V. G. APPLE.

DYNAMO ELECTRIC MACHINE.

APPLICATION FILED APR. 6, 1914.

1,127,158.

Patented Feb. 2, 1915.

2 SHEETS-SHEET 1.

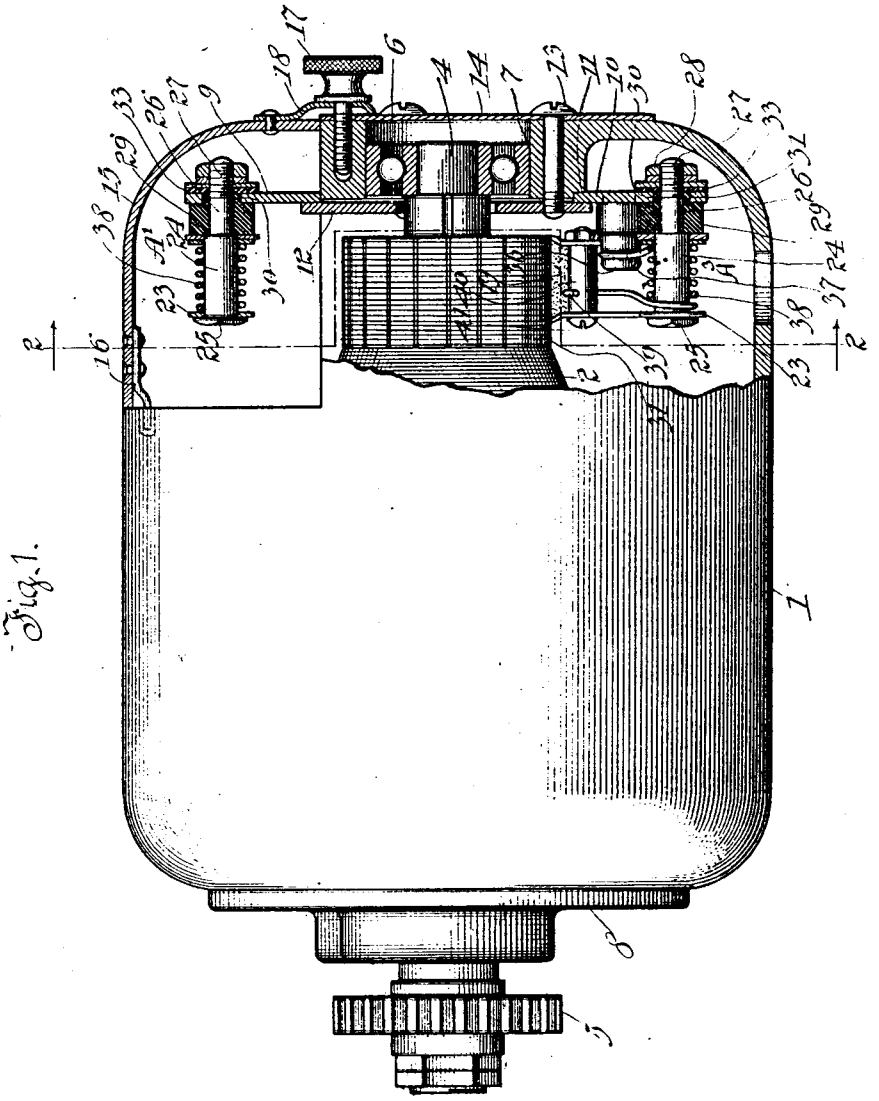

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

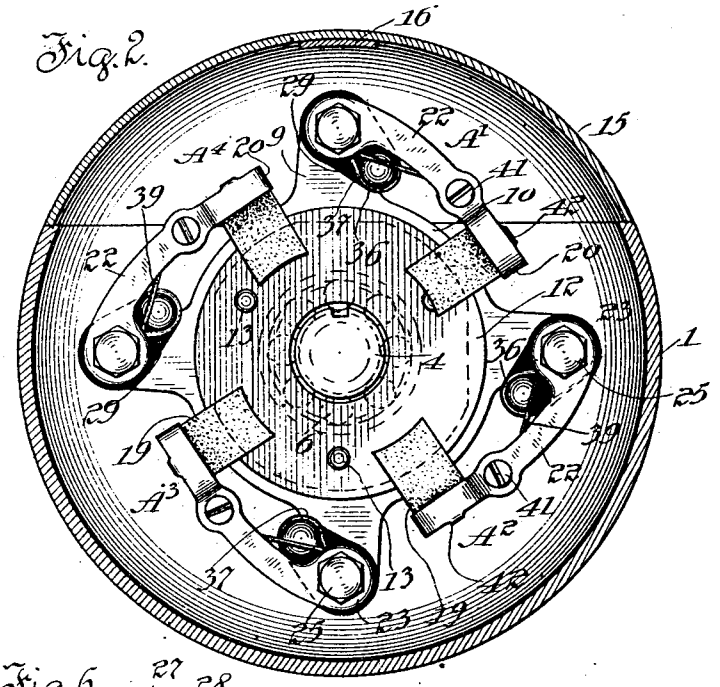


Fig. 6.

