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BRUSH HOLDER FOR DYNAMO ELECTRIC MACHINES

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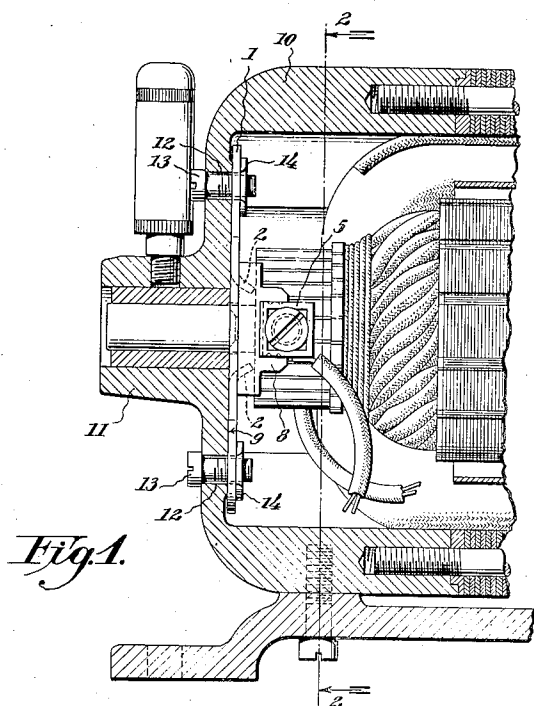


Fig. 1.

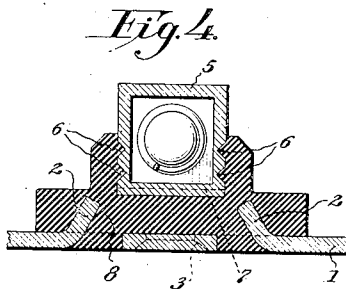


Fig. 4.

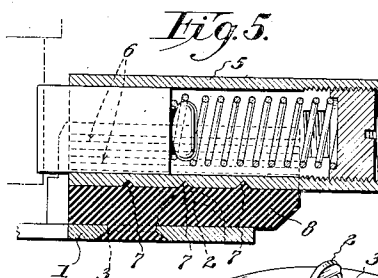


Fig. 5.

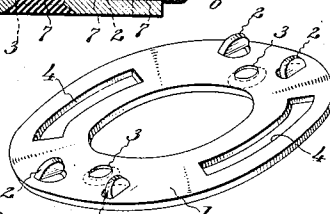


Fig. 6.

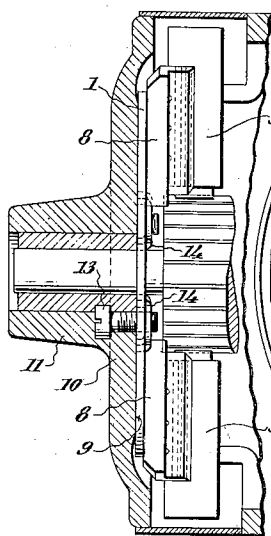


Fig. 3.

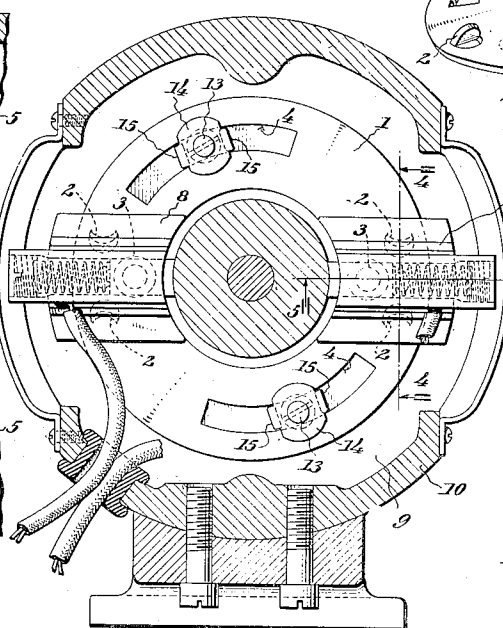


Fig. 2.

