C. HAMBUECHEN.

CARBON BRUSH CONNECTION.

APPLICATION FILED APR. 17, 1914.

1,188,761. Patented June 27, 1916.

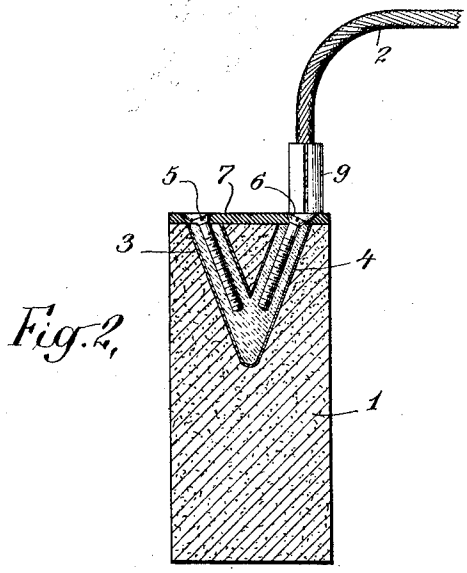

Fig. 2,

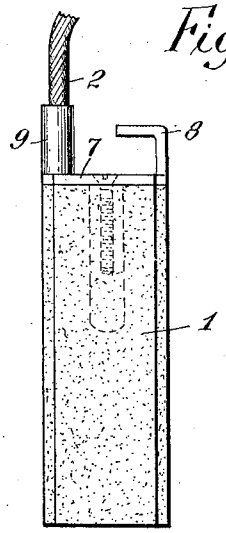

Fig. 1,

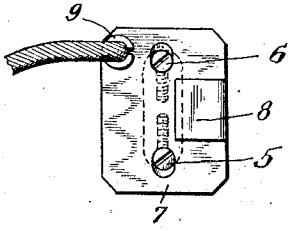

Fig. 3,

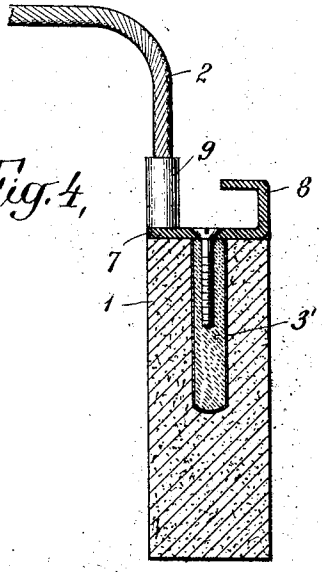

Fig. 4,

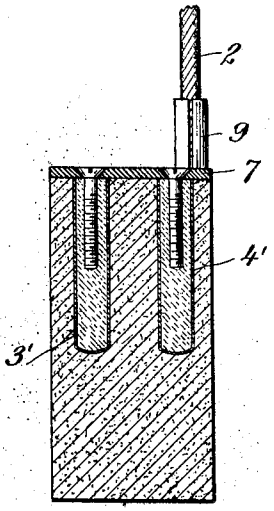

Fig. 5,

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CARBON-BRUSH CONNECTION.

1,188,761. Specification of Letters Patent. Patented June 27, 1916.

Application filed April 17, 1914. Serial No. 832,663.

To all whom it may concern:

Be it known that I, CARL HAMBUECHEN, a citizen of the United States, residing at Belleville, county of St. Clair, State of Illinois, have invented certain new and useful Improvements in Carbon-Brush Connections; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

It is the object of the present invention to provide a connection between a flexible conductor and a carbon block such as is used for motor brushes, dynamo brushes, and in the electrical arts generally, and more particularly to provide a detachable connection whereby the carbon block may be disconnected for renewal.

To accomplish the foregoing object and others, which will hereinafter appear, the carbon block is provided with a cavity which is filled with an amalgam, such as a copper amalgam, the cavity being first preferably lined with copper by electro-plating, and the conductor is electrically connected to this amalgam filling or plug by means of screws or the like threaded into the amalgam. Preferably a plate to which the flexible conductor is connected seats on the top of the brush and is held tight by these screws.

In the accompanying drawings, Figure 1 is a side elevation of a motor brush with the connection of the present invention; Fig. 2 is a sectional elevation through the same; Fig. 3 is a plan view; and Figs. 4 and 5 are sections through a modified form wherein the drilled holes filled with amalgam do not converge.

