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RESILIENT PAD FOR ELECTRICAL CONTACT BRUSHES

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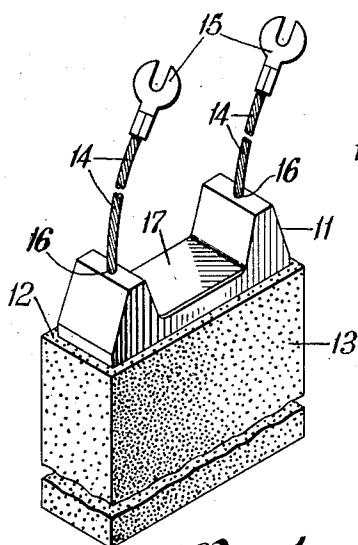


Fig. 1.

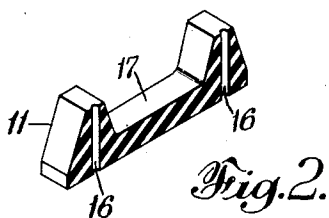


Fig. 2.

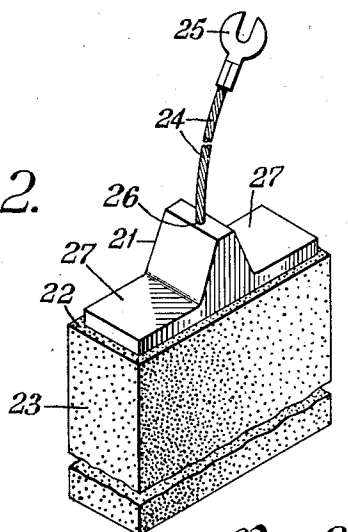


Fig. 3.

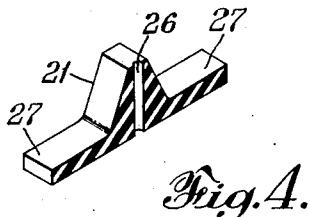


Fig. 4.

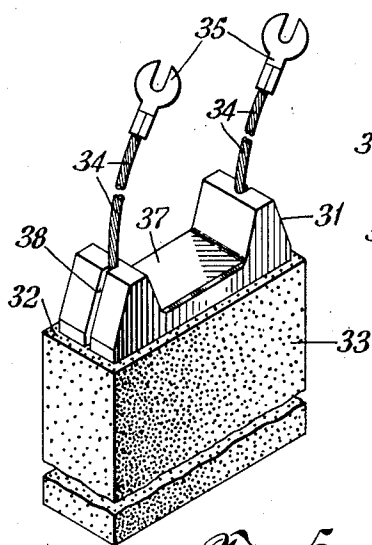


Fig. 5.

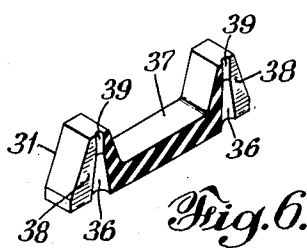


Fig. 6.

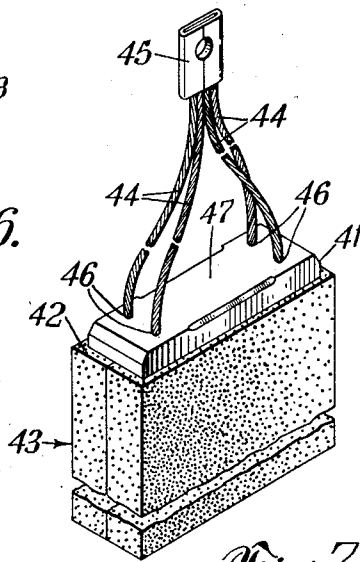


Fig. 7.

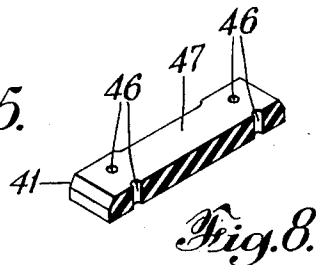


Fig. 8.

