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BRUSH FOR ELECTRICAL MACHINERY

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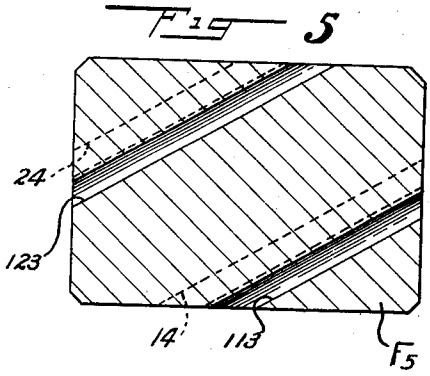


Fig 5

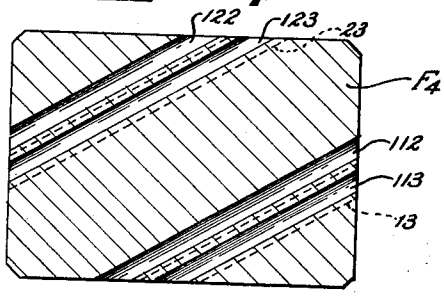


Fig 4

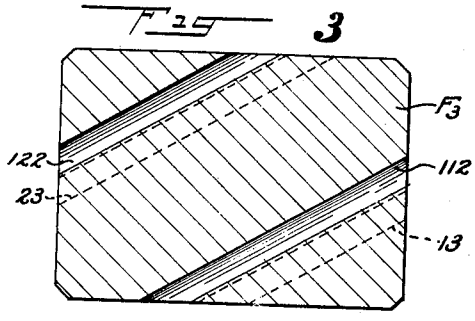


Fig 3

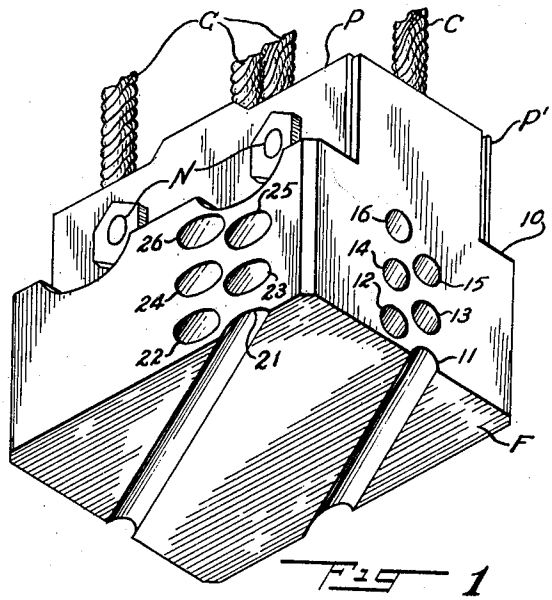


Fig 1

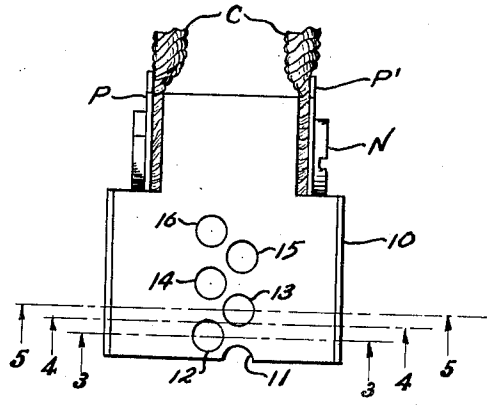


Fig 2

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BRUSH FOR ELECTRICAL MACHINERY

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12 Claims. (Cl. 171—325)

This invention relates to brushes for electrical machinery and especially to brushes which are adapted to contact means carried by rotating parts, such for example as commutators or collecting rings, in order to establish a current through such rotating parts, including rotors, armatures and the like.

Such brushes are usually produced by molding finely divided carbon, graphitized carbon, or a mixture of carbon and metal, such as copper, and then baking the molded product. A solid brush is thereby produced which is quite effective in general but has certain minor disadvantages. In the case of a brush having a wearing face in contact with a commutator or collector ring rotating at considerable speed, it has been found that the effectiveness of the electrical contact between the wearing face of the brush and the commutator or collector ring may be lessened by a vacuum or a pressure which tends to develop under portions of the face of the brush, and also by foreign particles of matter which attempt to pass under the brush.

