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D. H. BRENNAN

2,857,540

ELECTRIC CONTACT BRUSH ASSEMBLY

Filed Sept. 22, 1955

Fig. 1.

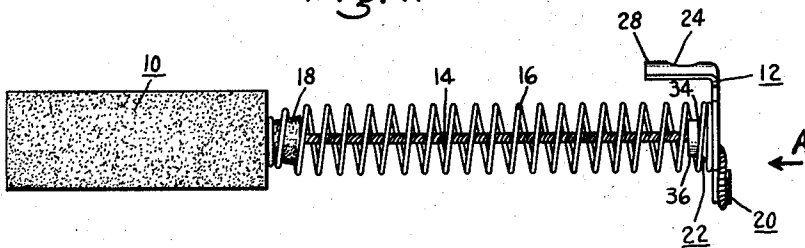


Fig. 2.

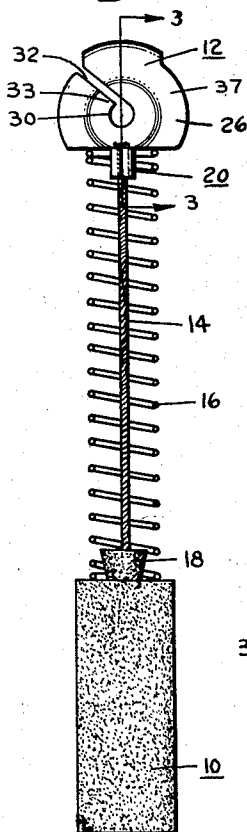


Fig. 3.

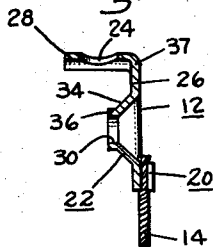


Fig. 4.

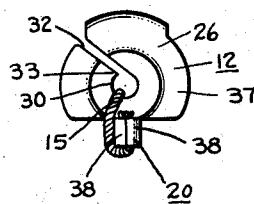


Fig. 5.

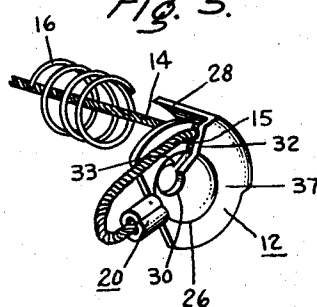
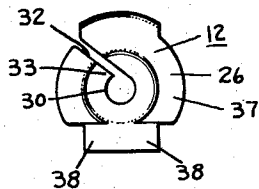


Fig. 6.



Inventor:
Daniel H. Brennan
by Armand Cifelli
His Attorney

2,857,540

ELECTRIC CONTACT BRUSH ASSEMBLY

Daniel H. Brennan, Cleveland Heights, Ohio, assignor to General Electric Company, a corporation of New York

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9 Claims. (Cl. 310—249)

My invention relates to electric contact brush assemblies and the method of making the same.

Connecting electric contact brushes to lead wires in motors has always been troublesome. Most electric contact brush assemblies comprise a contact brush and a terminal which are connected by a flexible electrical conductor, and a lead wire which is connected to some portion of the terminal. A particular problem in assembling contact brush assemblies is that of connecting the conductor to the terminal. It is important for the overall efficiency of the assembly that the conductor be centered with relation to the terminal and the brush. A prevalent method, prior to my invention, for assembling the contact brush assembly was to connect one end of a flexible electrical conductor to a contact brush and the other end of the conductor to a terminal by providing a small hole in the terminal and feeding said other end of the conductor through the hole and soldering it to the terminal. In this method, the hole in the terminal had to be kept small to prevent excessive amounts of solder from running through the hole and down the conductor, thereby causing the conductor to become rigid, an undesirable condition.

It is one object of the invention to provide an improved electric contact brush assembly.

Another object of the invention is to provide an improved method of making an electric contact brush assembly.

The objects of my invention are accomplished in one form by providing an improved terminal which provides for a solderless connection between the terminal and the flexible electrical conductor and thereby permits swift and easy assembly of the device.

Other objects and further details of that which I believe to be novel and my invention will be clear from the following description and claims taken with the accompanying drawings wherein:

Fig. 1 is an elevation view of the improved electric contact brush assembly.

