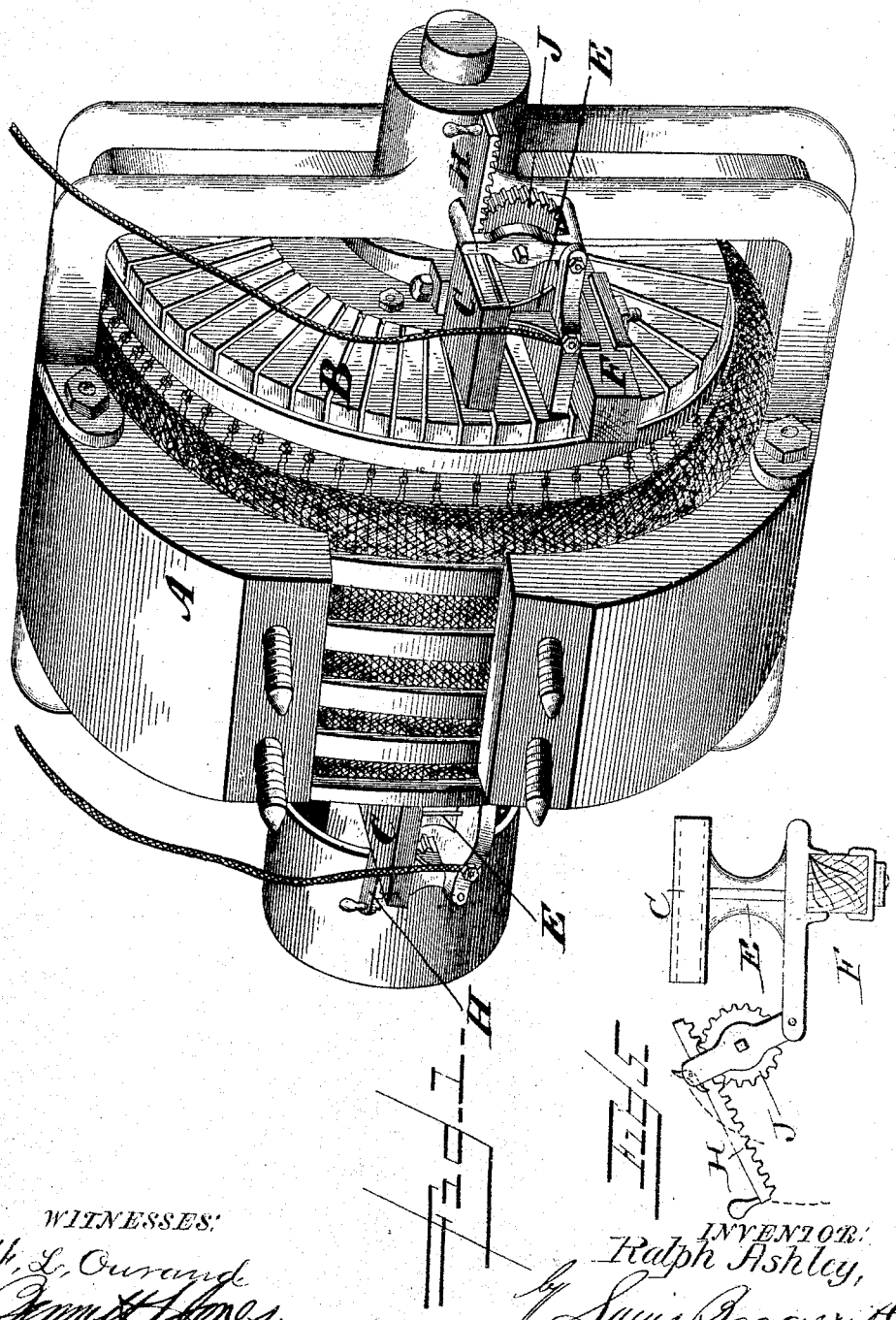
(No Model.) 2 Sheets—Sheet 1.

R. ASHLEY.

BRUSH HOLDER FOR DYNAMOS AND ELECTRIC MOTORS.

