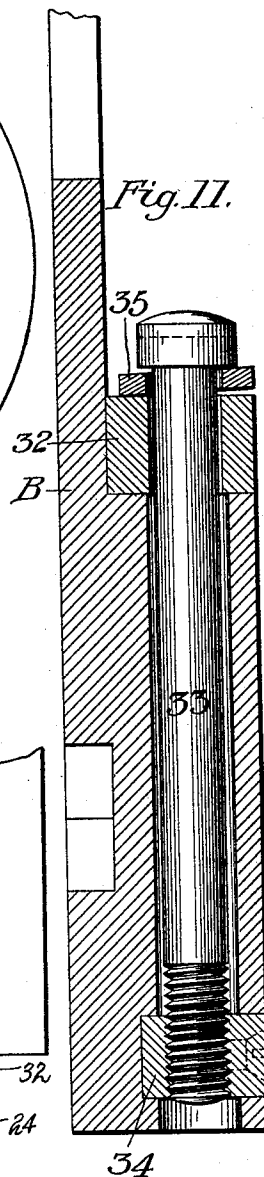
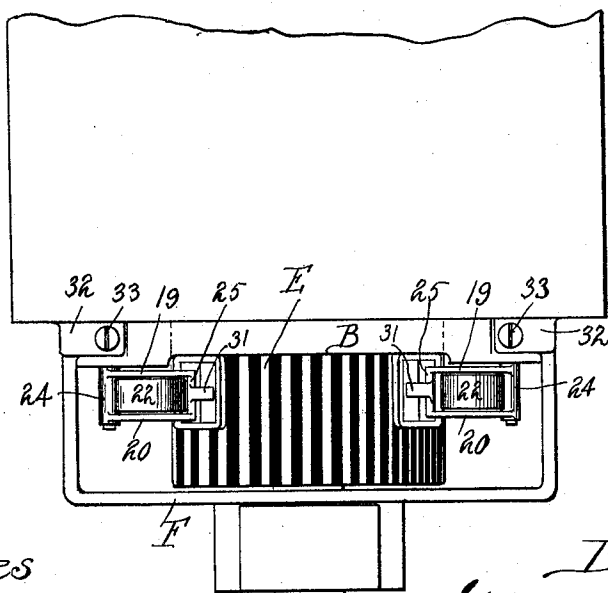


Fig. 2.



