Nov. 23, 1948. L. H. STAUFFER 2,454,579

CARBON BRUSH ELEMENT

Filed Aug. 17, 1946

Fig.1.

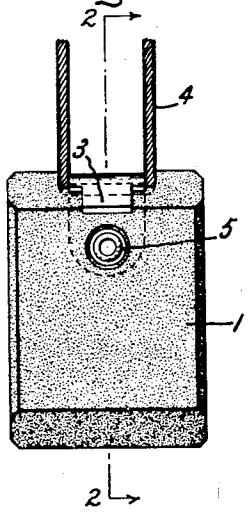


Fig.2.

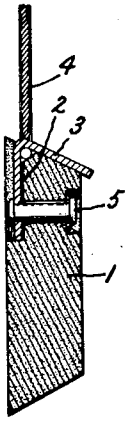


Fig.3.

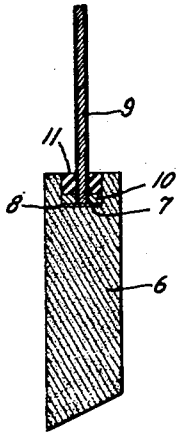
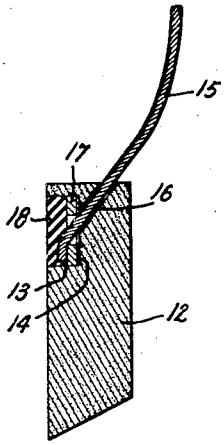


Fig.4.



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CARBON BRUSH ELEMENT

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3 Claims. (Cl. 171—326)

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My invention relates to a contact brush element for rotating electrical equipment and is particularly directed to an improved arrangement for securing a shunt to a brush of carbonaceous material.

An object of my invention is to provide an improved contact brush.

Another object of my invention is to provide an improved contact brush of carbonaceous material having a shunt adherently connected thereto by an alloy of tin and copper formed between the shunt and the brush surface to which the shunt is connected.

Further objects and advantages of my invention will become apparent and my invention will be better understood from the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

In the drawing, Fig. 1 is a side-elevational view of a brush provided with an embodiment of my invention; Fig. 2 is a sectional view, taken along line 2—2 of Fig. 1; Fig. 3 is a sectional view through a contact brush illustrating another embodiment of my invention; and Fig. 4 is a sectional view through a contact brush embodying a further modification of my invention.

Referring to the drawing, I have shown in Figs. 1 and 2 an embodiment of my invention in which a contact brush of carbonaceous material 1, which may contain a metal content if desired, is provided with a shunt connector member adapted to provide a better electrical connection between the brush and a terminal on the brush holder. This shunt connector is adapted to provide a very good electrical connection with the cabonaceous material 1 through an alloyed joint between the shunt and the carbonaceous material which is formed by applying a relatively thin layer of metal of high electrical conductivity, such as copper, to a surface portion 2 of the brush which is adapted to be electrically connected to the shunt. This metal is adherently deposited on the surface portion 2 of the brush 1 in any suitable manner, as by a fine molten metal spray, as is well known in the art. A non-corrosive flux, such as a mixture of rosin and alcohol, then is applied to the metal coating to facilitate alloying of this coating with metal of a terminal to be secured thereto. A shunt terminal clip 3 of suitable material, such as steel, to which a thin layer of alloying metal, such as tin, zinc, or cadmium, has been applied and to which a flexible conductor 4 is secured in any suitable manner, preferably by welding to the clip, then is arranged over the end of the carbonaceous brush member 1 with a surface of the terminal clip 3 arranged in good electrical contact with the layer of metal on the brush surface 2. This shunt terminal clip 3 preferably then is riveted by a suitable rivet 5 to the brush member 1 by any suitable means, after which the shunt terminal clip 3 is bonded to the carbonaceous material member 1 by subjecting the contact surface metals between the terminal clip 3 and the surface 2 of the member 1 to a substantially alloying temperature of these metals for a brief time, preferably only a few seconds. I have found that this can be done very conveniently by providing a welding electrode which can be arranged over the rivet 5 in contact with the brush member 1 but out of contact with the rivet 5 and another welding electrode arranged in contact with the back surface of the shunt terminal clip 3, such that most of the electric current passes through the brush contact member 1 and the metal surfaces which are in engagement between the surface 2 of the brush member 1 and the shunt terminal clip 3. This heating process may be carried on in any suitable manner, providing the contact metals forming the bond are heated sufficiently, such that the bond which results has the properties characteristic of a joint in which the shunt has been heated to substantially an alloying temperature of the contact surface metals. If desired, the rivet 5 may be omitted, as it has been found that a shunt which is connected to a carbonaceous contact member as above described provides a connection having a strength far in excess of any soldered joint which might be obtained between such metals as tin and copper, and the joint may be heated considerably above the melting point of tin without becoming loose.