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RESILIENT PAD FOR ELECTRICAL CONTACT
BRUSHES

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1

The useful life of an electrical contact brush, made in whole or in part of carbon or graphite materials, is often shortened by the vibration of the brush and brush parts and also by the vibration of various parts of the electrical equipment against the brush. For example, the conventional cable shunts which connect a brush with an external current are subjected to continuous vibration when in use. As a result, these shunts frequently separate, usually at the point where the shunt enters the brush. In addition, the spring finger of a conventional brush holder vibrates against the top of the brush, often causing the fracture or cracking of the brush.

The primary object of the present invention is to increase the useful life of an electrical contact brush by reducing the effects of vibration on the brush and brush parts.

Another object of the invention is to provide a means of reducing the harmful effects of both the vibration of cable shunts and the vibration of the spring finger of a brush holder against the holder end of the brush.

These objects are accomplished by providing the end face of the holder end of a brush with a resilient pad, preferably a pad made of an elastomer, and extending through this pad the cable shunts attached to the brush, the shunts being gripped or held firmly by the resilient pad.

Among the advantages of a brush equipped with a resilient pad according to the invention is the protection given the brush from the spring finger of the brush holder. Movement of the spring finger against the brush, caused in part by the unevenness of the moving surface over which the brush travels and in part by the vibrations created by the moving parts of the electrical equipment, is cushioned or absorbed by the resilient pad. Because the pad grips the cable shunt, the possibility of the pad becoming displaced is greatly reduced, and when two shunts extend through the pad this possibility is eliminated.

The effectiveness of resilient pads attached to brushes according to the invention in reducing the harmful consequences of the vibration of the cable shunts is apparent from the following data: Cable shunts attached to a brush without the protection of a resilient pad separated after an average of 2.45 million vibrations. Similar shunts under similar conditions which were extended through resilient pads according to the invention withstood up to 4.2 million vibrations before separating.

Great improvement is also noted in the stability of the resistance of tamped shunt connections when brushes are equipped with resilient pads

2

according to the invention. The increase in the voltage drop across shunt connections of brushes so equipped was only 22 millivolts on the average, at 10 amperes, after protracted use of the brush. Similar brushes without resilient pads but under the same conditions of service exhibited increases in the voltage drop across shunt connections of 146 millivolts on the average, at 10 amperes.

Should the cable shunts separate at or near the point of their entry into the brush, the most common point for failure to occur, the dangling end of the shunt is held by the pad, preventing "flash-overs" from the broken shunt to another shunt or other parts of the electrical equipment.

The drawing shows several embodiments of the present invention.

In the drawing:

Fig. 1 is a view showing a brush having two cable shunts extending from it and a resilient pad assembled in accordance with the teachings of the invention.

Fig. 2 is a view of the resilient pad, parts being broken away, shown in Fig. 1.

Fig. 3 is a view showing a brush having one cable shunt extending from it and a resilient pad assembled in accordance with the teachings of the invention.

Fig. 4 is a view of the resilient pad, parts being broken away, shown in Fig. 3.

Fig. 5 is a view similar to Fig. 1 with a modified resilient pad.

Fig. 6 is a view, parts being broken away, of the modified resilient pad shown in Fig. 5.

Fig. 7 is a view similar to Fig. 1 with a modified resilient pad for use with a split brush.

Fig. 8 is a view, parts being broken away, of the modified resilient pad shown in Fig. 7.

Referring more in detail to Figs. 1 and 2 of the drawing, a resilient pad 11 is positioned on the end face 12 of an electrical contact brush 13, the cable shunts 14 extending through the resilient pad 11. For convenience in fabricating, the terminals 15 on the shunts 14 may be attached after the shunts 14 are threaded through the pad 11. Openings 16 through the pad 11, which serve as passageways for the shunts 14, can be and preferably are provided. When these openings 16 are present, it is important that the smallest diameter of the opening is less than the outside diameter of the shunts 14 to insure the gripping of the shunts 14 by the pad 11. The surface 17 of the pad 11 presents a suitable resilient surface against which the spring finger of a brush holder might bear.

