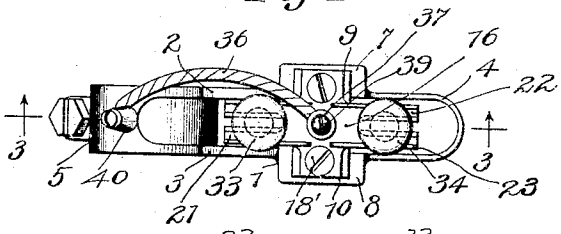
No. 862,951. PATENTED AUG. 13, 1907.

W. L. WATERS.

BRUSH HOLDER.

APPLICATION FILED DEC. 5, 1904.

Fig. 1.



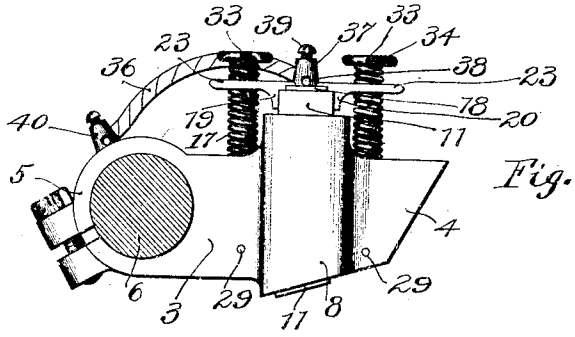




Fig. 2.

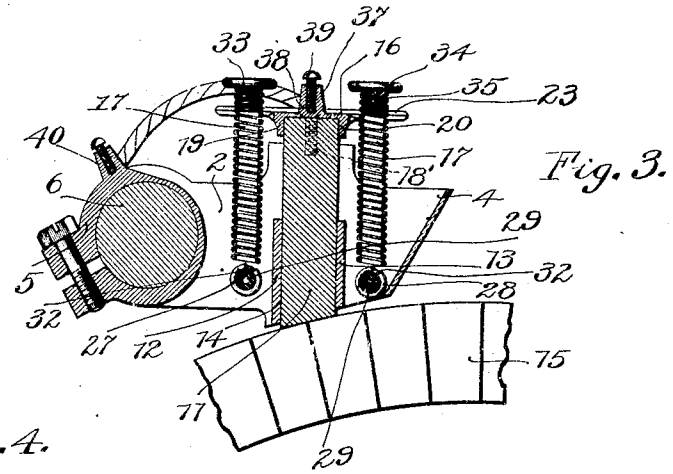



Fig. 3.

Fig. 4.

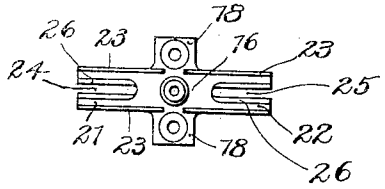
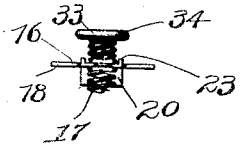



Fig. 5.




Witnesses:

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# UNITED STATES PATENT OFFICE.

WILLIAM L. WATERS, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO NATIONAL BRAKE & ELECTRIC COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

## BRUSH-HOLDER.

No. 862,951. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed December 5, 1904. Serial No. 235,460.

*To all whom it may concern:*

Be it known that I, WILLIAM L. WATERS, a subject of the King of England, and residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Brush-Holders, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to brush holders for electrical machinery, and its object is to provide various improved details of construction and arrangement of the brushes and springs therefor, and of the pig tails connecting the brushes with the brush-holders.

My invention will be best understood with reference to the accompanying drawings in which

Figure 1 is a plan view of the brush holder and supporting parts. Fig. 2 is a side elevation of a brush holder secured to a supporting frame. Fig. 3 shows the brush holder in engagement with a commutator, the brush holder and parts being shown in section taken on line 3—3 of Fig. 1. Fig. 4 shows a cap frame for engaging a brush and for engaging with springs, and Fig. 5 is an end view of Fig. 4 showing the top of the spring in engagement therewith.