Fig. 2 is an elevation view of the improved electric contact brush assembly at the stage during the steps of assembling the device, after the flexible electrical conductor has been connected to both the contact brush and the terminal, but before the conductor has been passed through the slot in the terminal and disposed in its final assembled position.

Fig. 3 is a sectional view taken substantially on line 3—3 of Fig. 2.

Fig. 4 is an end elevation view of the electric contact brush assembly shown in Fig. 1 looking in the direction of the arrow A.

Fig. 5 is a fragmentary perspective view showing the spring, terminal and flexible electrical conductor during the step of passing the conductor through the slot in the terminal, just prior to its being seated in its final assembled position.

Fig. 6 is an elevation view of the terminal prior to being assembled.

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Referring to the drawing, there is illustrated an electric contact brush assembly, such as those used with commutating dynamo-electric machines, which comprises the contact brush 10 which may be a conventional carbon brush, the electrical connector 12 which is herein referred to as a terminal, the pigtail or shunt 14 which is herein referred to as a flexible electrical conductor, and the coiled compression spring 16.

As viewed in Fig. 1 it will be seen that the conductor 14 is in the form of a flexible wire, and is secured at one end of its ends to the projection 18 formed at one end of the brush 10. The other end of the conductor 14 passes through the terminal 12 and is secured in the solderless connecting portion 20 of the terminal. The spring 16 is seated at one of its ends about the brush projection 18 and at its other end about a raised portion 22 of the terminal 12.

From Fig. 1 it will be observed that when the parts are fully assembled, the conductor 14 is disposed centrally of the spring 16; this is a desirable condition because it allows for even spring pressure on the brush. The contact brush assembly may be incorporated in a motor in any conventional manner. When so incorporated, a lead wire from the motor may be connected to the terminal 12, as by being connected in opening 24 of the flange 28 of the terminal.

The detailed construction of the terminal 12 can best be seen in Figs. 2 through 6, wherein it will be seen that the terminal generally comprises a bent and formed metal piece having a central portion 26 which is somewhat disk-like, but which has one side cut to form crimping tabs 38 which comprise the referred-to solderless connecting portion 20 (see Fig. 6). On the side opposite to the portion 20, the terminal has the referred-to, laterally extending flange 28 which has the opening 24 formed therein for facilitating connection of a lead wire. Centrally of the portion 26 is formed the raised portion 22 having a central opening 30 from which a slot 32 extends to and through the periphery of the portion 26. Slot 32 is not formed on a line radiating from the hole 30, but on a line parallel to but slightly spaced from such a radial line; this arrangement provides a retaining tip 33 for the conductor 14. Additionally, the slot 32 extends through a portion of the periphery of the portion 26 which is generally opposite to the location of connecting portion 20 (see Fig. 2). The term "generally opposite" is intended to embrace angular displacements of more than 90°. The raised portion 22 comprises a frusto-conical portion 34 which terminates in the tubular portion 36 which surrounds the opening 30. The remainder of the central portion 26 comprises the flat, washer-like portion 37 which surrounds portion 34.

To assemble the parts, the conductor 14 is connected at one of its ends to the projecting portion 18 of the brush 10 and its other end is passed through the coiled spring 16, which is seated about the projecting portion 18. The other end of the conductor 14 is then disposed contiguous with the crimping tabs 38, and these tabs are crimped about said end. After this occurs, the parts will be disposed as they are illustrated in Figs. 2 and 3. It should be clearly understood, however, that the conductor 14 may be connected to the terminal 12 prior to connecting it to the brush 10, if it is so desired.

Assuming the parts to be in the position shown in Figs. 2 and 3, in order to fully assemble the parts, the conductor 14 is passed through the slot 32 in the terminal, as by compressing the spring 16, bending the portion 15 of the conductor 14 and sliding it through the slot 32. An interim stage during this manipulation is shown in Fig. 5. When the portion 15 of the conductor is fully seated in the opening 30 it will be disposed as shown in Figs. 1 and 4. In Fig. 4 it will be noted that due to the

disposition of slot 32, tip 33 prevents the portion 15 from inadvertently slipping out of hole 30. In Fig. 1 it will be observed that when fully assembled the conductor passes through the opening in the tubular portion 36, and that one end of the coil spring 16 is seated about the frusto-conical portion 34 of the terminal.

