

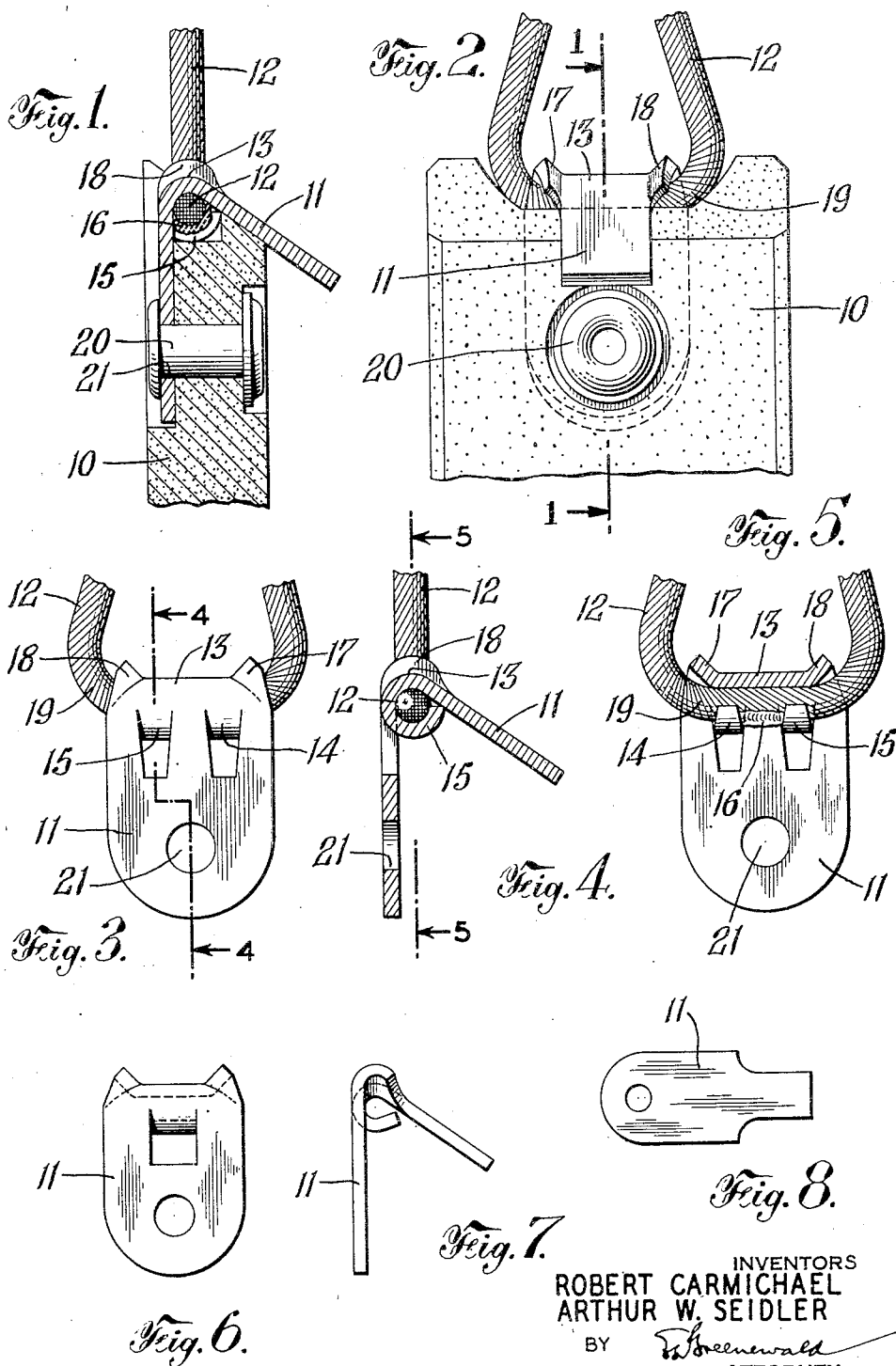
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STAKED TYPE SHUNT CONNECTION FOR CARBON BRUSHES

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STAKED TYPE SHUNT CONNECTION FOR
CARBON BRUSHES

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This invention pertains to commutator brushes or current collecting devices of carbon or graphite for use in electric machines and more particularly to shunt connections.

In the past, it has been common practice to use rivets, screws, bolts or solder to secure an electrical conductor either to a carbon brush or to a clip which in turn is secured to a carbon brush, to use various shapes of clips made of different conducting materials, to use various forms of welding for attaching a conductor to a clip and many other ingenious ways too numerous to mention. Regardless of the method used, the principal common objective is a shunt connection which insures good electrical and mechanical connection between a flexible braided conductor and a current collecting brush.

Although all existing pigtail connections have been devised with the aforementioned objective in mind, frequent brush failures have been experienced on marine crafts where the pigtails are subjected to corrosion by salt water and sea air in addition to severe vibration and flexing. The need of a substantially stronger shunt connection was self-evident to overcome the existing difficulties.

At first, it was thought that welding of a flexible conductor to a terminal clip which in turn is secured to a carbon brush would prove satisfactory. On the contrary, it was found that the heat generated at the point of weld and conducted away by the conductor oxidized the strands of the conductor sufficiently to make them stiff. When the stiff conductor was subjected to frequent flexing or severe vibrations, the strands of the conductor were easily broken.

