J. L. CREVELING.

REVERSIBLE BRUSH HOLDER FOR DYNAMO ELECTRIC MACHINES.

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Fig. 1.

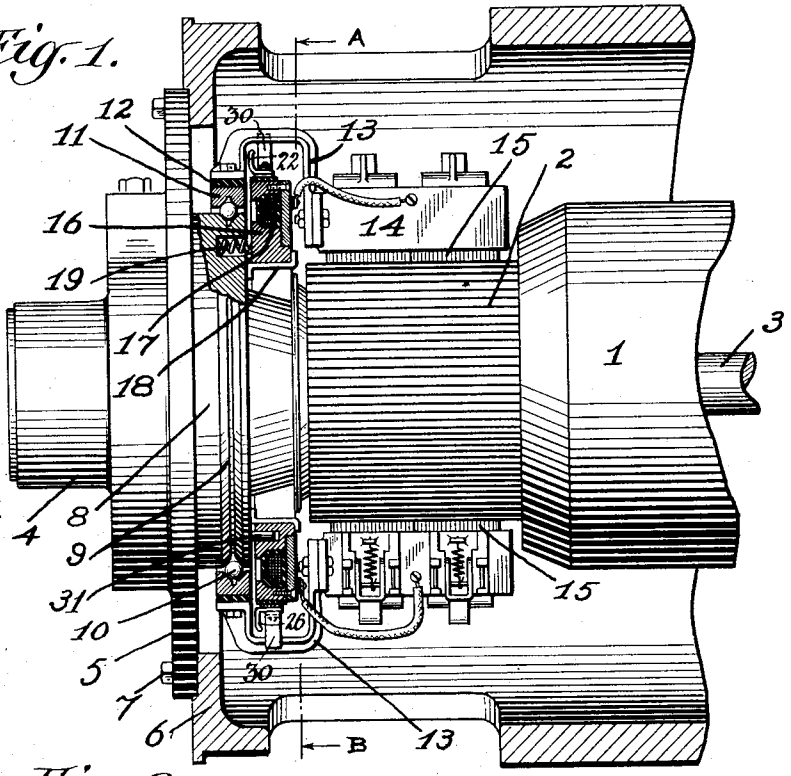
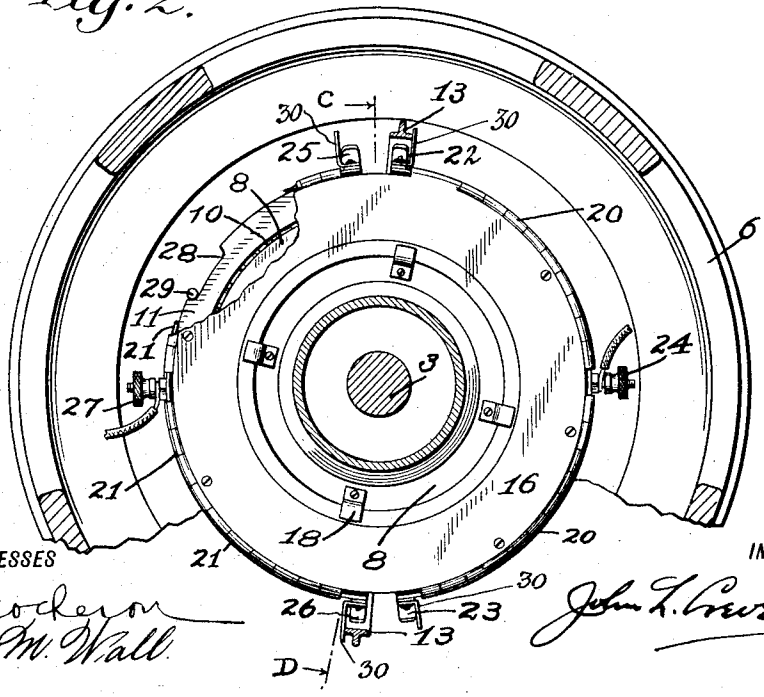


Fig. 2.