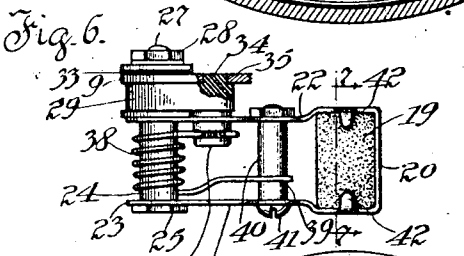


Fig. 4.

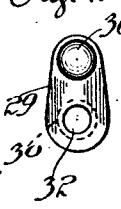


Fig. 5.

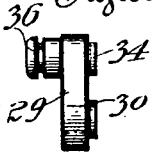
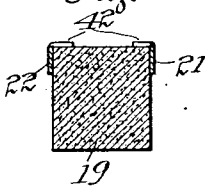


Fig. 7.



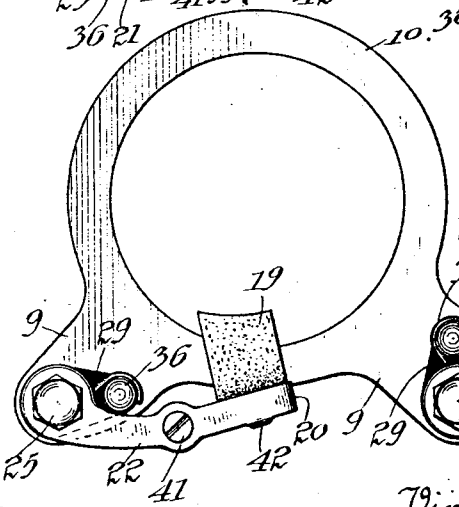
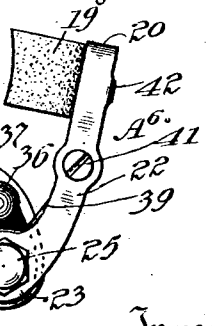


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

VINCENT G. APPLE, OF DAYTON, OHIO, ASSIGNOR TO THE APPLE ELECTRIC COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

DYNAMO-ELECTRIC MACHINE.

1,127,158. Specification of Letters Patent. Patented Feb. 2, 1915.

Application filed April 6, 1914. Serial No. 829,788.

To all whom it may concern:

Be it known that I, VINCENT G. APPLE, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

This invention relates to improvements in dynamo electric machines, and more particularly to brush holders through which, in the case of a generator, the commutated current is taken from the armature, and in a motor the current is distributed to the armature.

One of the objects of my invention is to provide an improved brush carrying ring together with means for mounting the same in a dynamo frame, whereby the brushes may be readily adjusted about the axis of the commutator until the most efficient commutating point is found, and there locked in position.

Another object of my invention is to provide such a brush carrying mechanism in which the clamping and adjusting device serves also the function of retaining one of the armature bearings from axial movement.

Another object of my invention is to provide an improved form of brush holder that may be stamped from a single piece of metal supported in an insulating bushing carried by the brush supporting ring. The brush holder, with its brush, is readily removable from the brush supporting ring and certain of the parts thereon are adapted to serve a plurality of functions.

Other and further objects of my invention will be apparent to those skilled in the art from the following description and drawings, wherein—

Figure 1 is a side elevation of a dynamo with parts broken away to show my improved brush holder and support. Fig. 2 is a vertical, transverse, sectional view on line 2—2 of Fig. 1. Fig. 3 is an end elevation of my improved brush holder and support removed from the dynamo and showing it adapted for use with a cross connected four pole armature. Fig. 4 is an end view of the insulating bushing in which the brush holder is carried. Fig. 5 is a side view of the insulating brush-carrying bushing. Fig. 6 is a plan view of the improved brush holder, parts being broken away, and; Fig. 7 is a sectional view taken on line 7—7 of Fig. 6.

Referring to the drawings the numeral 1 indicates the casing or frame of a dynamo electric machine of standard construction upon which I have illustrated my improved form of brush holder and carrier as being mounted. The armature 2 and commutator 3 are carried upon the shaft 4 rotatably mounted in bearings provided at each end of the frame, and a gear 5 is shown as applied to the end of the shaft opposite to that on which the commutator is mounted.

The commutator end of the shaft 4 is supported in an annular bearing 6, the outer raceway of which slidably engages the bore of an annular hub 7 integral with the frame 1. At the opposite end of the shaft I have provided a removable end plate 8 carrying a similar bearing, the opening in the casing 1 for the end plate 8 being sufficiently large to permit the removal of the armature.