No. 488,978. Patented Jan. 3, 1893.



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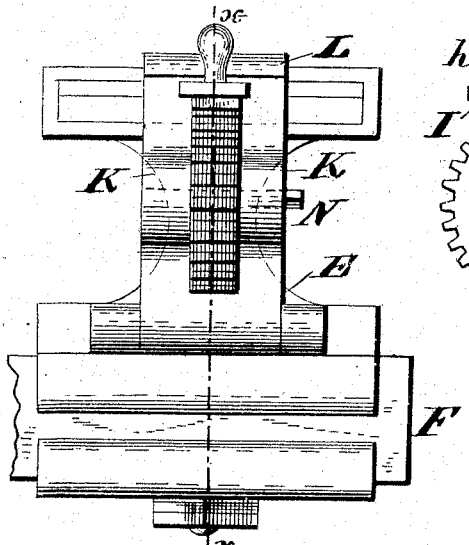


Fig. 3.

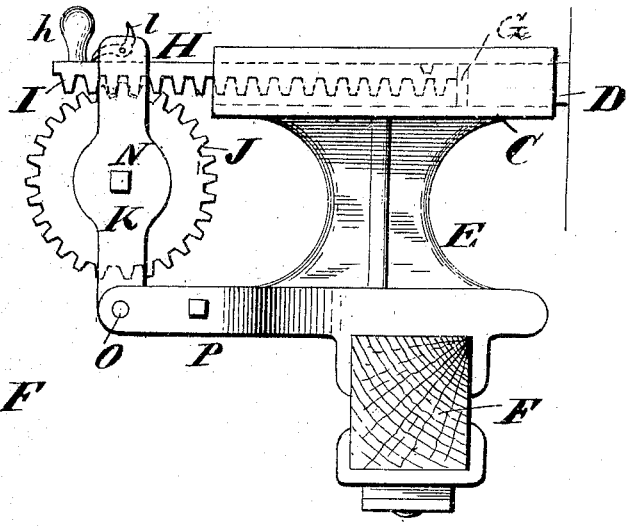


Fig. 2.

Fig. 4.

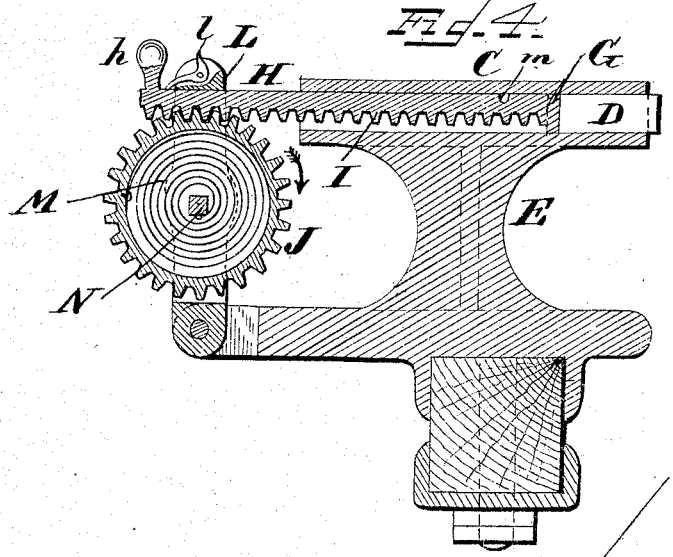
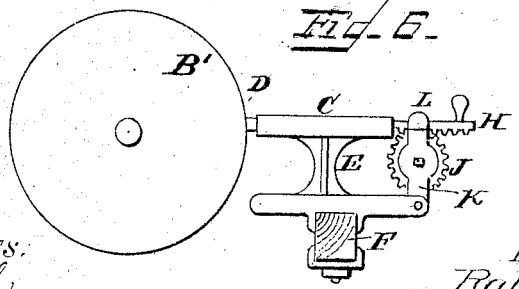


Fig. 6.



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UNITED STATES PATENT OFFICE.