WITNESSES

H. L. Crocker

Anna M. Wall

INVENTOR

John L. Creveling

UNITED STATES PATENT OFFICE.

JOHN L. CREVELING, OF NEW YORK, N. Y., ASSIGNOR TO SAFETY CAR HEATING AND LIGHTING COMPANY, A CORPORATION OF NEW JERSEY.

REVERSIBLE BRUSH-HOLDER FOR DYNAMO-ELECTRIC MACHINES.

1,164,262. Specification of Letters Patent. Patented Dec. 14, 1915.

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To all whom it may concern:

Be it known that I, JOHN L. CREVELING, a resident of New York, in the county and State of New York, have invented certain new and useful Improvements in Reversible Brush-Holders for Dynamo-Electric Machines, as set forth in the annexed specification and drawing, forming a part thereof.

My invention pertains to that class of brush holders for use with dynamo electric machines having rotary armatures subject to reversals in direction of rotation and will be fully understood by referring to the accompanying drawing, in which—

Figure 1 is a partial longitudinal section and elevation of one type of brush holders comprehending my invention and a commutator of a dynamo electric machine illustrating its use therewith, the section being taken on the line C—D of Fig. 2 as viewed from the left. Fig. 2 is a transverse section and partial elevation of the brush holder shown in Fig. 1 taken on the line A—B of said figure as viewed from the right.

In the drawing, 1 represents an armature provided with the commutator 2 carried by the shaft 3 supported in suitable bearings carried by the end members, or castings, one of which is indicated at 4. These end castings are provided with flanges 5 which may be secured to the dynamo frame, or shell, 6 as by means of screws 7. The end member 4 is also provided with an inwardly projecting flange 8 having a ball-race 9 therein which engages the balls 10 which in turn engage a similar race in the member 11 which is in the form of an annular ring which carries the brush supporting arms 13 insulated therefrom as by means of suitable insulating members indicated at 12. The arms 13 are of conducting material and support directly the brush-holders 14 which carry suitable brushes 15 bearing upon the commutator 2 and collecting current therefrom.

16 is an annular magnet-frame provided with a winding 17 which may be placed in shunt across the brushes as shown. The magnet frame may be supported by brackets 18 in such manner as to have a slight lateral play and is normally pressed in a right-hand direction as by springs 19 while revolution of the ring is prevented as by suitable pins, one of which is indicated at 31. The magnet-frame is faced in such manner that when moved in a left-hand direction it will make contact with the face of the flange 8 and also with the ring 11, both of which are of magnetic material, in such manner that when energized it will firmly hold the ring 11 in fixed relation to the flange 8 and relieve the balls and ball-races of any strain due to tendency of the brush carrying mechanism to vibrate or chatter as upon uneven wear of the commutator. The magnet frame 16 is provided on its periphery with two insulated conductors 20 and 21. The conductor 20 terminates in the contact pieces 22 and 23 and is provided with a binding-post 24 whereby it may be connected to an external circuit. The member 21 is connected with the contact members 25 and 26 and is provided with a binding-post 27 whereby it may be connected to an external circuit. These binding posts constitute the working terminals of the machine. The ring 11 has a portion cut out, as indicated at 28, in such manner as to leave shoulders which engage the pin 29 when revolved in either direction sufficiently to bring the arms 13 in proper alinement with the contact members carried by the conductors 20 and 21.

30, 30 are flexible contacts in connection with the conductors 20 and 21 and adapted to make contact with the brush supporting arms 13 when the same are swung into their operative positions in either direction for the purpose of carrying a light current used in the field while the generator is building up, the field magnet being preferably connected across the arms 13.

