Sept. 5, 1939. M. C. BURR ET AL 2,172,045

BRUSH FOR DYNAMO-ELECTRIC MACHINES AND METHOD OF MAKING

Filed Oct. 17, 1938

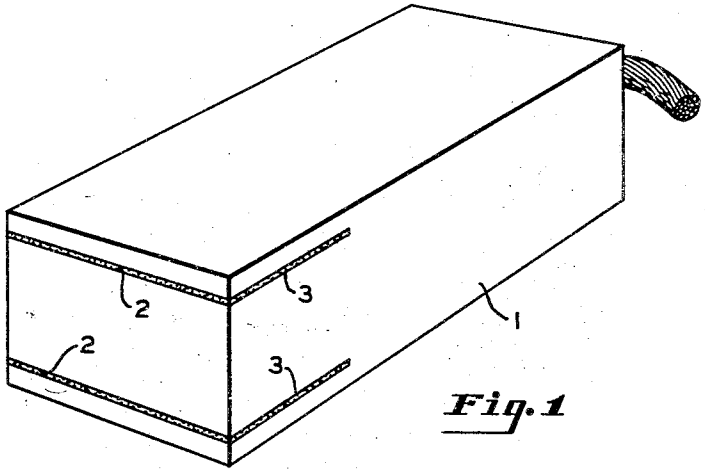


Fig. 1

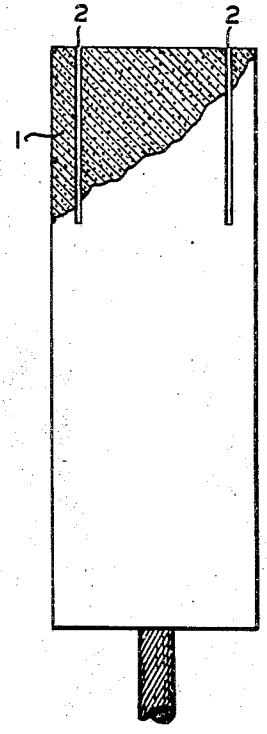


Fig. 2

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Patented Sept. 5, 1939 2,172,045

UNITED STATES PATENT OFFICE

2,172,045

BRUSH FOR DYNAMO-ELECTRIC MACHINES AND METHOD OF MAKING

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Application October 17, 1938, Serial No. 235,382

5 Claims. (Cl. 171—325)

This invention relates to carbon brushes for dynamo electric machines such as used on commutators or slip rings. It has been proposed to provide such brushes with inserts in the form of rods or strips containing a lubricating material such as graphite fitted into openings or slots in the body of the brush so as to provide a working face composed in part of a lubricating material. Various difficulties are experienced in the manufacture of such brushes. Difficulty is experienced in securing the inserts to the body of the brush so that they will not work loose in service. Difficulty is experienced in machining the body of the brush and the inserts with sufficient accuracy to provide a tight fit. The inserts must be of greater thickness than is desirable in order to enable them to be fitted into the body of the brush without breaking, and must be made harder than is desirable in order to provide the necessary strength.

The present invention has for an object to provide a method of making brushes with one or more fillers of lubricating material by which the filler is permanently united to the body of the brush, by which fillers of small thickness may be provided and by which carbon brushes may be provided with a filler of relatively soft lubricating material.

A further object is to provide a brush having a portion of its working face formed by a filler of relatively soft lubricating material, permanently secured in a recess formed in the brush body.

With the above and other objects in view the invention may be said to comprise the carbon brush and the method of making the same as illustrated in the accompanying drawing hereinafter described and particularly set forth in the appended claims, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention appertains.

Reference should be had to the accompanying drawing forming a part of this specification in which

Figure 1 is a perspective view of a brush embodying the invention;

Fig. 2 is a side elevation of the brush body prior to the filling of the slot with the plastic composition.

The brush of the present invention comprises a body portion made by the conventional method of making carbon brushes, being formed by baking a molded block composed of powdered material, mainly carbon, mixed with a suitable heat-hardenable resinous binder. The brush body 1 is provided with one or more narrow recesses or slots 2 opening to the bearing face of the brush, which may be cut in the finished block, or which may be formed by molding in the process of making the block. The slots or recesses 2 are filled with a plastic heat-hardenable composition and the brush body is then baked to solidify the insert and provide one or more lubricating strips extending to the bearing face which is integrally united to the body of the brush. The plastic filler composition may be flake graphite with which other materials such as various forms of carbon, amorphous graphite or metallic powder may be mixed together with a binder such as commonly used in the manufacture of carbon brushes; for example, pitch, tar, shellac, resin, sugar, molasses, or a synthetic resin such as Bakelite, durite, etc., and sufficient solvent for the binder to make the mix plastic. The plastic composition is introduced into the slot in any suitable way. It may be tamped into the slot or recess 2 by means of a tool adapted to be inserted into the slot, or may be forced into the slot by means of a fluid pressure device similar to a grease gun while the ends of the slots are kept closed by blocks clamped to the sides of the brush body 1.