To overcome the above disadvantages, a groove or grooves, preferably extending diagonally across the wearing face of the brush, have been found to be very effective in preventing the development of a vacuum or pressure at any point under the wearing face, and also in assisting the brush to free itself of foreign particles of matter attempting to pass under the brush.

However, as the brush wears down in service, that portion of the brush containing the groove will be worn away eventually and there will then no longer be a groove in the wearing face of the brush. The objects of this invention, therefore, are to provide a brush having means for continuously providing a groove in the wearing face thereof; and to provide such a brush which will be simple and economical to manufacture. Other objects and advantages will become apparent from the following description and the accompanying drawing, in which:

Fig. 1 is a perspective view of a brush embodying this invention;

Fig. 2 is an end view of the brush of Fig 1; and

Figs. 3, 4 and 5 are horizontal sectional views taken along the lines 3—3, 4—4 and 5—5, respectively, of Fig. 2.

A brush embodying this invention, as illustrated in Fig. 1, may comprise a body 10 of rectangular cross-section and consisting of a molded block of conductive material such as carbon, metal, or a mixture of carbon and metal. The body 10 is illustrated in a vertical position and has at one end thereof an initial contacting and a bearing or wearing face F adapted to engage the surface of a commutator or collector ring. One or more electrical connectors, such as flexible copper cables C, may be conductively secured to the opposite end of the body by bolts N and metallic plates P and P'. The body 10 is adapted to be inserted in a suitable brush holder and also may be provided with any other type of suitable connector.

The wearing face F is desirably initially provided with one or more recesses or grooves; for example, a diagonal groove 11 extending across the face F and terminating in adjoining sides of the body, and a second diagonal groove 21 extending across the face F and terminating in the other two adjoining sides of the body. The grooves 11 and 21 may have any suitable cross-sectional shape, such as semi-circular.

According to this invention, the brush body is so constructed that its face F will have one or more grooves or recesses automatically formed therein to replace those grooves or recesses which become obliterated by removal of, or by service wear of, the brush. To this end and as here shown, the body of the brush may be provided with one or more holes or passages, such as a series of passages 13, 15, and 23, 25, in spaced vertical relation with, and parallel to, the grooves 11 and 21, respectively. Adjacent the first series or vertical row of passages 13, 15, is a second vertical row of passages 12, 14, 16, which is horizontally spaced from the first row and the passages of which are parallel to the passages of the first row. As is best illustrated in Fig. 2, each of the passages of the second row is disposed in echelon and spaced vertically overlapping relation to the adjacent passages of the first row, i. e.—the uppermost portion of any particular passage is higher than the lowermost portion of the passage of the next higher level in the adjacent row. A vertical row of passages 22, 24, 26, is similarly disposed adjacent the vertical row of passages 23, 25.

These passages may have any suitable cross-sectional shape, such as circular; and these passages as well as the initial grooves may be formed in the body 10 by drilling or machining, or may be formed in the body during the molding operation, previous to the heating or baking. In addition, the passages may overlap any desired distance,

but an overlap of one-third the radius of the passages has been found to be desirable in the case of passages of circular cross-section.

As the brush becomes worn during service, successive horizontal portions of the body 10 of the brush will become wearing faces and the grooves 11 and 21 will finally disappear; but as soon as the grooves 11 and 21 begin to disappear, and preferably before they are entirely obliterated, the passages 12 and 22 will automatically provide new grooves in the wearing face of the brush; and as the successive grooves disappear, succeeding passages will provide grooves, so that one or more recesses or grooves will always be present in the wearing face of the brush.

The transition from the groove provided by one passage to the groove provided by an adjacent passage is illustrated in Figs. 3 to 5. When the original contact portion of the brush has worn away to the line 3—3 of Fig. 2, the surface F_3 of Fig. 3 will become the wearing face and the passages 12 and 22 will provide grooves 112 and 122; when the brush has become further worn to the line 4—4 of Fig. 2, the surface F_4 of Fig. 4 will become the wearing face and the passages 12, 13 and 22, 23 will provide grooves 112, 113 and 122, 123, respectively; and when the brush has become still further worn to the line 5—5 of Fig. 2, the surface F_5 of Fig. 5 will become the wearing face and the passages 13 and 23 will provide grooves 113 and 123. Thus it will be apparent that, due to the vertically overlapping relation of the passages and the original grooves, there will be automatically and continuously provided a groove in the wearing face throughout the useful life of the brush, not only when the wearing face is plane, but also when the wearing face is shaped to correspond with a portion of a circular commutator or collector ring.