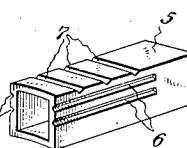


Fig. 7.

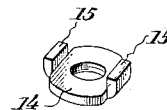


Fig. 8.

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## UNITED STATES PATENT OFFICE.

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## BRUSH HOLDER FOR DYNAMO-ELECTRIC MACHINES.

Application filed December 12, 1923. Serial No. 680,090.

*To all whom it may concern:*

Be it known that I, FREDERICK DIEHL, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Brush Holders for Dynamo-Electric Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to dynamo-electric machines and has for an object to simplify and improve the brush-holder and yoke construction of such machines and reduce the number of parts while retaining efficient insulation and ease of adjustment of the electrical angle of the brushes.

Another object of the invention is to provide a metallic yoke having metallic brush-holding means mounted thereon in efficiently insulated relation without recourse to the usual bolts, screws, insulating washers, bushings and the like which are liable to work loose and permit the brush-holder to sag.

According to the present improvement the metallic brush-holders are permanently secured in insulated relation to a metallic yoke by a molding operation involving the use of a phenol resin, such as bakelite, which hardens under heat and pressure applied during the molding operation and will not thereafter soften under the heat of operating conditions. The brush-holder and yoke are formed with bonding surfaces or irregularities into intimate engagement with which the mass of molded insulation flows under pressure and subsequently hardens, thereby permanently and securely gripping the brush-holder and yoke in insulated relation to one another. The yoke may take the form of a simple sheet-metal ring having bonding surfaces provided in the form of struck up tongues and counter-sunk apertures, while the brush-holders may comprise simple metallic tubes of rectangular cross-section, the side walls of which are externally grooved longitudinally and the bottom wall of which is externally grooved transversely. The molded insulation flows into the grooves and counter-sunk apertures and surrounds the tongues, effectively insulating the brush-holder from the yoke-ring, affording a construction of great simplicity, mechanical strength, du-

rability and freedom from trouble in operation, and one which can be manufactured in large quantities at low cost. The present brush-holder may be mounted directly in contact with the inner wall of the metallic end-cap of the motor or generator frame; provision for adjustment of the brushes being afforded by arcuate slots in the yoke ring of the brush-holder which slots are entered by screws passing through the wall of the end-cap and threaded into nuts having tongues extending into said slots to prevent their turning with the screws.

In the accompanying drawings, Fig. 1 is a longitudinal vertical section through the frame of an electric motor embodying the invention. Fig. 2 is a section on the line 2—2, Fig. 1. Fig. 3 is a longitudinal horizontal section through the motor frame showing the brush-holder and yoke construction in plan. Fig. 4 is a sectional view in larger scale on the line 4—4, Fig. 2. Fig. 5 is a sectional view on the line 5—5, Fig. 2. Fig. 6 is a perspective view of the yoke ring. Fig. 7 is a perspective view of one of the brush-tubes, and Fig. 8 is a perspective view of one of the screw-nuts into which the holding screws for the yoke are threaded.

In the preferred embodiment of the invention, as illustrated, 1 represents the brush-holder yoke in the form of a sheet-metal ring having bonding surfaces provided, for example, by the struck up tongues 2, 2, and back countersunk apertures 3; said ring also having the concentric arcuate slots 4 to provide for angular adjustment of the brushes. Associated with the yoke-ring 1 are the diametrically opposed and aligned brush-tubes 5 of rectangular cross-section, the side walls of which are externally grooved longitudinally at 6 and the bottom wall of which is transversely grooved at 7 to provide bonding surfaces. The tongues 2 are disposed in pairs with the tongues of each pair oppositely directed and inclined at an angle of say 60° to the plane of the ring 1; a back countersunk aperture 3 being located intermediate but somewhat offset from the space directly between each pair of tongues. The distance between the tips of a pair of tongues, Fig. 4, is preferably somewhat greater than the width of a brush-tube. The space between each brush-tube and the yoke-ring is filled with a mass 8