RALPH ASHLEY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE UNITED COLUMBIAN ELECTRIC COMPANY, OF NEW JERSEY.

BRUSH-HOLDER FOR DYNAMOS AND ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 488,978, dated January 3, 1893.

Application filed February 18, 1892. Serial No. 421,915. (No model.)

To all whom it may concern:

Be it known that I, RALPH ASHLEY, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Brush-Holders for Dynamos and Electric Motors; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of the armature of an electric motor equipped with my improved brush holder; Fig. 2 is a side view of the brush holder and its adjuncts; Fig. 3 is a rear elevation of the device; Fig. 4 is a longitudinal sectional view on the vertical plane indicated by the broken line marked *x*—*x* in Fig. 3; Fig. 5 is a view showing the position of the brush holder when it is to be replenished with a fresh brush; and Fig. 6 is a diagrammatic view showing the brush and holder as applied to an electric engine having a cylindrical commutator.

Like letters of reference denote corresponding parts in all the figures.

This invention has relation to the mechanical devices for holding the brushes, or brush material, in contact with the commutators of the armatures of electric machines of all kinds, whether generative (dynamos) or power-producing (motors), and has for its object not only to so hold the brush, or brush material, that it shall always be presented to the commutator at the most effective angle—that is to say, at right angles to the flat face of a disk commutator, and in a radial or diametrical line with respect to cylindrical or ring commutators—but, in addition, thereto, hold it against the commutator with an even and unvarying pressure, regardless of the amount of brush material consumed, and without varying the angle of the brush and the commutator at the point of contact.

To this end, my invention consists in the improved construction and combination of parts of a brush holder as will be hereinafter more fully described and claimed.

In the accompanying drawings, I have shown my improved brush holder as applied to an electric motor, A, of the type in which the armature has flat disk-commutators B, revolving in vertical planes.

The holder proper consists of a rectangular box or receiver C, open at both ends, into which is inserted a cake of carbon or other suitable brush material, D, of such size and shape that it will fit and slide in the box. This box is supported by a standard, E, the lower end of which is clamped and bolted to a suitable support, F, fastened to the frame of the machine, so as to present box C at right angles to the face of the disk commutator B.

Projecting into the open rear end of the box or receiver, C, is a plunger or follower, G, which bears or presses against the squared rear end of the carbon slab D, which constitutes the brush. This follower has a rearwardly projecting arm or extension, H, the under side of which forms a toothed rack, I, the teeth of which engage a cog-wheel J, journaled between bearings K, K, which are connected on top by a plate or cross piece L, between the under side of which and the cogged periphery of wheel J, the rack-bar H I is inserted. Thus it will be seen that this cross piece L operates to maintain the rack in gear with the teeth of the wheel, and also, in connection with box C, serves as a guide to cause the rack-bar and its follower G to move forward and back in a straight line, or at right angles to the face of the commutator disk. The cog-wheel J is hollow, and contains a coiled spring, M, which may be wound up by a key fitted upon the square winding-stud N. In other words, this wheel is constructed like the "barrel" of a watch or spring clock, so that after the spring has been wound up, it will have a tendency to revolve wheel J in the direction of the arrow shown in Fig. 4, and with considerable force. As the teeth of rack I engage the wheel, it follows that this rack with its plunger G will be forced into box C and against the rear end of the carbon slab or brush D placed therein, so as to press the

projecting outer end of the latter up against the commutator.

In Fig. 6, I have shown the position of the brush and brush holder relative to a common cylindrical commutator, B′, as used on most electric motors; it will be seen that the brush is presented to the circumference of the commutator in a line forming an extension of one of the radii of the cylinder, so that the position of the brush does not require to be shifted when it is desired to reverse the motor. The brush does not "overlap," but bears true edgewise against the successive commutator sectors or segments (as the case may be) regardless of the direction in which the armature revolves.