The operation of my invention is substantially as follows: If the armature in Fig. 1 be rotated in such direction that its uppermost portion is traveling away from the observer, the friction of the brushes 15 will cause the brush-holders 14, arms 13 and annular ring 11 to revolve upon the balls 10 in the stationary ball-race 9 until in that position shown in Fig. 2 when the stop 29

will prevent further revolution in this direction and the upper arm 13 will be in line with the contact 22 and the lower arm 13 will be in line with the contact 26. Then if the armature speed increase sufficiently that its voltage be appreciable, or approaching useful dimensions, the winding 17 will become energized and cause the ring 16 to move against the action of springs 19 and firmly grip the flange 8 and the ring 11 in such manner as to hold said frame in proper position as above outlined and simultaneously cause contact between the contact arms 22 and 26 and the arms 13, and the upper member 13 will be in electrical communication with the binding post or terminal 24 and the lower member 13 will be in communication with the binding post or terminal 27. If now the generator stop and its voltage fall to zero, the magnet 16—17 will be pressed into the position shown in Fig. 1 by the springs 19. If the direction of rotation now be reversed, the upper arm 13 will be swung into alinement with the contact member 25 and the lower member 13 will be swung into alinement with the contact member 23 and further revolution of the ring 11 in reverse direction will be prevented by the stop 29 striking the opposite end of the engaging slot 28 and if the generator speed increase sufficiently as to approach usefulness, the magnet 16—17 will again be attracted against the action of springs 19 so as to firmly grip the ring 11 and the flange 8 and properly support the ring 11 and cause contact between the upper arm 13 and the contact member 25 and the lower arm 13 and the contact member 23. It will be noted therefore that while the current delivered from each respective brush may be reversed by reversal of direction of rotation of the armature, the current delivered to line will remain constant in polarity owing to the fact that upon reversal in direction of rotation the respective brushes are connected to opposite terminals of the external circuit. In practice the amount of travel given to the ring 11 may be as small as desired and I so position the contact members 22 and 23, 25 and 26 and so dimension the slot 28 that the brushes will be allowed to swing through that arc desired as an angle of lead upon reversals.

From the foregoing it will be plain that I have produced a reversible brush holder wherein the current to line may be of uniform direction notwithstanding reversals in direction of rotation of the armature, also that this is accomplished by means of brush carrying mechanism due to the ever present friction of the brushes upon the commutator and that this is accomplished without allowing the brush holders to revolve through any great arc or only upon revolution sufficient to provide the desired angle of lead. Further, that positive and separate contacts are made and held due to the action of the magnet 16—17 without any danger of sticking upon reversals as the contacts are all opened before said reversals take place and that the means for causing the contacts also relieves the moving parts of my device from all strain or vibration when the generator is running.

I make no claim herein to the broad idea of a stop for the brush-holders in combination with additional means for holding the brushes at the point of arrest, nor to the broad idea of magnetic means for holding the brushes under control by current generated by the machine, as the same are made the subject of my application filed Aug. 7, 1911, Serial No. 642,582. Nor do I make claim herein to electromagnetic means broadly for restraining the brush-holders, as such feature is made the subject of my application filed Aug. 19, 1911, No. 644,983. Nor do I claim herein the broad idea of means of securing the brushes together about the commutator, as such feature, in the proper combination, is made the subject of my application filed Sept. 25, 1911, No. 651,022. Nor do I claim the broad idea of means of mounting a brush-holder, having a plurality of brushes, so as to enable it to change its position on reversals of the commutator, in combination with means for maintaining a fixed angular relation of the brushes relative to the commutator, as such means are claimed, in various combinative arrangements, in my application filed Oct. 20, 1911, No. 655,660.

I do not wish in any way to limit myself to the details of construction nor to the exact mode of operation outlined above to illustrate one form of my invention, for it is obvious that wide departure may be made in the way of details without departing from the spirit and scope of my invention which is as set forth in the following claims:

1. The combination with an armature having a commutator in operative relation thereto, of means for collecting current therefrom, movable means for carrying the collecting means, binding posts or terminals adapted to be connected to an external circuit, means whereby motion of the collecting means determines the connection of the same with said terminals and electromagnetic means for establishing such connection.

2. The combination with an armature having a commutator in operative relation thereto, of means for collecting current therefrom, movable means for carrying the collecting means, binding posts or terminals

adapted to be connected to an external circuit, means whereby motion of the collecting means determines the connection of the same with said terminals and electromagnetic means for establishing such connection and coöperating to hold the movable means.