In Figs. 3 and 4 the brush 23 is provided with only one cable shunt 24, and the resilient pad 21

on the end face 22 is modified accordingly. The remarks made above concerning the terminals 15 and openings 16 apply to terminal 25 and opening 26 of this embodiment of the invention. The surfaces 27 of the pad 21 present a resilient surface to the spring finger of a brush holder.

In Figs. 5 and 6, two modifications of a resilient pad within the scope of the invention are illustrated. It will be apparent that these modifications need not be used on the same pad since each is independent of the other. As is shown in the drawing, the resilient pad 31 is placed on the end face 32 of the holder end of the brush 33, with the cable shunts 34, to which terminals 35 may be attached, extending through and being gripped by the pad 31. Slots 38 extending from openings 36 in the pad 31 to the outer surface of the pad are provided. These slots 38 facilitate assembly of the brush 33 and pad 31 by permitting the pad 31 to be slipped around the shunts 34. For any given opening 36, the slotted pad will not grip the shunts as tightly as would a pad without slots but the gripping action obtained with the slotted pad is nevertheless satisfactory in most instances.

The openings 36 in the pad 31 are tapered in the bottom portions. The top portions 39 of the openings 36 are smaller than the diameters of the cable shunts 34 while the lower portions of the openings may be slightly larger than the shunts 34. If so, the pad 31 grips the shunt 34 at the top of the opening only. The tapered opening facilitates the alignment of the pad and shunts. The results with this pad have been excellent. The surface 37 of the pad 31 presents a suitable resilient surface for the spring finger of a brush holder to bear against.

Figs. 7 and 8 illustrate a flat resilient pad 41 adapted for use with a split brush 43. The pad 41 is held in position on the end face 42 of the brush 43 as a result of the gripping action exerted by the resilient pad 41 on the cable shunts 44. Openings 46 through the pad 41 can be and preferably are provided as passageways for the shunts 44. The surface 47 of the pad 41 presents a resilient surface against which the spring finger of a brush holder might bear. The remarks made about the terminals 15 and openings 16 apply to the terminal 45 and openings 46.

The use of the resilient pad with a split brush, as shown in Figs. 7 and 8, results in several advantages in addition to those ordinarily obtained with the pads of the invention. Great difficulty has been experienced in securing pads of the prior art to split brushes by cementing the pads to both halves of the brush. With the resilient pad of the invention, this difficulty is

obviated since no cement is used. In addition, the resilient pad tends to equalize the riding pressure on the brush halves.

Excellent results have been obtained with the resilient pad shown in Fig. 1 made of the elastomer, neoprene, a synthetic rubber. This pad, for use with a brush having shunts of about 0.102 inch in diameter, had openings of about 0.080 inch through it and extended up the shunts for above five-eighths of an inch above the top of the brush.

The resilient pad can, of course, be made of any number of resilient materials. Among those elastomers found suitable are natural rubber, and rubbery polymers and copolymers of butadiene.

The various modifications of the invention illustrated in the drawing are by no means exhaustive of those within the scope of the invention which might be adopted. As an example of another possible modification within the invention, the pad 11 shown in Fig. 1 can be adapted for use with the split brush shown in Fig. 7, and the tapered openings 36 shown in Fig. 6 may be used with such a pad if desired.

I claim:

1. An electrical contact brush, at least one cable shunt extending from the end face of the holder end of said brush, and a resilient pad, said resilient pad being disposed on the end face of the holder end of said brush, each said cable shunt extending through and being gripped by said resilient pad, said resilient pad having a surface against which the spring finger of a brush holder can bear.

2. An electrical contact brush, at least one cable shunt extending from the end face of the holder end of said brush, and a resilient pad made of an elastomer, said resilient pad being disposed on the end face of the holder end of said brush, each said cable shunt extending through and being gripped by said resilient pad, said resilient pad having a surface against which the spring finger of a brush holder can bear.

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