Witnesses

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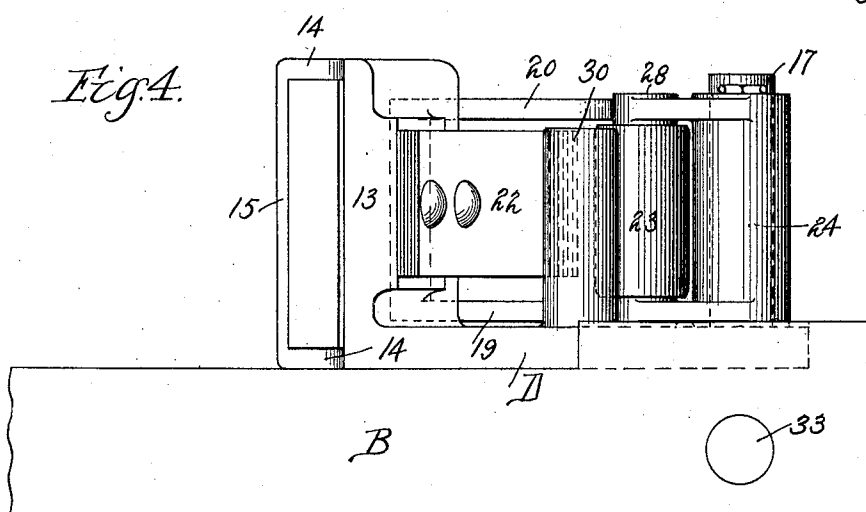
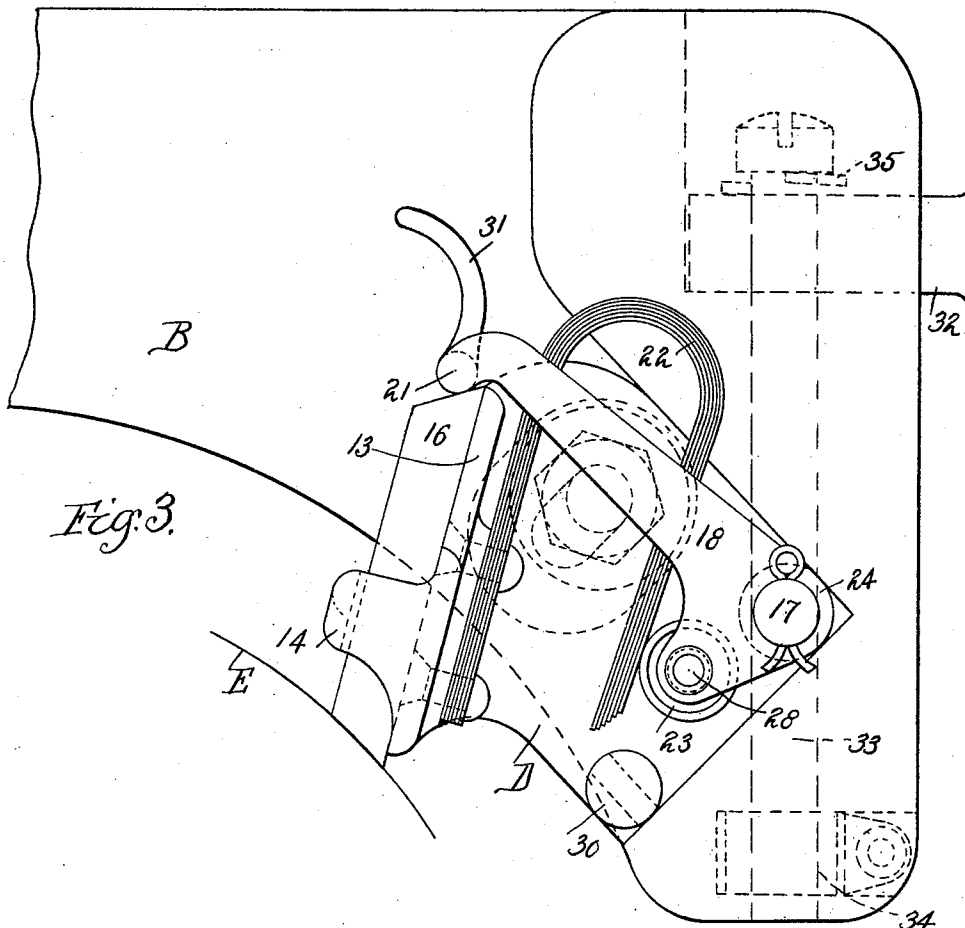
(No Model.)