Since the filler should be softer than the body of the brush and does not need to possess great strength, the filler is hardened by baking in an open chamber with no pressure upon the filler. If a large amount of solvent is employed the filler will be quite porous. With a small amount of solvent the filler will be less porous. After baking the brush has a filler 3 of relatively soft lubricating material integrally united with the body 1 thereof. The filler may have abrasive material mixed therewith if desired to exert a polishing and cleaning action in the slip ring or commutator with which the brush engages.

By the method of the present invention extremely thin inserts can be provided in a brush without difficulty, and the inserts can be made very soft. Inserts one thirty-second to one-sixteenth of an inch thick can readily be provided.

It would be impracticable to attempt to machine such thin strips for insertion into a brush slot and much difficulty would be experienced in inserting such thin strips without breaking them. Also, formed strips must be made rather hard to enable them to be machined and to give them sufficient strength to enable them to be pushed into a close-fitting slot in the brush. By the method of the present invention the filler

strips may be made of any hardness desired and the texture may be varied to suit different operating conditions. For example, brushes have been made with inserts having a hardness of 5 scleroscope and a breaking strength of only 100 pounds. Such material could not be handled in sheet form and made into blocks for insertion into a brush recess.

It has been found in actual practice that it is necessary that the insert material be very soft to obtain the best results. If the insert is hard it is apt to wear away less rapidly than the body of the brush and, since the insert is a poorer conductor of electricity, a brush riding on the insert sparks very badly. However, if the insert material is very soft it will not support the weight of the brush and the insert material will wear down with the body of the brush so that the full contact of the bearing face of the brush with the slip ring or commutator is maintained.

The present invention provides a means of supplying a soft lubricating material to the rings or commutator without interfering with the passage of current between the brush and ring or commutator.

In direct current machines the brush of the present invention serves to increase the path of the short circuited current in the armature coils to include the length of the brush material bordering on the insert. The insert being of comparatively high resistance will not carry the current, and the short circuited current in the coils undergoing commutation has to pass up around the insert rather than directly across the face of the brush as is the case with the ordinary brush.

It will be apparent that the composition of the filler may be varied considerably; that the hardness may be varied by varying the temperature and time of baking; and that the porosity of the filler may be varied by varying the amount of solvent employed.

An example of a typical filler mix is 70 parts graphite, 30 parts Bakelite, with sufficient solvent to make the mix plastic. With such a mix the brush, after the filling of the recess with the plastic material, would be subjected to a temperature of about 390° F. for about two hours. When coal tar or pitch is used as a binder the curing temperature and also the time of curing must both be greatly increased. The proportioning of the ingredients and the curing of the filler are determined with reference to the physical characteristics desired in the filler, as well understood in the carbon brush industry.

While a single lubricating strip may be employed, it is preferred especially in the larger brushes to employ two thin lubricating strips as shown in the drawing in order to provide effective lubrication and to retain the advantages of thin lubricating strips., When two lubricating strips are employed it is preferred to locate the strips close to opposite edges of the working face of the brush, since this arrangement of the lubricating strips tends to provide a smoother riding brush.

Furthermore, it is to be understood that the particular form of apparatus shown and described, and the particular procedure set forth, are presented for purposes of explanation and illustration and that various modifications of said apparatus and procedure can be made without departing from our invention.

What we claim is:

1. The herein described method of making carbon brushes which comprises making a brush body of a molded heat-hardened material with one or more recesses opening to the bearing face, making a composition containing a solid lubricating material, a heat-hardenable binder, and sufficient solvent for the binder to make the composition plastic, filling the recess of the brush with the plastic composition, and subjecting the plastic composition to heat to evaporate the solvent, harden the binder, and form a brush having one or more filler strips of lubricating material extending to the bearing face thereof.

2. The herein described method of making carbon brushes which comprises making a brush body of a molded heat-hardened material with one or more recesses opening to the bearing face, making a composition containing powdered material including flake graphite, a heat-hardenable binder, and sufficient solvent for the binder to make the composition plastic, filling the recess of the brush with the plastic composition and subjecting the plastic composition to heat to evaporate the solvent, harden the binder, and form a brush having one of more relatively soft fillers of lubricating material extending to the bearing face thereof.

3. A carbon brush having one or more lubricating filler strips of relatively soft material integrally joined to the body of the brush and extending to the bearing face thereof.

4. A carbon brush having a body portion provided with one or more recesses opening to its bearing face and a body of solid but relatively soft lubricating material in said recesses integrally united to the body portion of the brush.

5. A carbon brush having a body portion provided with narrow transverse slots opening to its working face adjacent opposite edges thereof and a body of solid but relatively soft lubricating material in each recess integrally joined to the body of the brush.

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