

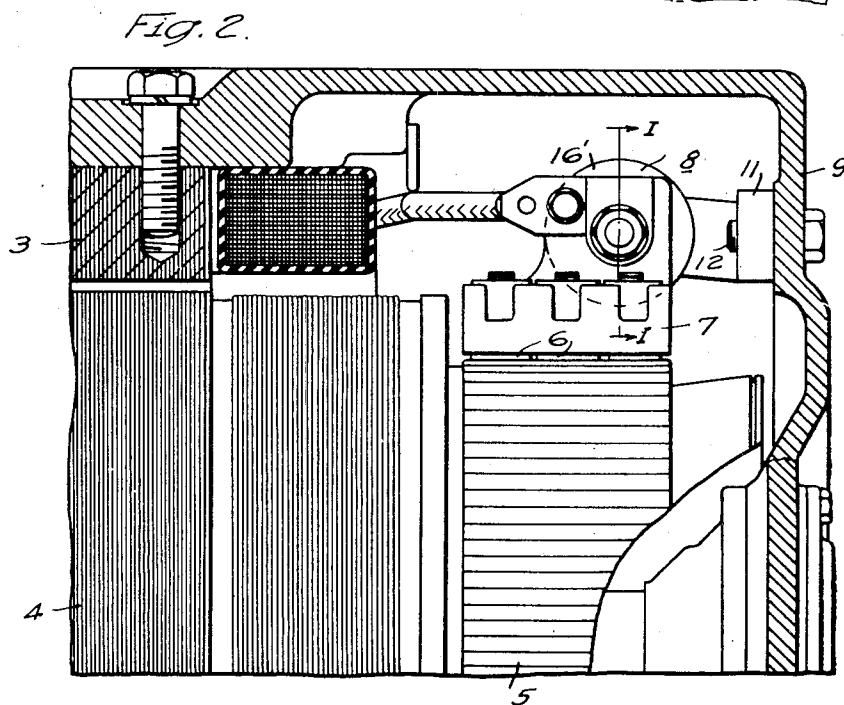
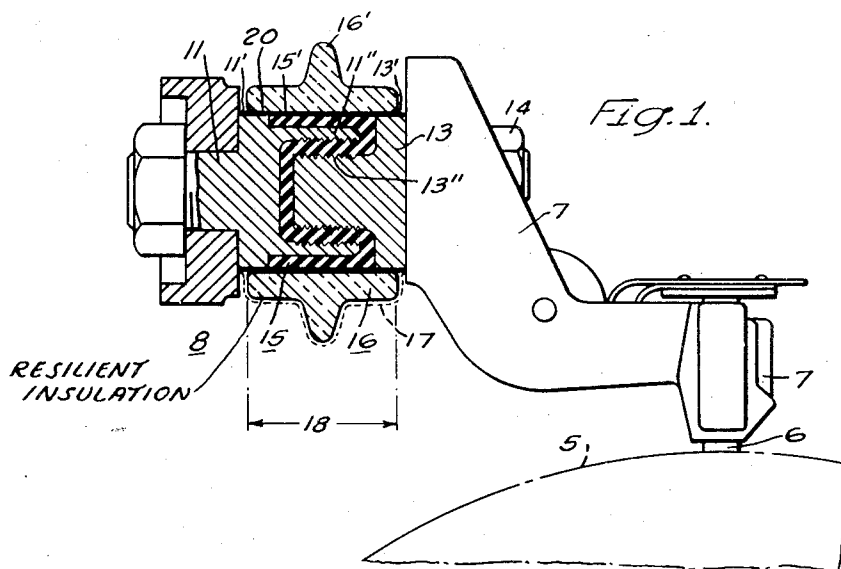
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2,451,969

INSULATING MOUNTING FOR BRUSHHOLDERS AND THE LIKE

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INSULATING MOUNTING FOR BRUSH
HOLDERS AND THE LIKE

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Our invention relates to insulating mountings, and it has particular relation to commutator brushholder mountings for 4000-volt direct-current locomotive motors, although it is applicable to other uses.

Due to space-limitations in transportation-motors, the size of the brushholder mounting is limited. Creepage surfaces must be held to a minimum. In the design of the 4000-volt motor, a horizontal creepage-distance of three inches between the support and the brushholder is the maximum allowed in the brushholder-mounting. That does not provide a sufficient safety-factor for 4000-volt operation. However, it is permissible to increase the actual creepage-distance by utilizing an insulator having a cylindrical outer surface having one or more bulged portions or flanges or skirts, for providing a greater actual creepage-surface length than the axial length of the insulator.