3 Sheets—Sheet 2.

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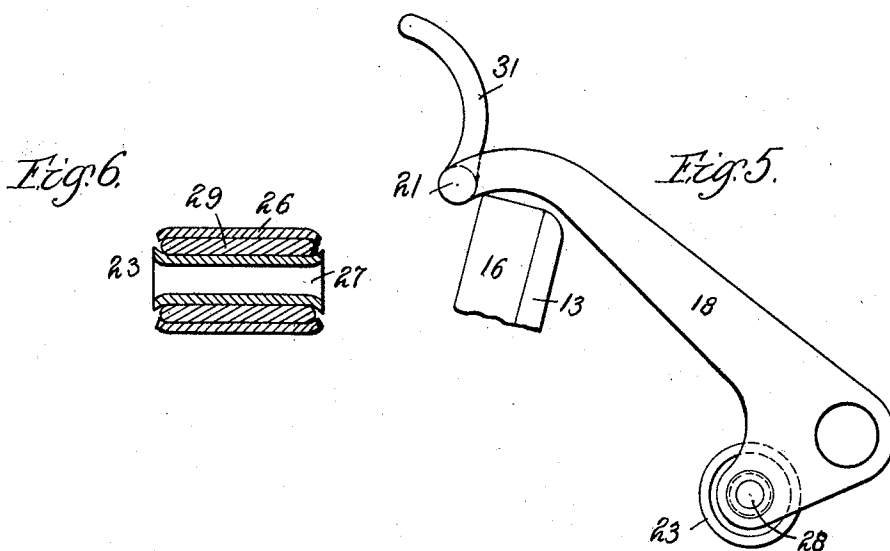
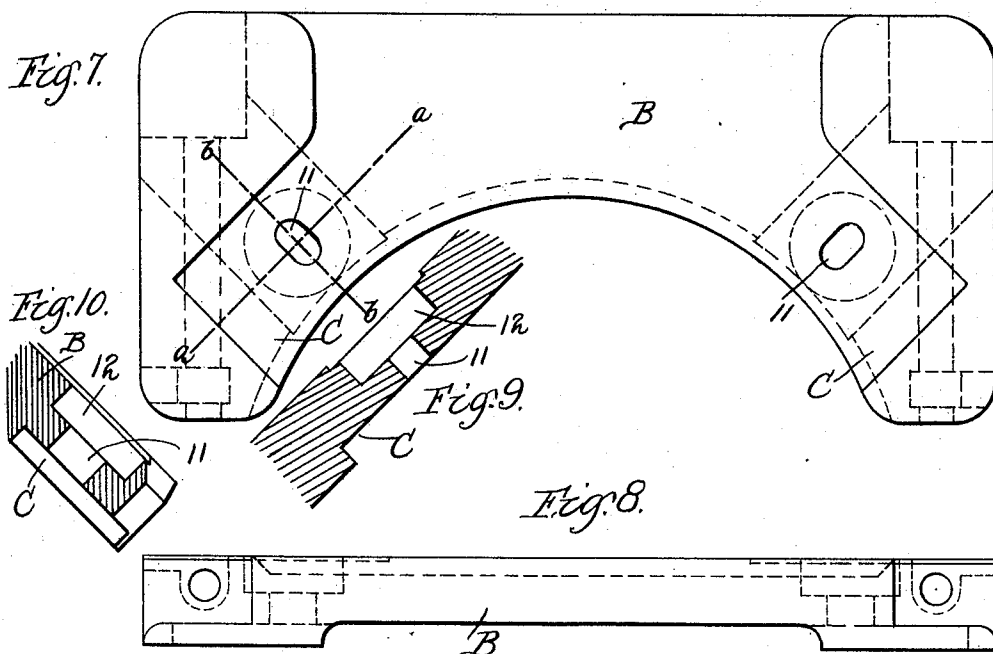
(No Model.)

3 Sheets—Sheet 3.

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Witnesses

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UNITED STATES PATENT OFFICE.

SIDNEY H. SHORT, OF CLEVELAND, OHIO.

BRUSH-HOLDER.

SPECIFICATION forming part of Letters Patent No. 568,413, dated September 29, 1896.

Application filed October 29, 1895. Serial No. 567,313. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY H. SHORT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Brush-Holder, of which the following is a specification.

This invention relates to brush-holders.

The object of the invention is to provide a holder for the commutator-brushes of dynamos or motors which is of improved construction, simple, and efficient in operation.

The invention consists, substantially, in the construction, combinations, location, and relative arrangement of parts, all as will be more fully hereinafter described, as shown in the accompanying drawings, and finally set forth in the appended claims.

