



(No Model.)

2 Sheets—Sheet 2.

R. HOFFMANN.

COMMUTATOR BRUSH FOR DYNAMO ELECTRIC MACHINES OR MOTORS.

No. 410,896.

Patented Sept. 10, 1889.

Fig. 4

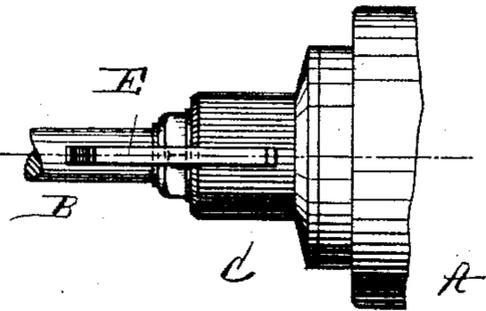


Fig. 5

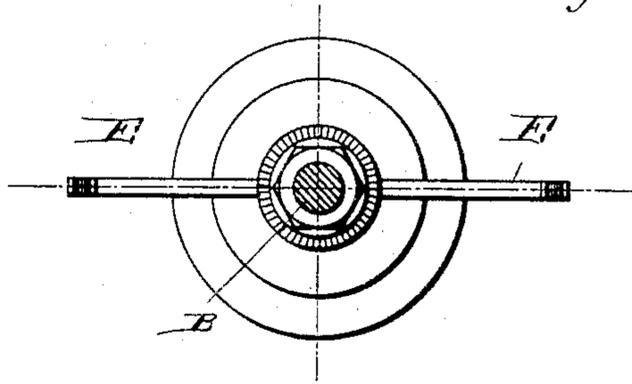


Fig. 9

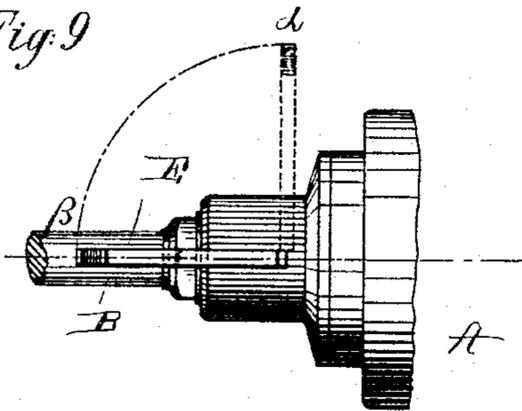


Fig. 6

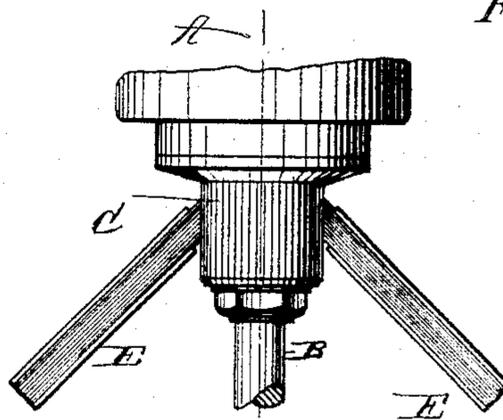


Fig. 7

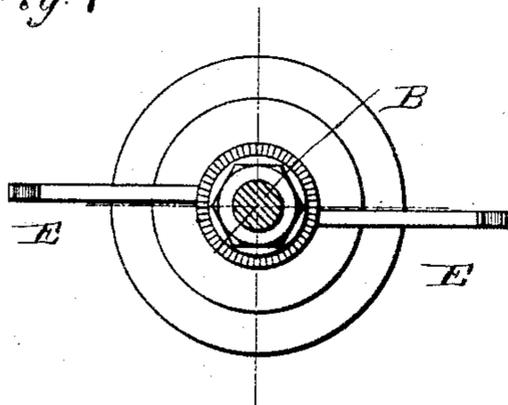
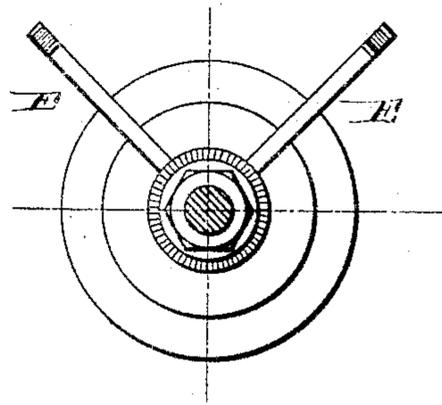


Fig. 8



Witnesses:  
Gunnett & Jones.  
R. M. Elliott.

Inventor:  
Rudolf Hoffmann  
by Lewis Rigger & Co.  
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# UNITED STATES PATENT OFFICE.

RUDOLF HOFFMANN, OF ZURICH, ASSIGNOR TO THE MASCHINENFABRIK OERLIKON, OF NEAR ZURICH, SWITZERLAND.

COMMUTATOR-BRUSH FOR DYNAMO-ELECTRIC MACHINES OR MOTORS.

SPECIFICATION forming part of Letters Patent No. 410,896, dated September 10, 1889.

Application filed June 30, 1888. Serial No. 278,614. (No model.)

*To all whom it may concern:*

Be it known that I, RUDOLF HOFFMANN, a citizen of the Republic of Switzerland, residing at Zurich, in the Republic of Switzerland, have invented certain new and useful Improvements in the Arrangement of Commutator-Brushes for Electromotors and Dynamos, Specially for Motors of Electrical Locomotives, (which have not been patented to myself or to others with my knowledge or consent in any country,) of which the following is a specification.