My improved brush holders, indicated in general by the letters A^1, A^2, A^3, and A^4, are pivotally mounted upon plates 9 extending radially beyond the flat ring 10. The inner face of the hub 7 is provided with a shoulder 11 of a diameter substantially equal to that of the ring 10, and in connection with the collar 12 provides a raceway or track upon which the ring 10 may be rotated. The collar 12 is held in frictional engagement with the ring 10 by means of the screws 13—13 which take through the hub 7 from its outer face and into tapped holes in the collar 12. It is thus evident that the ring 10 is held from axial movement in one direction by the shoulder 11 on the hub 7 and in the other direction by the collar 12. Frictional engagement of the collar 12, adjustable through the medium of the screws 13—13, permits rotation of the ring 10, until the brushes are positioned at their most efficient commutating points and the tightening of the screws then locks the ring in place.

As before stated the outer raceway, of the annular bearing 6, fits within the bore of the hub 7. The collar 12 is of a radial width sufficient to extend inward toward the shaft 4 to prevent axial movement of the bearing 6 toward the gear end of the dynamo thus serving, not only the function of holding the brush ring 10 in position, but also serving as an end stop for the annular bearing 6. A plate 14 overlies the end of the hub 7 and

prevents dust or other foreign matter entering the bearing 6. A removable cap 15, conforming to the contours of the cylindrical frame 1, overlies the commutator and permits ready inspection of the brushes. This cap 15 is held in position by a lug 16 engaging a socket formed in the frame and a removable thumb screw 17 which takes into the hub 7. A spring 18 is provided for engagement with the thumb screw 17 to prevent it from jarring loose.

A particular advantage of my improved construction is that where two brush and four brush machines are manufactured as standard output it is unnecessary to carry in stock both forms of brush holders, as the two-brush-holder, such as shown in Fig. 3, may obviously be used in both machines.

The brush holder arm, in which the carbon or composition brush 19 is secured, comprises a single strip of metal, stamped, as illustrated in Figs. 3 and 6, and formed into substantially U-shape with the brush receiving part at the base or closed end 20 of the U. The sides, 21 and 22 of the U, are enlarged at their ends, as at 23, and are pivotally carried upon the stud 24. The outer end of the stud is provided with a head 25 and its inner end is reduced in diameter, as at 26, and threaded, as at 27, to receive a retaining nut 28.

An insulating bushing 29 preferably made of bakelite or the like, and of generally ovate form, as illustrated in Figs. 4 and 5, is provided with a projecting thimble 30 which enters an opening 31 provided in the end of the arm 9. An opening 32, extending through the bushing and thimble 30, receives the reduced portion 26 of the stud 24 and insulates the same from the brush supporting ring 10. An insulating washer 33 overlies the threaded end 27, so that the brush lead can readily be secured under the nut 28.

At the opposite end of the ovate bushing 29, from that which carries the thimble 30, I have provided a projecting lug 34 which extends into an opening 25 in the arm 9, thereby preventing rotation of the bushing 29 about the center 32. Projecting from the bushing 29 at the opposite side from the lug 34 is a second lug 36 which receives one end 37 of the coil spring 38. This coil spring encircles the stud 24 and at its other end is looped, as at 39, about a spacing tube 40, carried by the bolt 41 which extends through the two sides 21—22 of the U-shaped holder. This bolt 41 serves the purpose, not only of holding the end 39 of the coil spring, but also draws the sides of the U together, securely locking the brush 19 within the closed end 20 of the holder. This frictional engagement of the holder with the brush is for most purposes sufficient to lock it in position, but in order to prevent any possible outward movement of the brush under continued use, I have provided two lips 42—42 extending up over the edges of the U and engaging with the top surface of the brush 19 to prevent its movement outward and away from the commutator.

The coil spring 38, engaging as it does at one end with a part of the brush, and at the other end with a fixed projection from the frame, tends to force the outer end of the brush inward against the commutator. In order to prevent unwinding of the spring, when the brush carrying ring is removed from the motor I have extended the lug 36 sufficiently far out so as to provide a stop against which the arm 22 of the U engages when forced inward oy the spring, as shown by the brush. This position is occupied by brush A^5 of Fig. 3. Normally when engaging with the commutator the brush is moved outward, against the action of the spring, and assumes the position shown by the brush as indicated by A^6 in Fig. 3.

Whereas I have illustrated and described a particular embodiment of my invention, it is obvious that various changes and modifications may be made therefrom without departing from the spirit or scope of the invention, or the appended claims.

Having described my invention, what I claim is:—

1. The combination of a substantially closed dynamo frame; a hub, at the commutator end of the frame; a brush-carrying ring, overlying the inner end of said hub; a collar carried on the hub for retaining said brush-carrying ring in position; and means, accessible from the outer end of said hub for securing said collar thereto.