Reference is made to the accompanying sheets of drawings and to the various views and reference-signs appearing thereon, wherein—

Figure 1 is an end elevation of a motor or dynamo, showing the brush-holder applied thereto. Fig. 2 is a plan view of the same. Fig. 3 is a partial detail side or face view of the brush-holder embodying my invention. Fig. 4 is an edge view looking from the bottom of the construction shown in Fig. 3. Fig. 5 is a detached detail view of the brush-holder lever, illustrating a slightly-modified form of brush. Fig. 6 is a detail view, in central longitudinal section, of the friction-roller. Fig. 7 is a detail side or face view of the brush-holder plate with the brush-holder removed. Fig. 8 is an edge view of the same, looking from the bottom of Fig. 7. Fig. 9 is a sectional detail view taken on the line *a a*, Fig. 7. Fig. 10 is a sectional detail view taken on the line *b b*, Fig. 7. Fig. 11 is a sectional view illustrating the construction for yieldingly and adjustably mounting the brush-holding board on the framework of the machine.

The same reference-sign is employed throughout the several views to designate the same part wherever it occurs.

Reference-sign A designates an electric motor or dynamo to which my improved brush-holder is applied.

B designates the brush-holder-supporting-

plate. This plate is of rectangular outline, but shaped upon one edge thereof to correspond substantially with the contour of the commutator to which the brush is to be applied, as shown. (See Figs. 1, 3, and 7.) The plate B may be of wood, leatheroid, strawboard, hard rubber, or any other suitable or convenient insulating material. Wood is deemed a satisfactory material for this purpose. At suitable points upon the plate B, preferably at the ends thereof and adjacent to the lower edge, I cut away the material of the plate, or otherwise suitably form thereon a seat C, having two walls thereof intersecting each other angularly, as shown, for a purpose that will presently more fully appear, said seats extending to the edge of plate B, as shown more particularly in Fig. 7. In each seat I form an elongated slot 11, extending through the plate. In the seats C, I arrange the brush-holding plate D of suitable shape to conform to the angular outline of said seats, that is, having two of the edges thereof angularly arranged with reference to each other and adapted to be received, respectively, against the walls of the seats. By this construction the brush-holding plates are firmly supported upon plate B.

A securing-bolt carried by the holding-plate D is arranged to pass through the elongated slot 11 to clamp the plates D in position upon supporting-plate B, the elongation of slot 11 permitting a range of adjustment of the holder-plate D upon the supporting-plate B. The back or rear face of supporting-plate B is preferably countersunk, as at 12, to receive the head of the adjusting-bolt. (See Figs. 9 and 10.) Cast with or otherwise suitably formed on holder-plate D is a plate 13, having extensions 14 projecting from the opposite edges thereof, which arms are preferably joined at their extremities by bar 15, thereby forming an open-ended pocket or seat to receive the brush 16, which when arranged in position therein is adapted to bear upon the commutator E of the machine, as shown. Preferably the pocket or seat for the brush is formed at one end of the holder-plate D. A pin 17 is suitably cast with or otherwise formed on the opposite end of the plate D and is adapted to receive loosely thereon a

sleeve or hub 24 of a lever 18, said lever arranged to project toward the brush-seat and is adapted to engage the brush and hold the same firmly to its seat and also firmly in contact with the commutator E. In the particular construction shown, to which, however, I do not desire to be limited, lever 18 comprises the arms 19 20, projecting from the opposite ends of sleeve or hub 24 and suitably joined at their projecting or free ends by a transverse bar or other connection 25. The arms 19 20 are preferably, though not necessarily, arranged to project over the upper end of the brush-seat and may be suitably curved or bent toward the brush-seat, as shown at 21, for a purpose that will be presently explained.

In order that lever 18 may be pressed with yielding force against the brush 16 to hold the same firmly to its seat and in contact with the commutator, I arrange a spring 22 to bear upon said lever. The spring and lever may be of any suitable construction and relative arrangement to effect the desired result, and, while I have shown a specific form and arrangement of devices which I deem at present the best form, I do not desire to be limited or restricted thereto, as the idea may be embodied in a wide variety of specific forms and arrangements and still fall within the spirit and scope of my invention. In the particular form shown spring 22 comprises a substantially U-shaped laminated leaf-spring having one leg thereof riveted or otherwise suitably secured to the plate D, preferably to the back wall 13 of the brush seat or pocket, and having the opposite leg thereof arranged to bear on lever 18. A simple, sufficient, and convenient arrangement is to form lever 18 into a bell-crank lever, as shown, the two arms thereof arranged to project on the same side of the pivot 17, the long arm comprising the two side bars 19 20, which at their free ends engage the brush and the short arm forming a bearing for the spring 22. In order to reduce friction when the lever 18 is rocked about its pivot-pin 17 to permit of the removal, replacement, inspection, or arrangement of the brush, I mount a friction-roller 23 in the lever 18 to receive the contact of the spring.

