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BRUSH STRUCTURE WITH PARALLEL FLAKES

Filed Sept. 4, 1943

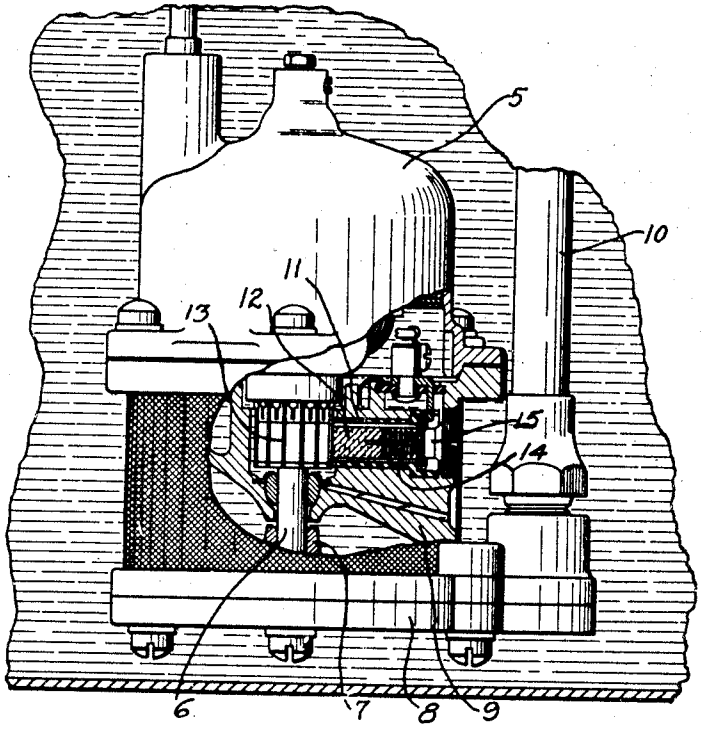


FIG. 1.

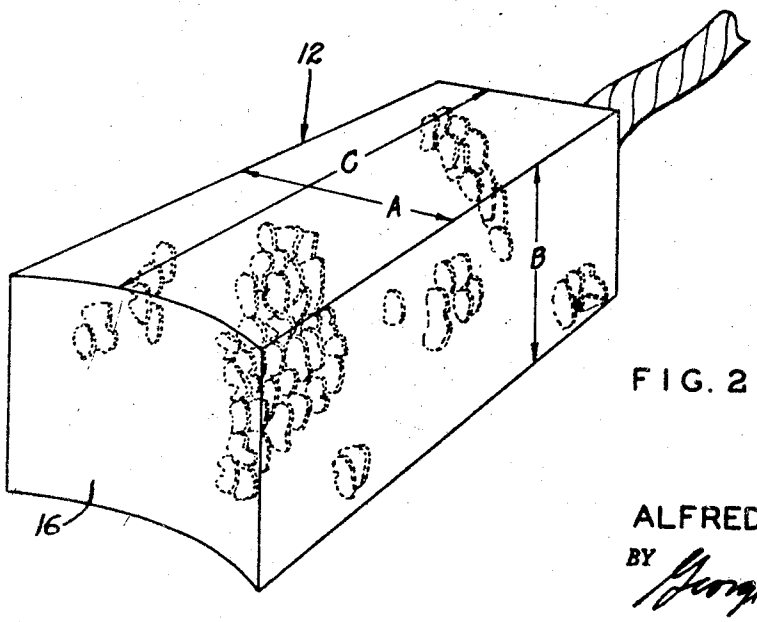


FIG. 2.

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BRUSH STRUCTURE WITH PARALLEL FLAKES

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Application September 4, 1943, Serial No. 501,318

6 Claims. (Cl. 171—325)

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This invention relates to brushes for electrical machines particularly of the type which operate submerged in a liquid.

Patent No. 2,319,934 of the present inventor and another discloses an electrical fuel pump which operates submerged in the fuel tank with all of the motor parts bathed by the fuel, in normal service. It has been found that gasoline, particularly the aromatic, commercially supplied, causes the ordinary graphite brushes to swell and, frequently, become lodged in the brush carrier. Such brushes are, customarily, formed of flaked graphite material and applicant discovered that the swelling occurs only in the direction normal to the planes of the flake surfaces. It was further discovered that such brushes, as commercially furnished, sometimes swelled in one dimension and sometimes in another depending upon the alignment of the graphite flakes.