However, it is not practical to properly and satisfactorily provide such a design in a molded insulating connector-member, moldedly interlocking with parts of two metal end-members, and having the bulged or flanged or skirted outer creepage-path, because of the deep draw needed for the mold. Also, in railway practice, glazed porcelain surfaces have been found to be more suitable for a high creepage-insulation, due to the severe conditions of moisture and dirt in railway motors, as a glazed porcelain surface has better moisture and dirt-resistant creepage-characteristics than the best creepage-surface characteristic that can readily be given to the molded insulating connector-member. And yet the molded connector-construction has better strength-characteristics than the porcelain.

It is an object of our invention to provide a novel construction and combination which makes it feasible to successfully combine the desirable characteristics of both types of insulation, in a mounting suitable for brushholders and other electrical devices.

The drawing shows an exemplary embodiment of our invention, in an insulating mounting for a brushholder for a high-voltage direct-current railway-motor, Fig. 1 being a fragmentary end-view of the commutator-end of such a machine, with parts broken away to show the brushholder-mounting in section on the line I—I in Fig. 2,

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while Fig. 2 is a fragmentary longitudinal section through the machine.

The illustrated motor is a minimum-dimensioned dynamo-electric machine having a voltage sufficiently high to make insulating creepage-distances somewhat difficult to obtain, particularly with a sufficient factor of safety for the application of the desirable overvoltage tests during the manufacturing operations. It has a field-member 3, within which is rotatably supported an armature member 4, having a commutator 5. Bearing on the commutator are brushes 6, which are carried by brushholders 7. The brushholders are supported by our improved insulating brushholder-mountings 8, which are supported from the end-head 9 of the motor-frame.

Our insulating brushholder-mounting 8 comprises a support-end metal member 11, adapted to be connected, at 12, to the supporting member or frame 9, and an electrical-end metal member 13 which is adapted to be connected, at 14, to the brushholder 7 or other electrical member to be insulatingly supported. These two end-members 11 and 13 of the insulating mounting 8 each have a cylindrical outer surface as shown at 11' and 13', (defining a cylinder as the surface generated by any straight line moving parallel to a fixed straight line or axis). Between these two metal end-members 11 and 13, we provide a molded insulating connector-member 15, moldedly interlocking with parts 11' and 13' of both of said metal end-members, and securely joining the same together in one mechanically joined, but electrically insulated, unit. This insulating connector-member 15 has a cylindrical outer surface 15' which substantially merges with the cylindrical outer surfaces 11' and 13' of the metal end-members 11 and 13.

In accordance with our invention, we also provide a porcelain creepage-surface insulator 16, fitting over the cylindrical outer surface 15' of the connector-member 15, and having one or more bulged portions 16', of increased outer diameter, for providing a greater actual creepage-surface length, indicated by the curved dotted line 17 in Fig. 1, than the axial length 18 of the porcelain. The porcelain insulator 16 has a glazed outer creepage-surface, along which the dotted creepage-line 17 has been drawn, and an

unglazed bore, which fits over the merging cylindrical surfaces 11', 15', 13'.

To successfully utilize the form of construction which has just been described, it is necessary to utilize means for holding the porcelain insulator 15 in place, and for so filling the space between the bore of the porcelain and the cylindrical surfaces 11', 15', 13', that any electrical flashover between the metal end-members 11 and 13 shall always occur over the outer creepage-surface indicated by the curved dotted line 17, and never through the space between the bore of the porcelain and the surfaces 11', 15', 13' of the metal end-members 11 and 13 and their molded insulating connector-member 15. To this end, we provide a substantially non-shrinking, insulating adhering-member 20, which substantially completely fills the aforesaid space inside of the bore of the porcelain creepage-surface insulator 16, while being capable of adhering tightly to both the unglazed surface of the bore of the porcelain and the outer cylindrical surface 15' of the molded insulating connector-member 15. This space must be filled with a solid or non-gaseous insulator, because if any gas-filled crack should exist or develop therein, such crack would constitute a shorter flashover distance or path than the outer creepage-surface indicated by the curved dotted line 17. In order for the adhering-member 20 to leave no air-filled flashover-cracks, it is necessary for it to be substantially non-shrinking on setting. In order to enable it to meet the operating conditions of the motor, it is necessary also for this adhering-member 20 to be resistant to heat, water and oil. It is desirable also, for this adhering-member 20 to have rubber-like resilient properties, in the finished product, or after setting or curing, in order to better safeguard against the possibility of cracking.