The foregoing fabrication and assembly of the parts of the electric contact brush assembly completely eliminates the necessity of soldering the flexible conductor to the terminal. This constitutes a significant improvement over prior art devices wherein it was necessary to pass an electrical conductor through a small opening in the terminal and then solder these parts. It can be readily appreciated that with the instant invention, to assemble the parts, it is simply necessary to crimp a portion of the terminal around an end of the electrical conductor, and pass the conductor through a slot into the opening in the terminal. It is an additional advantage of this invention that the entire terminal may be formed in a progressive die and the last step in the forming process may be the crimping of the terminal's solderless connecting portion about the end of the conductor.

The instant invention permits contact brush assemblies to be fabricated and assembled at an overall cost which is appreciably lower than that of comparable prior art constructions. In an art as old and as crowded as the one to which the instant invention pertains, such a reduction in cost is highly desirable.

As will be evident from the foregoing description, certain aspects of my invention are not limited to the particular details of construction of the example illustrated, and I contemplate that various and other modifications will occur to those skilled in the art. It is, therefore, my intention that the appended claims will cover such modifications and applications as do not depart from the true spirit and scope of my invention.

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

1. An electric contact brush assembly having a generally disk-like, planar terminal comprising a portion for crimping to a flexible electrical conductor, an opening spaced from said portion and disposed centrally of said terminal for reception of a portion of said conductor other than that which is crimped when the parts are fully assembled, and a slot having a width that is less than the diameter of said opening extending from said opening to and through an edge of said terminal for permitting passage of said portion of said conductor to said opening during assembly of the parts, said slot being parallel to a line radiating from said opening.

2. A terminal comprising a disk-like, planar member having an opening centrally disposed, a slot extending from said opening to and through an edge portion of said member, and a pair of crimping tabs spaced from said opening and formed at another edge portion of said member, the portion of said member surrounding said opening being displaced laterally to form a generally tubular portion.

3. A terminal comprising a generally planar, disk-like member having a central portion displaced laterally and forming a radially inner, tubular portion and an intermediate, frusto-conical portion, a radially outer, flat, washer-

like portion around said central portion, a slot in said member extending through said tubular portion, said intermediate portion and said outer portion, and a pair of tabs formed out of said outer portion on a side thereof generally opposite to where said slot extends through said outer portion.

4. An electric contact brush assembly comprising a contact brush, a terminal, resilient means urging said brush away from said terminal, a flexible electrical conductor secured at one of its ends to said brush, the other end of said conductor passing centrally through said terminal and being secured to said terminal at a non-central portion thereof by a solderless connection.

5. A device as defined in claim 4 wherein said terminal comprises an opening for receiving said conductor, and a slot extending from said opening to and through an edge of said terminal for permitting passage of a portion of said conductor to said opening during assembly of the parts.

6. A device as defined in claim 4 wherein said terminal has a pair of tabs formed at one of its edges for effecting the solderless connection.

7. A device as defined in claim 4 wherein said terminal comprises a generally planar, disk-like member having a central portion displaced laterally and forming a radially inner, tubular portion and an intermediate, frusto-conical portion, a radially outer, flat, washer-like portion around said central portion, said conductor passing through said tubular portion and said resilient means being seated about said frusto-conical portion.

8. A device as defined in claim 7 wherein said terminal includes a slot which extends through all of the terminal portions for permitting passage of said conductor to the interior of said tubular portion during assembly of the device.

9. The method of making a carbon brush assembly comprising the steps of forming and cutting a terminal with a central opening and a slot extending from said opening to and through an edge of the terminal, crimping a portion of said terminal onto an end of a flexible conductor, connecting the other end of said conductor to a contact brush, and passing a portion of said conductor through said slot to said opening.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,857,540

October 21, 1958

Daniel H. Brennan

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 48, list of references cited, under "UNITED STATES PATENTS", for

"831,158 Herz ~~Nov. 6, 1906~~

read

~~835,158~~ Herz ~~Nov. 6, 1906~~

Signed and sealed this 21st day of July 1959.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents

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