2. The combination with a substantially closed dynamo frame; of an armature therein; a bored hub, at the commutator end of the frame; an armature supporting bearing, carried in the bore of the hub; a brush carrying ring, overlying the inner end of said hub; a collar carried on the hub for retaining said brush carrying ring in position; and means, accessible from the outer end of said hub for detachably securing said collar thereto.

3. The combination of a substantially closed dynamo frame, having an inwardly extending hub, at its commutator end; an annular shoulder, formed on the inner end of said hub; a brush-carrying ring, overlying the said shoulder and rotatable thereon; a collar carried on the inner end of the hub for holding said brush-carrying ring in position; and means, accessible from the outer end of said hub for detachably securing said collar thereto.

4. The combination with a dynamo frame of an armature, therein; a bored hub, a the commutator nd of the frame;

an armature-carrying bearing, axially slidable in the bore of the hub; a brush-carrying ring, overlying the inner end of said hub; and a collar, removably connected to the hub for retaining said brush-carrying ring in position, said collar extending radially inward to overlie the inner end of said bearing.

5. The combination with a dynamo frame; of an armature, therein; a bored hub, on the frame at the commutator end; an armature-supporting annular bearing, having outer and inner raceways; said outer raceway, being axially slidable in the bore of the hub; a brush-carrying ring, overlying the inner end of said hub; and a collar, removably connected to the hub for retaining said brush-carrying ring in position, said collar extending radially inward to overlie the end of said outer raceway.

6. The combination with a substantially closed dynamo casing; of an armature, therein; a bored hub, at the commutator end of the casing; an armature carrying bearing, axially slidable in the bore of the hub; a brush carrying ring, overlying the inner end of said hub; a collar, carried on the hub for retaining said brush carrying ring in position, said collar extending radially inward to overlie the inner end of said bearing; and means accessible from the outer end of said hub for detachably securing the collar thereto.

7. The combination with a dynamo frame; of a brush-supporting plate, secured thereto, and having two adjacent openings therein; an insulating bushing, in one of said openings, said bushing having an extension overlying one face of the plate and projecting into the second opening; a stud, in the bushed opening; a brush holding arm, pivoted on said stud; and a spring, secured at one end to the arm and at its other end, to said bushing.

8. The combination with a dynamo frame; of a brush-supporting plate, secured thereto and having two adjacent openings therein; an insulating bushing, in one of said openings; said bushing having an extension overlying one face of the plate and projecting into the second opening; a stud, in the bushed opening; a brush holding arm, pivoted on said stud; a spring, secured at one end to the arm; and a lug, extending from said bushing to engage with the other end of the spring.

9. The combination with a dynamo frame; of a brush-supporting plate, secured thereto, and having two adjacent openings therein; an insulating bushing, in one of said openings, said bushing having an extension overlying one face of the plate and projecting into the second opening; a stud, in the bushed opening; a brush-holding arm, pivoted on said stud; a spring, coiled about said stud and having one free end secured to said arm; and a lug, integral with said bushing extension and adapted to engage with the other free end of the spring.

10. The combination with a dynamo frame; of a brush-supporting plate, secured thereto and having two adjacent openings therein; an insulating bushing, in one of said openings, said bushing having an extension overlying one side of the plate and projecting into the second opening; a stud, in the bushed opening; a brush-holding arm, pivoted on said stud; a spring, secured at one end to the arm; and a lug, on said bushing-extension extending into the path of said brush holding arm to prevent its complete rotation and engaging with the other end of said spring.

11. The combination of a U-shaped brush holding arm; a brush, within the closed end of the U-shaped arm; a stud, upon which the free ends of the U-shaped arms are pivotally mounted; and a bolt, passing through the sides of the U-shaped arm intermediate its ends, for increasing the clamping pressure upon said brush.

12. The combination of a U-shaped brush holding arm; a brush, within the closed end of the U-shaped arm; a stud, upon which the free ends of the U-shaped arm are pivotally mounted; a bolt passing through the sides of the U-shaped arm intermediate its ends; and a spring, coiled about said stud and having one end secured to a part thereof and the other end engaging with the said bolt.

13. The combination of a U-shaped brush holding arm; a brush, within the closed end of the U-shaped arm; a stud, upon which the free ends of the U-shaped arm are pivotally mounted; a bolt passing through the side of the U-shaped arm intermediate its ends; and lips integral with the said U-shaped arm adjacent the closed end and extending up and over the outer end of said brush.

In testimony whereof I hereunto set my hand in the presence of two subscribing witnesses.

VINCENT G. APPLE.

In the presence of—
E. V. MARTIN,
E. KRAUTTER.

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