In order to feed the brush D through the box, from one end to the other, the teeth of rack I are so geared with the teeth of the feed-wheel J that a one-half revolution of the wheel will feed arm H and plunger G from one end of the brush-box C to the other. With a spring of proper strength and tension, therefore, the spring-power of the feed-wheel remains practically unchanged during this operation; that is to say, the pressure of plunger G against brush D does not vary perceptibly whether a fresh brush has just been inserted, or whether one is nearly consumed. In the latter case, there will be a large amount of surplus power still stored in the spring, which has expended only a small portion of its force in feeding the rack and follower through the brush-box.

In order to facilitate the insertion of a fresh brush (or cake of carbon) into the box, the bearings of the feed-wheel J are pivoted, at O, upon the outer end of their supporting bracket P, so that all the parts of the device, except the brush-box or holder C, may be swung down into the position shown in Fig. 5, in which position they will be out of the way, leaving the opening into box C free and unobstructed for the insertion of a fresh cake of carbon. To do this, the arm H is first pulled back, by means of its finger-piece *h*, until its follower G shall have cleared the box, and by the same operation of pulling back arm H, wheel J will be revolved backward by rack I, so as to again set or wind the spring. To prevent the pressure of wheel J from forcing the arm or bar H forward before it has been reinserted into the box, and, at the same time, make it possible for the operator to use one hand only during this operation of replenishing the brush-holder with fresh material, I provide the cross-piece L (or one of the side bearings K) with a small pawl *l*, the free end of which, when bar H is pulled back all the way, will drop into and engage a small recess, *m*, in the flat top of the bar, thereby locking it and its rack I in place and preventing the wheel from turning. After a fresh brush has been inserted into box C, the parts are swung back to their normal working position, at the same time reinserting plunger G into the box; and by now releasing or disengaging the retaining-pawl *l*, the wheel with its rack will be free to act upon and press plunger or follower G forward up against the rear end of brush D, so as to feed the same to the commutator with a practically unvarying degree of spring-pressure from the beginning to the end of the feed, and, at the same time, present that end of the brush nearest to the commutator at an unvarying angle, as well as with an unvarying area at the point of contact. This construction of my brush holder permits of the location of this point of contact upon the area of the commutator, whether this be of a disk-shape, cylindrical, or annular, at the most advantageous point with respect to the obtaining of a minimum of "sparking," a maximum of effective power, and the greatest possible facility for reversing the machine.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States:

1. The combination of the brush, the brush-holder or receiver, the follower, and the spring-actuated feed-wheel adapted to feed the follower and brush against the commutator, substantially as and for the purpose set forth.

2. The combination of the brush, the brush holder or receiver, the follower having a rearwardly extending arm, and the spring-actuated feed-wheel connected with said arm so as to push the follower through the receiver and feed the brush to the commutator, substantially as and for the purpose set forth.

3. A brush-holder for electric machines comprising a box or receiver adapted to contain the brush material, a follower working in said box and bearing against the brush material inserted therein, and a spring-actuated feed-wheel adapted to operate the follower and push it through the box so as to feed the brush material to the commutator, substantially as and for the purpose set forth.

4. In brush holders for electric machines, the combination of a box or receiver adapted to contain the brush material, a follower working in said box and having a rearwardly projecting extension, and a spring-barrel connected with said extension so as to push the follower through the receiver, substantially as and for the purpose set forth.

5. The combination, in brush-holders for electric machines, of the box or receiver adapted to contain the brush material, the follower provided with a toothed arm or extension, and the spring-actuated cog-wheel engaging said toothed arm, substantially as and for the purpose set forth.

6. The combination, in brush-holders for electric-machines, of the box or receiver adapted to contain the brush material, the follower provided with a rack, and the spring-

actuated cog-wheel journaled in hinged bearings, substantially as and for the purpose set forth.

7. The combination, with the box or receiver adapted to contain the brush material, of the follower provided with a rearwardly projecting rack-bar having a recess in its upper side, the spring-actuated cog-wheel, and the pawl adapted to engage the recess in the rack bar, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

RALPH ASHLEY.

Witnesses:
THEO. H. MCCALLA,
C. W. KENNEDY.