It will be understood that instead of a laminated spring any other suitable form of spring adapted for the purpose may be employed.

In order to prevent the possibility of short-circuiting the current through the spring and its contact with lever 18, I prefer to insulate the contact of said spring with said lever. With this end in view I have shown a special form of contact friction-roller, (see particularly Fig. 6,) wherein I provide an outer sleeve 26 and an inner sleeve 27, the latter adapted to be received to rotate upon the journal-pin 28, and between said sleeves I interpose a sleeve 29 of suitable insulating material. In order to hold the insulating-sleeve in place, I preferably expand the ends of the inner sleeve 27 and contract or crimp

the ends of the outer shell 26, as clearly shown. By this construction the insulation is firmly held in place and the spring is insulated from the lever 18.

By insulating the spring 22 from lever 18 passage of current through the spring is prevented. This is important, for the reason that by the passage of the heavy currents through the springs said springs, as well as the brush and other parts of the holder, become unduly heated on account of their electrical resistance. The springs thereby rapidly lose their temper and elasticity. This is a serious objection, for the reason that it is important to maintain an efficient and uniform pressure on the brush to press it constantly against the commutator. Moreover, by reason of the variations in the contact of said springs with the arm of lever 18, against which said springs bear, due to the roller 23, sparking is induced, which it is desirable to avoid, and which is completely avoided by insulating said roller as above described.

In practice I prefer to provide a brush of frusto-pyramidal contour in longitudinal cross-section, as shown in Fig. 3, the long side or face of which is adapted to be received and to bear against plate 13, the one inclined end of said brush arranged to bear against the commutator, and the lever 18 is arranged to bear against the other inclined end. This arrangement is particularly advantageous in connection with a bent-ended lever, as shown, for the reason that the bent end of the lever overreaches the end of the brush and bears against the inclined end thereof, thereby not only holding the brush against the wall 13 of its seat, but also bearing down upon the brush by reason of the force of the spring acting upon said lever, and hence forcing the brush into efficient electrical contact with the commutator. If desired, however, a brush of any other suitable or convenient shape in cross-section may be employed with good results, as, for instance, such as shown in Fig. 5, wherein the brush is provided with a squared end. In this case the overreaching bent-ended lever bears against the brush in such a manner as to hold the same firmly to its seat and also into good electrical contact with the commutator.

In practice I prefer to employ a carbon brush having a copper or other suitable plating, except at the commutator end thereof, though it is obvious that any suitable brush material may be employed and the plating may be omitted or varied at pleasure.

Reference-sign 30 designates the binding-post for the leading wires.

It frequently happens that in case of sparking at the brush the sparks jump across the space from the brush or some part of its holder to a grounded part of the adjacent framework of the machine or supporting structure. This objection in the practical operation of motors has proven serious in many instances, and it is a matter of importance in the line of effi-

ciency to avoid it. This I accomplish in an effective manner by mounting a fiber or other suitable non-conducting board F of considerable width adjacent to the brush-holder and partially surrounding the same, as shown in Figs. 1 and 2. To the same end I provide a holding board or plate B of considerable area, said board being of wood, fiber, or other suitable non-conducting material, and being arranged between the brush and the motor or armature acts as a shield to prevent the sparks from jumping across the intervening space to an exposed part of the motor or other frame. By this arrangement the brush-holder is practically surrounded or inclosed in a non-conducting shield, which acts to prevent short-circuiting of the current or sparking and a consequent impairment of the efficiency of the machine.