The passages will not only continuously provide grooves in the wearing face of the brush in the manner explained above, but will also produce a more effective dissipation of the heat which may be produced by electrical and frictional effects.

It is to be understood that the brush may be used in other than vertical positions, that the brush may be continuously provided with a single groove or recess which may be inclined at any desirable angle to the ends or sides of the brush, that the passages may have any cross-sectional shape, and that other changes may be made which will not depart from the spirit of this invention.

What is claimed is:

1. A brush for electrical machinery comprising a body of conductive material having a contacting face subject to wear in service, said face having a recess therein, and a hole in said body so disposed that it will provide another recess in the contacting face of the brush as soon as the first-named recess becomes obliterated by service wear.

2. A brush for electrical machinery comprising a body of conductive material having a contacting face subject to wear in service, said face having a recess therein, and holes in said body so disposed relatively to said recess and to one another that said holes will successively provide other and separate recesses in successive contacting faces of the brush as soon as a preceding recess is obliterated by service wear.

3. A brush for electrical machinery comprising a conductive body having a wearing surface provided with a groove, said body also having means for continuously providing a groove in the wearing face thereof as said surface wears off.

4. A brush for electrical machinery comprising a body having a plurality of passages therethrough, said passages being disposed substantially parallel to the lower surface of said body and also disposed in vertically overlapping relation so as to continuously provide a groove in the wearing face of said brush.

5. A brush for electrical machinery comprising a body having a wearing face provided with a groove, and a plurality of passages disposed substantially parallel to said wearing face, said passages being disposed in vertically overlapping relation so as to continuously provide a groove in the wearing face of said brush as said brush becomes worn.

6. A brush for electrical machinery comprising a body having a lower surface and a plurality of passages formed in said body and disposed substantially parallel to said lower surface and to each other, said passages being disposed in at least two rows, said rows being spaced horizontally and the passages of one row being disposed in vertically overlapping relation with adjacent passages of the other row so as to continuously provide a groove in the wearing face of said brush as said brush becomes worn.

7. A brush for electrical machinery comprising a body having a lower surface adapted to provide a wearing face; a group of passages disposed substantially parallel to said lower surface and leading diagonally from one end of said brush to a side thereof adjacent said end; and a second group of passages also disposed substantially parallel to said lower surface and leading diagonally from the other side of said brush to the end of said brush opposite said first-mentioned end, the passages of each of said groups being disposed in two spaced vertical rows and each passage being in vertically overlapping relation with an adjacent passage of the adjacent row so as to continuously provide a plurality of diagonal grooves in the wearing face of said brush as said brush becomes worn.

8. An article of manufacture comprising a body having a wearing face and at least two passages formed in said body and disposed substantially parallel to said wearing face, said passages being disposed in spaced vertically overlapping relation, the said passages being disposed in such relation that the uppermost portion of any particular passage is higher than the lowermost portion of the passage of the next higher level.

9. A brush for electrical machinery comprising a body having a wearing face provided with a diagonal groove; and a passage formed in said body and disposed substantially parallel to said wearing face, said passage being disposed in such spaced relation with said groove that as said wearing surface wears the passage is uncovered before the groove disappears.

10. An article of manufacture comprising a carbonaceous body having a bearing face provided with a diagonal groove; and at least one passage formed in said body and disposed substantially parallel to said groove and also in spaced relation with said groove and in such spaced relation that said passage is changed to a groove before said first-named groove disappears due to the wearing away of said bearing face in use.

11. An article of manufacture comprising a body having a wearing face provided with a groove of substantially semi-circular cross-sec-

tion, and a plurality of passages formed in said body and disposed substantially parallel to said wearing face, said passages being disposed in echelon and having a substantially circular cross-section so that at least one passage is always uncovered to provide a groove in said wearing face as the latter wears away in use.

12. An article of manufacture as set forth in claim 11, in which said passages are adapted to be uncovered for substantially one-third the radius thereof before the disappearing groove disdisappears.

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