In the embodiment illustrated, the carbon block 1 may be of usual size and composition, and the flexible conductor 2 is preferably of stranded copper wire. At the top of the carbon block two converging holes 3 and 4 are drilled until they intersect, forming a V-shaped cavity in the upper part of the brush, say in the upper half. This cavity is then lined with copper by electro-plating, since by this method an intimate contact is established with the carbon surface of the cavity. The entire cavity is next filled with an amalgam, preferably a copper amalgam, to form a plug or filling to which the other parts may be mechanically connected. The composition of the amalgam and its mode or production may vary, but satisfactory results are obtained by using 50 parts by weight of copper powder, or copper bronze powder, to 50 parts mercury. To prepare the amalgam, copper bronze powder is wet with water to a paste and then the mercury is added, and the materials rubbed together thoroughly. A small quantity of dilute sulfuric acid is then added and the mixture again rubbed and complete amalgamation effected, after which the material is washed free of acid. The amalgam is then in porous or puffy condition and can readily be tamped into the cavity without the use of heavy pressure, and without danger of cracking or rupturing the carbon block. It felts together well, and after standing for 24 hours becomes hard and coherent and possessed of the desired mechanical strength. Other proportions may be used, but with too low mercury content the mixture is too dry, and will not pack or felt together well, and with too much mercury it is too brittle to be tapped. The mixture above specified is of good conductivity and swells slightly on hardening and superficially amalgamates with the copper lining, and is otherwise well adapted for the purpose, though I am aware that the amalgam may contain other components and be compounded in other ways.

The amalgam plug after hardening is drilled down the center of each leg of the V and then is tamped to receive the threaded screws 5 and 6. These screws not only serve as current conductors to or from the amalgam, but also hold tightly clamped against the top of the brush a conductive plate 7. This plate is preferably cut to fit the entire top of the brush and has an upturned integral finger 8 which is bent back over the brush, as indicated in Fig. 1, to serve as a handle, whereby the brush may be lifted from the commutator when desired. Plate 7 is also provided with an integral strip which is bent up and rolled together at its edges to form a socket 9 into which the end of stranded conductor 2 may be received, and by which it may be tightly gripped without the need for soldering. Current passing through the stranded conductor 2 can flow from plate 7 into the carbon block, and to facilitate this the top face of the block and a portion of its sides may be electroplated with copper, but a large part of the current flow passes through screws 5 and 6

and through the amalgam filling, so that an even distribution of current is obtained with consequent freedom from local heating. The entire connection is free from solder or other low fusing metals, or alloys, and the amalgam filling becomes harder with age or use, and the brush may be subjected to hard usage without unsatisfactory results.

In the modification illustrated in Figs. 4 and 5, the drilled holes 3′ and 4′ do not converge but are parallel, and each is provided with a separate filling, or plug, into which a screw is tapped as before. This modification does not have the advantage of the interlocking plugs, but I have found that even with this construction the amalgam adheres most tenaciously in the cavities, and a satisfactory connection can be made.

With either modification here disclosed, there is no danger that the commutator will be injured by the metal parts of the connection, for even though the brush be worn down until the amalgam filling comes in contact with the commutator, this filling is softer than the commutator and will not produce destructive scratching.

I am aware that various changes and modifications in the form and arrangement of parts may be made without departing from the spirit of the invention as defined by the appended claims.

I claim:

1. The combination with a carbon brush having a cavity, an amalgam filling therein, a stranded conductor, a plate connected to said stranded conductor and a screw threaded into said amalgam and securing said plate to said carbon brush.

2. The combination of a carbon brush having a plurality of holes, an electro-plated lining for said holes, an amalgam filling for said holes, a stranded conductor, a plate secured to said stranded conductor and screws passing through said plate and threaded into said amalgam filling.

3. A carbon brush having a plurality of drilled holes at its top, a copper amalgam filling for said holes, screws threaded into said amalgam, a plate covering the top of said brush and held in place by said screws, said plate having an integral socket, and a stranded conductor clamped in said socket.

4. A carbon brush having a plurality of converging holes, an electro-plated lining for said holes, an amalgam filling for said holes, screws threaded into said amalgam filling, a plate held in place by the said screws and a stranded conductor connected with said plate.

5. The combination of a carbon brush, a conducting plate covering the top of the carbon brush and secured thereto and having an upturned integral finger whereby the brush may be lifted, and having an upstanding integral socket for the reception of a conductor and a stranded flexible conductor seated in said socket; substantially as described.

6. The combination of a carbon brush having a plurality of converging holes in the top thereof forming a cavity, an electro-plated lining for said cavity, an amalgam filling for said cavity superficially amalgamated with said lining and comprising copper and mercury in about equal parts, screws threaded into said amalgam, a conducting plate contacting with the top of the carbon brush, said plate being removable from said carbon brush upon withdrawal of the screws, and a stranded flexible conductor permanently attached to said plate.

7. The combination of a carbon brush having a plurality of converging cylindrical holes drilled in the top thereof, an amalgam filling for said holes, screws threaded into said filling, a flat conducting plate covering the top of the carbon brush and having an upturned integral finger whereby the brush may be lifted, and having an upstanding integral socket for the reception of a conductor, said plate being removable from said carbon brush upon withdrawal of said screws, and a stranded flexible conductor seated in said socket and mechanically gripped thereby; substantially as described.

In testimony whereof I affix my signature.

CARL HAMBUECHEN.