In order to facilitate the rocking of the lever 18 about its pivot to inspect, remove, adjust, or replace the brush, I provide said lever with a convenient handle or thumb-catch 31, as shown, which can be readily and easily grasped to effect a rocking of the lever.

The brush holding or supporting board B is bolted or otherwise suitably mounted upon the motor or dynamo in suitable and proper position for the brush to bear on the commutator-segments, but, preferably, as above indicated, with the said board or plate arranged between the motor or dynamo armature and the brush, that is, with the brush presented outwardly. I have shown a convenient arrangement of securing the holding-board B upon the motor or dynamo-framework, wherein the said board, on the rear face thereof at the opposite upper corners, is cut away to receive a suitable perforated projection 32 from the motor or dynamo, and a bolt 33 is arranged to pass through the perforation in said extension and into a suitable seat formed in said supporting-plate B, the end of the bolt being received in a threaded nut 34, suitably arranged in a seat formed in said board, a spring 35 being interposed between the head of said bolt and said extension, all as fully illustrated by dotted lines. (See more particularly Figs. 3, 7, and 8.) By this construction a certain range of adjustment of the brush-supporting board is provided and the board is resiliently held in place upon the extension.

Many variations and changes in size and proportions of parts and the relative arrangement thereof would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention. I do not desire, therefore, to be limited or restricted to the exact details shown and described; but,

Having explained the object and nature of my invention and a form of apparatus embodying the same and having explained the principle and mode of operation thereof, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a brush-holder, an adjustably-mounted brush-supporting board of suitable non-conducting material arranged between the brush and the end of the motor-armature, as and for the purpose set forth.

2. In a brush-holder, a brush-supporting plate provided with a seat adapted to receive the brush-holder and means for mounting said plate upon a motor or dynamo, said plate being arranged between the brush and the end of the motor-armature, as and for the purpose set forth.

3. In a brush-holder, a brush-supporting plate adapted to receive the brush-holder and means for yieldingly supporting said plate, as and for the purpose set forth.

4. In a brush-holder, a supporting-plate adapted to receive the brush-holder and means for adjustably supporting said plate as and for the purpose set forth.

5. In a brush-holder, a supporting-plate for the brush constructed of non-conducting material of considerable area and arranged between the brush and the dynamo or motor-armature, as and for the purpose set forth.

6. In a brush-holder, a framework provided with a perforated extension, a supporting-plate for the brush adapted to receive said perforated extension of the framework and a bolt mounted in said plate and arranged to pass through said perforation whereby said plate is supported as and for the purpose set forth.

7. In a brush-holder, a supporting-plate for the brush, a threaded nut or thimble arranged therein and a supporting-bolt arranged to be received in such nut or thimble whereby said plate may be adjusted, as and for the purpose set forth.

8. In a brush-holder, a supporting-plate for the brush adapted to receive a perforated extension of the framework, a bolt arranged to pass through said perforation and to be received in said plate and a spring interposed between said bolt and the extension whereby said plate is yieldingly supported and held to its seat, as and for the purpose set forth.

9. In a brush-holder, a supporting-board for the brush having a seat with angular walls formed therein adapted to receive the brush-holding plate, as and for the purpose set forth.

10. In a brush-holder, a supporting-board cut away to form a seat having shoulders or walls at right angles to each other in combination with the brush-holding plate shaped to be received in said seat and to bear against and be supported by said walls or shoulders, as and for the purpose set forth.

11. In a brush-holder, a brush-holding plate provided with an open-ended casing adapted to receive the brush, a bell-cranked lever having one of the arms thereof arranged to bear against the brush, and a U-shaped spring secured at one of its ends to said casing and having its other end disconnected from but arranged to bear loosely against the other

arm of said lever, whereby said lever is permitted to move relatively to and under the constant influence of said spring, as and for the purpose set forth.