of heat-resisting insulation material, such as bakelite, which is molded into intimate engagement with and firmly grips the walls of the bonding surfaces provided on the brush-tubes and yoke-ring, thereby permanently joining the brush-tubes to the ring-yoke. It will be noted that the masses of insulation material are disposed entirely at one side of the plane of that face of the yoke-ring which is more remote from the brush-tubes, whereby such yoke-ring face remains flat and devoid of projections and may be secured flatwise to the internal flat wall 9 of the end cap 10 of the motor-frame.

The closed end wall of the end cap 10 is formed adjacent the armature bearing boss 11 with apertures 12 for the screws 13 which are passed through the arcuate slots 4 in the yoke-ring and threaded into the nuts 14 which latter are formed with projections 15 entering the slots 4 and serving to prevent such nuts from turning. By virtue of this construction the screws 13 which are accessible exteriorly of the motor may be readily loosened to permit adjustment of the electrical angle of the brushes and tightened after such adjustment has been made.

Having thus set forth the nature of the invention, what I claim herein is:—

1. Brush-holding means for dynamo-electric machines comprising metallic yoke and brush-holding elements having bonding surfaces and heat-resisting insulating material molded into intimate engagement with such surfaces and permanently holding said elements in insulated relation.

2. Brush-holding means for dynamo-electric machines comprising a metallic yoke ring and a plurality of metallic brush-tubes, said ring and tubes having bonding surfaces, and masses of molded heat-resisting insulating material intimately engaging such surfaces and permanently holding said elements in insulated relation.

3. Brush-holding means for dynamo-electric machines comprising a sheet-metal yoke ring having angularly spaced bonding apertures, a pair of alined radially disposed metallic brush-tubes spaced from said ring and having bonding surfaces adjacent the bonding apertures in said ring, and masses of molded heat-resisting insulating material filling the spaces between said ring and

brush-tubes and intimately engaging said bonding apertures.

4. Brush-holding means for dynamo-electric machines comprising a sheet-metal yoke ring having angularly spaced bonding apertures, a pair of alined radially disposed metallic brush-tubes spaced from said ring and having bonding surfaces adjacent the bonding apertures in said ring, and masses of molded heat-resisting insulating material filling the spaces between said ring and brush-tubes and intimately engaging said bonding apertures, said brush-tubes and the masses of molded material lying wholly on one side of the plane of that face of said yoke ring which is the more remote from said brush-tubes.

5. A sheet-metal brush-holder yoke having one or more struck up tongues, a metallic brush-tube substantially parallel to and spaced from said sheet-metal yoke adjacent said tongues, and formed with bonding surfaces, and a mass of heat-resisting insulating material filling the space between said yoke and tube and intimately engaging said tongues and bonding surfaces.

6. A dynamo-electric machine having a frame formed with an armature bearing and a flat internal end-wall adjacent said bearing, a sheet-metal yoke ring secured flatwise to said internal end wall and formed with bonding surfaces entirely at one side of the plane of said end-wall, a plurality of brush-tubes disposed radially of and spaced from said yoke-ring and formed with bonding surfaces, and masses of molded heat-resisting insulating material intimately engaging said bonding surfaces and permanently securing said brush-tubes in insulated relation to said yoke-ring.

7. A dynamo-electric machine having a frame formed with an end wall, a screw having its head disposed externally of and its shank passed through an aperture in said end wall, a sheet-metal brush-holder yoke ring disposed within said end wall and having an arcuate slot also entered by the shank of said screw, and a nut into which said screw is threaded, said nut having a projection entering said arcuate slot.

I testify whereof, I have signed my name to this specification.

FREDERICK DIEHL.