It is the main object of the present invention to provide means for preventing sticking of the brush in the brush carrier due to swelling caused by immersion of the brush in gasoline fuel.

It is another object to provide a brush in which the swelling tends to compensate for the normal wear of the brush in service.

These objects and other more detailed objects hereafter appearing are attained by the structure and method disclosed in the attached drawing, in which:

Fig. 1 is a side view, partially sectioned, illustrating an electric fuel pump for operation submerged in a fuel tank and embodying the invention.

Fig. 2 is an enluarged view of the novel brush with the flake arrangement illustrated diagrammatically.

The pump device illustrated comprises an electric motor enclosed within a housing 5 and having a depending shaft 6 to the lower extremity of which a centrifugal impeller 7 is attached. The pump casing 8 is attached to the motor casing by radial ribs, one being shown at 9, and the unit is supported in the fuel tank by means of a rigid tube 10 which also serves as the outlet for the pumped fuel. This pump is fully described and claimed in the above-mentioned patent and in a co-pending application of the present inventor, Serial No. 473,683, filed January 27, 1943.

An insulated brush casing 11 is mounted in one of the ribs 9 with suitable relationship to a grounded brush (not shown). Slidable within casing 11 is a graphite brush 12 yieldingly urged

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against commutator 13 by a coiled spring 14 compressed between the brush and a plug 15 at the outer end of the carrier casing.

The brush is formed of flaky graphite material with all of the flakes arranged parallel to the arcuate wearing surface 16 thereof. By this arrangement of the flakes, the brush swelling occurs along the dimension C and tends to compensate for the normal wear of the brush during service. This arrangement of the flakes also prevents swelling of the brush along the dimensions A and B which would cause the same to stick in the carrier casing.

As an example of the effectiveness of this means of eliminating the bad effects of brush swelling, sample brushes were immersed in aromatic gasoline at 125° F. for 24 hours and, during this time, the brush increased in length as much as .011". Two of these brushes were then installed in a twenty-four volt electric fuel pump and run continuously for 917 hours immersed in fuel in the normal manner. It was then found that one of the brushes had neither increased nor decreased in length, while the wear on the other brush amounted to .0005". The normal wear of these brushes with the flakes arranged parallel to one of the sides of the brush, rather than to wearing surface, for the same period of time, was found to be .007". Accordingly, it was evident from the tests that the swelling in length, due to immersion of the brush in gasoline, practically compensated for the normal wear during the time of the test. However, exact compensation is not particularly necessary since both the swelling and wear occur longitudinally and the free sliding of the brush in its casing is maintained.

The invention may be modified in various respects as will occur to those skilled in the art and the exclusive use of all modifications as come within the scope of the appended claims is contemplated.

I claim:

1. A brush for electrical machines comprising a block of flaked material with the flakes arranged parallel to the wearing surface thereof.

2. An electrical brush for operation in contact with liquid or moisture comprising a block of flaked material susceptible to swelling by contact with the liquid or moisture, the flakes being arranged parallel to the wearing surface of the brush so that such swelling tends to compensate for the normal wear of the brush in service.

3. An electrical brush comprising graphite flakes pressed into a block with all the flakes arranged parallel to the wearing surface.

4. An electrical brush for operation in contact with a liquid comprising a block of flaked graphite with its flakes arranged parallel to the wearing surface thereof.

5. In an electrical machine, a commutator, a brush comprising a block of flaked graphite, a brush holder mounting the brush within an exposed surface engaging said commutator, and means to maintain said brush immersed in a bath of liquid during normal service, the graphite flakes being arranged parallel to said commutator engaging surface whereby swelling of the graphite tends to compensate for normal wear of the brush.

6. In an electrical machine for operation immersed in liquid, a brush mounting, a commutator, and a brush of flaky graphite supported in said mounting with the flakes thereof arranged parallel to the brush surface engaging said commutator whereby swelling of the graphite due to contact with the liquid occurs only in the direction normal to said surface.

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REFERENCES CITED

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