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In Fig. 3 I have shown another embodiment of my invention in which an electrical contact brush member 6 of carbonaceous material preferably is formed with a recess portion 7 in the upper part thereof which is adapted to be electrically connected to a suitable shunt. In this construction a layer of metal of high electrical conductivity, such as copper, is adherently deposited as shown at 8 on the surface of the recess portion 7 of the contact member 6, and a suitable non-corrosive flux, such as a mixture of rosin and alcohol, is applied to its surface to facilitate alloying with metal of a suitable terminal. A shunt including a flexible conductor 9 electrically con-

nected to a terminal element 10, which may be formed of steel having a thin layer of alloying metal, such as zinc, cadmium, or tin thereon, is arranged in good electrical contact with the metallic surface 8 in the recessed portion 7 of the contact element 6. As in the construction shown in Figs. 1 and 2, the terminal 10 of the shunt is heated in any suitable manner, as by the passage of electric current therethrough, to an alloying temperature of the contact surface metals of the terminals 10 and on the surface of the recess 7 to provide a strong bond between the shunt and the contact member 6, such that this bond has the properties characteristic of a joint made in this manner. If desired, a filler material 11 may be arranged in the space above the terminal 10 to seal it against corrosive elements. Preferably this filler material is made of a compound of carbon and metal powders with a suitable binder and is preferably cured under pressure by an electrically heated ram to unite it to the carbon sides of the recessed portion 7 of the contact element 6.

In Fig. 4 I have shown a further embodiment of my invention in which a contact brush element 12 of carbonaceous material is formed with a recessed portion 13 in one side thereof which is adapted to be electrically connected to a suitable shunt. The inner side of the recessed portion 13 is preferably covered with a thin layer 14 of metal of high electrical conductivity, such as copper, which is adherently deposited thereon in any suitable manner, as by a fine spray of molten metal, as is well known in the art. A suitable flux is then applied over the metal coating to facilitate alloying with metal of a shunt or terminal member. A suitable shunt including a flexible conductor 15 may be arranged to extend through a passage 16 in the end of the contact element 12 and is electrically connected to a terminal element 17 in any suitable manner, as by welding thereto. The terminal element 17 may be formed of any suitable material, such as steel, and coated with a thin layer of alloying metal, such as zinc, cadmium, or tin and arranged in the recessed portion 13 of the contact element 12 with the tin surface thereof in good electrical contact with the metal surface 14 of the recess, after which a good electrical and mechanical bond is formed between the terminal element 17 and the carbonaceous material of the contact element 12 by subjecting the contact surface metals under pressure to a suitable alloying temperature for a brief period of time, preferably a few seconds. I have found that this can be very suitably carried out by passing a relatively large electric current between welding electrodes through the shunt terminal and the brush, such that the joint formed therebetween possesses the properties characteristic of a joint formed in this manner. If desired, a filler material 18 may be arranged over the shunt terminal in the recessed portion 13, thereby sealing it against corrosive elements and providing a more desirably smooth surface to the contact member. This filler material 18 preferably is made of a compound of carbon and metal powders with a suitable binder which may be cured under pressure by an electrically heated ram to unite it securely to the carbonaceous material of the contact member 12.

While I have illustrated and described particular embodiments of my invention, modifications thereof will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not to be limited to the particular arrangements disclosed, and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A contact brush of carbonaceous material having a portion adapted to be electrically connected to a shunt, a layer of copper adherently deposited on said portion of said brush, and a shunt including a steel clip having a flexible conductor electrically connected thereto and having a surface with a thin layer of tin thereon arranged in contact with said layer of copper on said brush and bonded thereto, said bond having the properties characteristic of a joint in which the clip has been heated to substantially an alloying temperature of said copper and tin by passage of electric current through said clip and said brush for a few seconds.

2. A contact brush of carbonaceous material having a portion adapted to be electrically connected to a shunt, a layer of copper adherently deposited on said portion of said brush, and a metallic shunt bonded to said layer of copper on said brush by an alloy of tin and copper characterized by having a melting point substantially in excess of the melting point of tin.

3. A contact brush of carbonaceous material having a portion adapted to be electrically connected to a shunt, a layer of copper adherently deposited on said portion of said brush, and a shunt including a steel terminal element having a surface arranged adjacent to said copper and bonded thereto by a layer of tin and copper having a melting point substantially in excess of the melting point of tin.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,438,554	Robertson	Dec. 12, 1922
1,929,142	Hosfield	Oct. 3, 1933