For a good electrical connection between the conductor and the brush the use of solder is most desirable. However, the tendency of molten solder to be taken up by the conductor by capillary action either during the initial application of the solder or if the solder should be melted by excessive heat due to heavy overload currents leads to an alloying effect on the strands of the conductor which tends to make them stiff and brittle. Further, when subjected to severe vibration and flexing, such a stiff conductor limits the movement of the brush.

According to the invention an improved method of attaching an electrical conductor to a terminal clip has been devised which insures good mechanical and electrical connection under the most adverse conditions and lessens the possibility of brush failures.

The principal objects of this invention are to

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provide an improved method of securing electrically and mechanically a flexible metallic conductor to a terminal clip attached to a current collecting brush; to provide a clip of such construction which will permit free flexing of the conductor without injury to the strands of the conductor; and to provide a clip having means for not only holding a flexible conductor rigidly in place but also preventing molten solder from being taken up by the strands of the conductor which causes undesirable stiffening of the conductor. These and other objects will be evident in the description of the invention which follows in which:

Fig. 1 is a section of a brush showing the conductor and clip attached thereto;

Fig. 2 is a front elevation of the assembled brush;

Fig. 3 is a rear view of the clip comprising the invention;

Fig. 4 is a section taken along line 4—4 of Fig. 3;

Fig. 5 is a front elevation taken along line 5—5 of Fig. 4;

Fig. 6 is a rear view of a clip showing a modification of the invention;

Fig. 7 is a side view of Fig. 6; and

Fig. 8 is a blank from which the clip is fashioned.

The shunt connection comprising the invention includes, in combination with a conventional brush 10, a substantially V-shaped terminal clip 11 of suitable conducting material and a flexible electrical conductor 12 having a loop thereof mechanically secured in place in a channel formed by the inner surface of the apex 13 of the clip 11 by tongues 14 and 15 spaced a predetermined distance apart and electrically connected to the clip 11 by solder 16 placed between the tongues 14 and 15.

The clip 11 is formed from a blank shown in Fig. 8 by bending the blank in such a manner that the edges 17 and 18 of the channel formed by the inner surfaces of the apex 13 are rounded upwardly to permit easy bending of the flexible conductor without injury to the strands of the conductor when the conductor is subjected to severe vibration and flexing.

From the rear of the clip 11 are lanced two tongues 14 and 15, a predetermined distance apart for mechanically and rigidly securing the loop 19 to the clip 11 by crimping the tongues 14 and 15 over the loop 19 as clearly illustrated in Fig. 5. In the space provided between the tongues a metallic material 16 is inserted to es-

establish good electrical connection between the clip and the conductor. Such metallic material is preferably a solder having a low resistance in order to keep at a minimum the amount of heat developed when current is being conducted and having a high melting point in order to be able to withstand additional heat produced by excessive overload currents without melting the solder.

By crimping the tongues 14 and 15 very securely over the conductor 12, the tendency of molten solder flowing up the cable due to capillary action is minimized, thus reducing the tendency of the cable becoming stiff by such action.

Having securely affixed the conductor 12 to the clip 11, the clip is secured to the brush 10 by a rivet 20 which extends through an opening in the brush and a complementary opening 21 in one side of the clip.

For smaller size brushes designed for use on low current machines, the clip may be constructed with only one wide tongue as shown in Figs. 6 and 7, whereas, for use with excessively high current machines, the clips may contain any number of tongues necessary to increase the contacting surfaces between the clip and the conductor in order to reduce contact resistance and to insure a good electrical connection without undue heating or arcing.

We claim:

1. In combination with an electric contact brush, an improved shunt connection comprising a V-shaped terminal clip secured thereto, a flexible electrical conductor having a portion thereof disposed between said terminal clip and said brush and lying within a channel formed by the inner surfaces of the apex of said clip, and crimping means tightly attaching said conductor to said clip, the ends of said channel being bent away from said conductor.

2. In combination with an electric contact brush, an improved shunt connection comprising a terminal clip secured thereto and bent to form a channel for receiving a flexible electrical conductor, a flexible electrical conductor formed as a loop having a portion thereof disposed between said terminal clip and said brush and lying within said channel, said terminal clip having at least one tongue lanced from said clip underlying said

loop and mechanically securing the same to said clip, the ends of said channel being bent away from said conductor.

3. In combination with an electric contact brush, an improved shunt connection comprising a V-shaped terminal clip secured thereto, a flexible electrical conductor formed as a loop and having a portion thereof disposed between said terminal clip and said brush and lying within a channel formed by the inner surfaces of the apex of said clip, said terminal clip having at least two tongues lanced from the rear of said clip underlying said loop and mechanically securing said loop in said channel, the ends of said channel being bent away from said loop, and said tongues being spaced apart a predetermined distance to permit introduction of solder in order to join electrically the surfaces of said conductor and said clip.

4. In combination with an electric contact brush, an improved shunt connection comprising a terminal clip secured thereto and bent to form a channel for receiving a flexible electrical conductor, a flexible electrical conductor formed as a loop and having a portion thereof disposed between said terminal clip and said brush and lying within said channel, said terminal clip having at least two tongues lanced from said clip underlying said loop and mechanically securing said loop in said channel, the ends of said channel being bent away from said loop, and said tongues being spaced apart a predetermined distance to permit introduction of solder in the area between said tongues in order to join electrically the surfaces of said conductor and said clip.

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