There are several materials capable of more or less completely fulfilling the above requirements for the adhering-member 20, including an uncured silicon rubber stock, one of the silicon resins with a filler of titanium oxide or other suitable inert pigment. Such products are heat-stable, oxidation-resistant, and resilient. They are characterized by their excellent dielectric properties, their moisture-resistance, and their oil-resistance; and they retain their rubberiness at high temperatures (300° F.). They are a "dope" or cement, having 100% solids, with no solvents; requiring no oxygen or loss of solvent to cure; and retaining (or acquiring) their rubber-like texture on curing, as by baking, for a suitable number of hours, at temperatures such as 150° C., 200° C. and 225° C., or other suitable temperature, depending upon the precise material used.

We claim as our invention:

1. An insulating mounting comprising a support-end metal member having a cylindrical outer surface, an electrical-end metal member having a cylindrical outer surface of substantially the same diameter, a molded insulating connector-member moldedly interlocking with parts of both of said metal members and securely joining the same together in one mechanically joined but electrically insulated unit, said insulating connector-member having a cylindrical outer surface substantially merging with the cylindrical outer surfaces of the metal members, a creepage-surface insulator fitting over the cylindrical outer surface of the connector-member and having one or more bulged portions, of increased outer diameter, for providing a greater actual-creep-

age-surface length than the axial length of the creepage-surface insulator, and a substantially non-shrinking, heat, water and oil-resistant, insulating adhering-member substantially completely filling the space between the bore of the creepage-surface insulator and the cylindrical outer surface of the connector-member for preventing electrical flash-over from occurring through said space.

2. A minimum-dimensioned dynamo-electric machine having a voltage sufficiently high to make insulating creepage-distances somewhat difficult to obtain, characterized by said machine including a plurality of insulating brushholder-mountings, each mounting comprising a support-end metal member having a cylindrical outer surface, an electrical-end metal member having a cylindrical outer surface of substantially the same diameter, a molded insulating connector-member moldedly interlocking with parts of both of said metal members and securely joining the same together in one mechanically joined but electrically insulated unit, said insulating connector-member having a cylindrical outer surface substantially merging with the cylindrical outer surfaces of the metal members, a creepage-surface insulator fitting over the cylindrical outer surface of the connector-member and having one or more bulged portions, of increased outer diameter, for providing a greater actual creepage-surface length than the axial length of the creepage-surface insulator, and a substantially non-shrinking, heat, water and oil-resistant, insulating adhering-member substantially completely filling the space between the bore of the creepage-surface insulator and the cylindrical outer surface of the connector-member for preventing electrical flashover from occurring through said space.

3. The invention as defined in claim 1, characterized by the material of said insulating connector-member having better strength-characteristics than the material of said creepage-surface insulator, and the outer creepage-surface of said creepage-surface insulator having better moisture and dirt-resistant creepage-characteristics than the best creepage-surface characteristic that can readily be given to the material of said insulating connector-member.

4. The invention as defined in claim 2, characterized by the material of said insulating connector-member having better strength-characteristics than the material of said creepage-surface insulator, and the outer creepage-surface of said creepage-surface insulator having better moisture and dirt-resistant creepage-characteristics than the best creepage-surface characteristic that can readily be given to the material of said insulating connector-member.

5. The invention as defined in claim 1, characterized by said creepage-surface insulator being porcelain, with a glazed outer creepage-surface and a substantially unglazed bore, and said insulating connector-member being of a molded moldable material having better strength-characteristics, in the finished molded state, than the porcelain.

6. The invention as defined in claim 2, characterized by said creepage-surface insulator being porcelain, with a glazed outer creepage-surface and a substantially unglazed bore, and said insulating connector-member being of a molded moldable material having better strength-characteristics, in the finished molded state, than the porcelain.

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7. The invention as defined in claim 1, characterized by said adhering-member also having rubber-like resilient characteristics in the finished product.

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8. The invention as defined in claim 2, characterized by said adhering-member also having rubber-like resilient characteristics in the finished product.

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