3. In a generator provided with an armature, a commutator and brushes in operative relation thereto, movable means for supporting said brushes whereby friction between the brushes and the commutator may move the brushes, binding posts or terminals adapted to be connected to an external circuit, means for establishing connections between the brushes and said terminals comprehending means whereby the connection of the brushes to the said terminals may be reversed and electromagnetic means for effecting said connections.

4. In a generator provided with a rotor, means in frictional contact with a portion of said rotor and adapted to collect current therefrom, movable means for carrying said collecting means, binding posts or terminals adapted to be connected to an external circuit, means whereby the motion of said movable means determines which branch of the external circuit is connected with the collecting means and electromagnetic means for operating the same.

5. In a generator provided with a rotor, means in frictional contact with a portion of said rotor and adapted to collect current therefrom, movable means for carrying said collecting means, binding posts or terminals adapted to be connected to an external circuit, means whereby the motion of said movable means determines which of said terminals is connected with the respective collecting means and electromagnetic means for effecting the same and coöperating to hold the movable means.

6. The combination with an armature having a commutator and brushes in operative relation thereto, of brush holders for said brushes, movable means for holding said brushes, additional means for allowing for a revolution thereof throughout an angle with reference to the axes of commutation, binding posts or terminals adapted to be connected to an external circuit and electromagnetic means coöperating with the movable means to connect the brushes with opposite sides of said terminals depending on the direction of revolution of the armature.

7. The combination with an armature having a commutator and brushes in operative relation thereto, of brush holders for said brushes, movable means for holding said brushes, additional means for allowing for a revolution thereof throughout an angle with reference to the axes of commutation, binding posts or terminals adapted to be connected to an external circuit and electromagnetic means coöperating with the movable means to connect the brushes with opposite sides of said terminals depending on the direction of revolution of the armature and coöperating to hold the brush holders.

8. The combination with a commutator and brushes in operative relation thereto; of brush-carrying means allowing some motion of the brushes with the commutator; means for arresting said motion and simultaneously making connection between the brushes and the circuit terminals so as to connect the brushes with opposite branches of said circuit upon reversals in direction of the commutator; said arresting means comprehending an electromagnet excited by current collected from said commutator to magnetically hold the brushes in fixed operative positions.

9. In a dynamo electric machine having a commutator; the combination of brush-holders having brushes resting on the commutator; means for mounting said brush-holders so that the same can be moved in unison through a certain angle by the friction of the commutator when the same reverses, a ring-shaped electromagnet surrounding the axis of rotation of the commutator for holding the mounting means against further movement; a pair of contacts carried by the ring-shaped magnet located on either side of one of said brush-holders; a second pair of contacts carried by the electromagnet diametrically opposite the first pair, and located on either side of another of said brush-holders; and means for connecting one member of each pair of conductors to one branch of an outside circuit, and the other member of each pair of said conductors to another branch of the outside circuit, whereby the connection of the brush-holders to the outside circuit may be reversed when the brush-holders change contact with said conductors.

10. The combination with a commutator and brushes in operative relation thereto; of brush-carrying devices and antifrictional mounting therefor confining them to movement about the commutator; electromagnetic means confined to movement parallel with the axis of the commutator for arresting the movement of the carrying-devices; and means enabling excitation of said electromagnetic means by current collected from said commutator, for moving said latter means into engagement with said mounting to hold the brushes in fixed operative position.

11. A brush-holder in combination with a dynamo electric machine; means for supporting said holder in either of two positions with respect to the commutator of said machine; and means on each side of said

holder for engaging the same for limiting the movement of the latter in either direction.

12. A brush-holder in combination with a dynamo electric machine; means for rotatably supporting said holder in either of two positions with respect to the commutator of the machine; and means on each side of said holder for engaging the same for limiting the movement thereof in either direction.

JOHN L. CREVELING.

Witnesses:
ANNA MARIE WALL,
M. HERSKOVITZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."