This invention relates to commutator-brushes for dynamo-electric machines or electric motors.

The object is to produce a commutator-brush which shall be of such construction that it may be readily shifted to and securely held in position between the point of greatest generation and that of no generation, and which will admit of the commutator being revolved in either direction without changing the relative position of the commutator-brushes; furthermore, to produce a commutator-brush which shall be simple of construction, efficient and durable in use, and comparatively inexpensive of production.

Heretofore commutator-brushes have been arranged substantially at right angles to the axis of the commutator and travel over its face in a uniform track, thereby speedily wearing a groove therein and rendering its face uneven. Furthermore, where the brushes are so arranged, there is generally seen a large amount of spark on the face of the commutators, indicating a loss of electric energy by its conversion at a point where it is not only unneeded but injurious to the commutator-brush, in that it causes its rapid destruction. To remedy this defect and to insure even wear of the whole surface of the commutator, I arrange the commutator-brushes so that they may be adjusted at any angle from a line at right angles to the plane of the axis of the commutator to a line that is approximately parallel with the same, and also raise one or lower the other brush at one and the same time, so that one will be at a point above the plane of the axis and the other below, thus preventing the brushes

from grinding against the commutator-cylinder.

The invention consists in the construction and novel combination of parts hereinafter described, illustrated in the drawings, and pointed out in the appended claim.

In the accompanying drawings, forming part of this specification, and in which like letters of reference indicate corresponding parts, I have illustrated one form of device with modifications embodying my invention, although the same may be carried into effect in other ways without in the least departing from the spirit thereof.

In the drawings, Figure 1 is a side elevation showing the commutator, the commutator-brushes, and the hand-lever working over a shunt for operating the same. Fig. 2 is a top plan view of the same, the shunt mechanism being detached, showing the position of the commutator-brushes in Fig. 1. Fig. 3 is a side elevation showing another form of commutator to be used when four pole-pieces are employed on the machine. Figs. 4, 5, 6, 7, 8, and 9 are detail views showing the different angles at which the commutator-brushes may be adjusted.

Referring to the drawings, A designates the armature of a dynamo-electric machine, to which this device is attached and which is of ordinary construction. B designates its shaft, on which the cylinder C is also mounted. This shaft extends out and is mounted in a suitable box *b*, so as to prevent the said shaft from running unevenly. On the sleeve *b'* of the bearing-box *b* is loosely mounted a yoke D, which is provided with a number of arms *d* and *d'*, the arms *d* being designed to support hinged clamps *d<sup>2</sup>*, in which the commutator-brushes E are secured in position against the commutator. The lower arm *d'* has pivoted to it a rod F, which extends to and connects with a hand-lever G, which is pivoted on a shunt or switch board H. The upper part of this switch-board is provided with a number of buttons *h*, to which the wires I from the resistance-box J connect.

As represented in Fig. 1, the hand-lever G is at the zero-point or at the point of no generation; but should it be desired to start the

motor the lever is drawn to one side and, coming in contact with the first button, completes the circuit and starts the motor. When in this position, the brushes are approximately parallel to the plane of the axis of the commutator, as shown in Fig. 5; but by moving the said lever to the point I the brushes will then be in the position shown in Fig. 7—*i. e.*, one being above and the other below the plane of the axis of the commutator. When the lever is at the point I, the motor will revolve to the right; but should it be desired to reverse its motion—*i. e.*, to cause it to revolve to the left—the lever is moved to the point I I, when this result will be accomplished.

By means of the springs  $d^3$ , which are secured to each of the hinged clamps  $d^2$ , the brushes are always kept in contact with the commutator-cylinder, which thus does away with the necessity of removing them when they become worn, as with brushes of ordinary construction. Should it be desired to cause the brushes to bear harder against the commutator-cylinder, it will only be necessary to turn the thumb-nuts  $d^4$  on the springs, which will expand them, and thus increase their tension.

It will be observed that the brushes are set obliquely to the plane of the axis of the commutator-cylinder. By this adjustment a much larger surface can be presented to the commutator than if the brushes were held diametrically opposite each other; but should it be desired to adjust them at right angles to the plane of the axis of the commutator it may be readily done by placing another yoke on the bearing-box, the clamps of which will be arranged for that purpose.

The many advantages of this device are obvious, for while it is not uncommon to change somewhat the position of the commutator-brushes it is not common to construct a commutator-brush which may be readily adjusted so as to allow the armature to revolve in either direction, and to effect this end without interfering with the wires in any way or changing the commutator-brushes, but by simply moving a hand-lever to effect these changes—that is, to switch the current so as to reverse the motor and change the commutator-brushes at one and the same time.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent is—

In a dynamo-electric machine, the combination, with the commutator, the yoke D, seated on the hub  $b'$  of the bearing-box  $b$  and provided with the arms  $d d'$ , the clamps  $d^2$ , hinged or pivoted at their outer ends to the ends of the arms  $d$  of the yoke, the springs  $d^3$ , directly connected at one end to the free ends of the brush-clamps  $d^2$  and at the other end directly connected to the arms  $d$  of the yoke, and the brushes E, held in the clamps by suitable screws, of the hand-lever G, pivoted on the switch-board, and the rod F, connecting the arm  $d'$  and the hand-lever, all constructed and arranged substantially as and for the purpose specified.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

RUDOLF HOFFMANN.

Witnesses:

EMIL BLUM,  
WILLIAM SCHNEIDER.