May 1, 1923.

1,453,793

V. C. HAMISTER

ELECTRICAL CONNECTION

Filed June 30, 1921

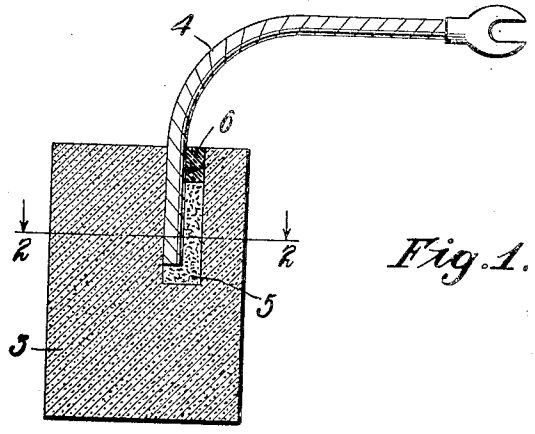



Fig. 1.

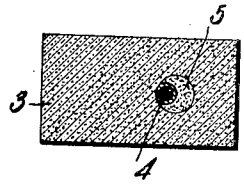



Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## ELECTRICAL CONNECTION.

Application filed June 30, 1921. Serial No. 481,646.

*To all whom it may concern:*

Be it known that I, VICTOR C. HAMISTER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Electrical Connections, of which the following is a specification.

For the purpose of securing a good mechanical and electrical connection between a flexible conductor and a block or prism of rigid material, it has been proposed to form a hole or cavity in the block or prism, insert a conductor of smaller diameter than the hole or cavity, and then fill the space between the conductor and the surrounding walls with compacted conductive material to form a hard, strong conductive body resisting withdrawal of the conductor. Such a connection has been used, for example, with brushes for electric machines, and is especially advantageous where the material of the brush is carbon or other fragile material so that only a limited pressure can be employed in joining the brush and conductor. Any rigorous clamping or wedging action is undesirable under these circumstances as the brush is apt to be split or cracked.

Various kinds of comminuted conductive material have been proposed for making the connection. Metal powder, filings, short lengths of fine wire, amalgams, graphite, and mixtures of two or more of these may be mentioned. The conductor is ordinarily a copper cable and the rugosities upon its surface enable the compacted material to grip it securely.

When such a connection is subjected to vibration, as it always is when used on a brush, there is a tendency for the compacted material to disintegrate and fall out, destroying the connection. It has been proposed to secure the conducting material in place by a seal of cementing material having maximum strength and adhesive properties as well as ability to resist the heat and other influences to which the connection is subjected.

I have found that the hard phenol-aldehyde condensation products are far superior as sealing material to the cements hereto fore proposed for this purpose. For a better understanding of the invention reference is made to the attached drawing showing one embodiment thereof, Fig. 1 showing a sectional elevation along the conductor and Fig. 2 being a transverse section on line 2—2 of Fig. 1.

In the embodiment illustrated, 3 is a brush or other block or prism of rigid material, 4 is a stranded copper cable, 5 is the compacted comminuted conductive material and 6 is the seal of condensation product.

In making the connection, the conductor is inserted in the hole or cavity and the conductive material compacted around it in any suitable way, depending on the particular material employed. Preferably only a portion of the hole or recess is so filled, space being left at the point or points where the conductor emerges from the block or prism so that the seal may be formed in part at least within the block. The materials from which the seal is to be formed are brought into position in a condition in which they can be formed into the desired shape and the hardened condensation product is then formed in situ by any suitable converting operation. The initial material is preferably a product of incipient condensation such as bakelite liquid A, No. 15 or bakelite solid A. If the liquid is used it may be placed in a pool in the desired place and converted to the hard product (bakelite C) for example, by heating for a time to 150° C. under 70 pounds pressure. The solid bakelite A is preferable in most instances to the liquid. It my be used as a powder fine enough to pass a 70 mesh screen and this powder, when moistened with 40% formaldehyde solution, forms a plastic mass which may be readily worked into the cavity in which the seal is to be located. The plastic material is then converted by heat and pressure.

It will of course be understood that I am not limited to any particular compacted conductive material, nor to any specific arrangement of conductor and connected body of rigid material. The use of bakelite is described herein only for illustration and any equivalent condensation product having the requisite strength and cementing properties and capable of withstanding the influences to which the connection is subjected in use, is included in my invention.

I claim:—

1. In combination, a block or prism having a cavity therein, a conductor having a portion within said cavity, compacted conducting material within said cavity electrically connecting said brush and said conductor, and a seal of a hard phenolic condensation product arranged to retain said compacted material in place.

2. In combination, a brush having a cavity therein, a conductor having a portion within said cavity, compacted conducting material within said cavity electrically connecting said brush and said conductor, and a seal of a hard phenolic condensation product arranged to retain said compacted material in place.

3. In combination, a carbon brush having a cavity therein, a conductor having a portion within said cavity, compacted graphite-containing material within said cavity electrically connecting said brush and said conductor, and a seal of a hard phenolic condensation product arranged to retain said compacted material in place.

In testimony whereof, I affix my signature.

VICTOR C. HAMISTER.