12. In a brush-holder, a brush-holding plate provided with an open-ended casing adapted to receive the brush, a bell-cranked lever having one of the arms thereof arranged to bear against the brush and a laminated U-shaped spring secured at one of its ends to such casing and having its other end disconnected from but arranged to bear loosely against the other arm of said lever whereby said lever is permitted to move relatively to but under the constant influence of said spring, as and for the purpose set forth.

13. In a brush-holder, a brush-holding plate provided with a casing adapted to receive the brush, a lever having one of the arms thereof arranged to bear against the brush and a spring secured at one of its ends and having its free end arranged to bear loosely against the other arm of said lever, as and for the purpose set forth.

14. In a brush-holder, a brush-holding plate, a lever pivotally mounted thereon and adapted to bear on the brush, a spring also mounted on said plate and arranged to engage said lever and means for insulating the contact of said spring with said lever, as and for the purpose set forth.

15. In a brush-holder, a pivotally-mounted bell-crank lever arranged to bear at one end upon the brush, in combination with a spring adapted to engage the other end of said lever and an insulated antifriction-contact interposed between said lever and spring, as and for the purpose set forth.

16. In a brush-holder, a bell-crank lever arranged to bear at one end on the brush, a roller mounted on the other end of said lever and a U-shaped spring mounted at one end on said holder and adapted at its free end to bear against said roller whereby said lever is held by spring-pressure to its work and the rocking of said lever out of operative position is facilitated, as and for the purpose set forth.

17. In a brush-holder, a bell-crank lever arranged to bear at one end on the brush, an insulated antifriction-roller mounted on the other end of said lever, and a U-shaped spring mounted at one end on said holder and adapted at its free end to bear against said insulated roller, whereby said lever is held by spring-pressure to its work and the rocking of said lever out of operative position is facilitated, as and for the purpose set forth.

18. In a brush-holder, a lever, a spring arranged to bear thereon, a roller mounted on said lever and arranged to receive the contact of said spring, said roller comprising an in-

sulated cylindrical sleeve as and for the purpose set forth.

19. In a brush-holder a lever, a spring arranged to bear thereon, a pin mounted on said lever, a cylindrical sleeve mounted thereon adapted to receive a sleeve of insulated material, and a contacting-sleeve mounted on said insulation and adapted to receive the contact of said spring, as and for the purpose set forth.

20. In a brush-holder, a brush-holding lever, an antifriction-roller mounted thereon comprising an inner and an outer sleeve and an interposed insulating-sleeve, and a spring arranged to bear against said roller, as and for the purpose set forth.

21. In a brush-holder, an antifriction-roller comprising an inner and outer sleeve and an interposed sleeve of insulating material, the ends of said inner sleeve being expanded and the ends of said outer sleeve being contracted or crimped whereby said insulation is held in place, as and for the purpose set forth.

22. In a brush-holder, a pivoted lever arranged to bear at one end on the brush in combination with a laminated leaf-spring mounted at one end upon the holder and arranged to act at the free end thereof on said lever and hold it to its work, as and for the purpose set forth.

23. In a brush-holder, a pivoted lever arranged to bear on the brush in combination with a U-shaped laminated leaf-spring mounted at one end on the holder and arranged to act at the other end thereof upon said lever and hold it to its work, as and for the purpose set forth.

24. In a brush-holder, a shield for the brush comprising a plate or board of non-conducting material arranged to surround the brush, as and for the purpose set forth.

25. A shield for the commutator-brush of an electric machine, comprising a sheet or board of non-conducting material, said sheet or board arranged on that side of the brush farthest from the armature, as and for the purpose set forth.

26. In a brush-holder, a support for the brush, a pin mounted on said holder, a sleeve mounted on said pin and having arms and projections extending therefrom, said arms joined at their free ends and arranged to bear on the brush to hold the same to its seat and also to the commutator and a spring arranged to act on said projections to hold the arms to their work, as and for the purpose set forth.

In witness whereof I have hereunto set my hand this 25th day of October, 1895.

SIDNEY H. SHORT.

Attest:

M. I. CAVANAGH,
S. E. DARBY.