The brush holder frame consists of a metallic shell 1 having side walls 2 and 3 connected at the front end by the wall 4. The rear ends of the side walls form into a clamping frame 5 having adjustable engagement with the brush holder supporting frame 6. The side walls 2 and 3 have outward extensions 7 and 8 which form the guideways 9 and 10 for the brush 11. Walls 12 and 13 extend between the sides 2 and 3 at the lower half thereof, and form a chamber 14 which incloses the lower end of the brush, and which is a continuation of the guideways 9 and 10. The brush holder is adjusted on the supporting frame 6 so that the brush extends a slight distance below the chamber 14 and into engagement with the commutator 15, as shown in Fig. 3.

To maintain the brush in contact with the commutator, I provide a cap frame 16 engaging the brush and helical springs 17 17 disposed between the cap frame and the brush holder. This cap frame may be integral and consists of a plate 18 for engaging the top surface of the brush, being secured thereto preferably by screws 18′, and flanges 19 and 20 extending downwardly from the plate 18 to form a cap with the plate which engages securely over the top of the brush, the brush being preferably copper plated to insure good conductivity with the cap frame.

Extensions 21 and 22 project laterally from the plate 18, and at their edges have strengthening flanges or ribs 23. Extending inwardly from the ends of the extensions are slots 24 and 25 having sharp beveled inner edges 26.

Disposed directly below the inner ends of the slots 24 and 25 are studs 27 and 28 of insulating material secured between the side walls 2 and 3 of the brush holder, these studs being secured by means of pins 29 which pass through the studs and through the side walls. The helical spring 17 17 extend between the extensions of the cap plate and the studs. The lower ends of the springs engage in circumferential grooves 32 on the insulating studs, while the springs at their upper ends are inserted in the corresponding slots 24 and 25. As the edges of these slots are beveled, as before described, the springs may be engaged between any of its turns, and their tension adjusted to provide any desired pressure of the brush against the commutator.

To allow the springs to be easily moved into different adjustments buttons 33 are provided, which may be of metal, but which are preferably of insulating material. Each button consists of a head 34 and a stem 35 threaded to receive the upper end of the springs. Thus to adjust the tension of the springs they may readily be slid from the slots in the cap frame and extended or released and inserted in the slots at a different position. Should a spring become broken, it can easily be replaced by the removal thereof from the cap frame slot and by the withdrawal of the corresponding insulating stud pin and can thus very quickly be replaced. The insulating studs serve also to insulate the springs from the brush holder to prevent any current passing through them.

To afford a connection for a pig tail 36 with the cap frame, a binding post 37 is secured to the top of the plate 18, the pig tail ends passing through the opening 38, to be clamped therein by a set screw 39. A binding post 40 secured to the top of the clamping member of the brush holder will serve in like manner to secure the other end of the pig tail in good mechanical and electrical contact with the brush holder.

I thus provide a brush holder of very simple construction and very efficient means for holding the brush in position, and for providing the necessary pressure thereon. By placing a spring at either side of the brush, as shown, their tension may be relatively adjusted to produce the proper pressure on the brush, and at the same time to prevent chattering thereof. Both the pig tails and the springs, due to their arrangement, are very readily removed and replaced.

I do not wish to be limited to the exact construction and arrangement of the parts herein shown, as many modifications may be made without departing from the spirit of invention.

I claim as new, and desire to secure by Letters Patent:

In a brush holder, the combination of a supporting frame having side walls 2 and 3, there being a brush channel 14 extending between said walls, a brush in said channel, a metallic cap plate 16 for said brush having good mechanical and electrical connection therewith, lateral ex-

tensions 21 and 22 from said cap frame, there being a slot extending inwardly from the end of each of said extensions, a pin connecting the side walls below each extension, a bushing of insulating material on each pin, a helical spring at each side of the brush, the lower end of each spring engaging about the corresponding bushing, the upper end of each spring being adapted for engagement between any of its turns within said slot, whereby the tension of said springs is adjustable, buttons having threaded engagement with the upper end of the springs, the edges of the slots being beveled whereby they may be readily inserted between any of the spring turns, a binding post on said cap plate, a binding post on the supporting plate, and a pig tail connector having its ends secured in said binding posts.

In witness whereof, I hereunto subscribe my name this first day of December A. D., 1904.

WILLIAM L. WATERS.

Witnesses:
JOHN E. HUBEL,
N. S. MAY.