Nov. 5, 1929. W. C. KALB 1,734,811

BRUSH FOR DYNAMO ELECTRIC MACHINERY

Filed May 19, 1925

Fig. 1.

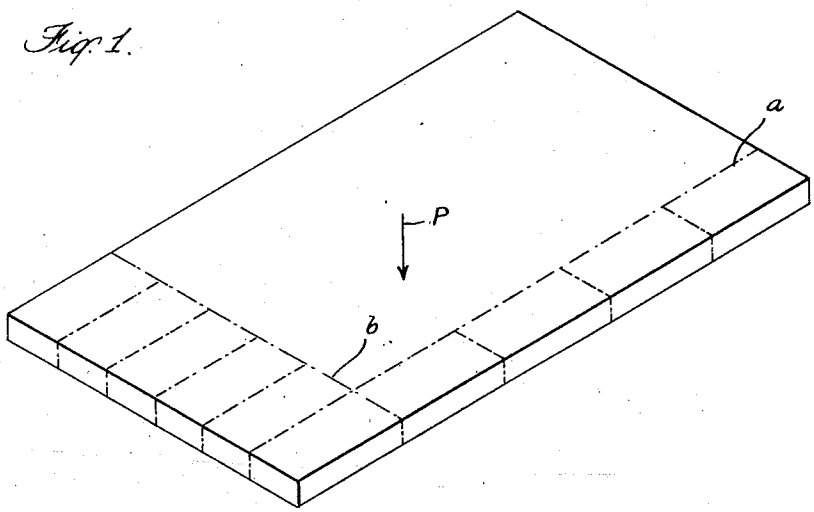


Fig. 2.

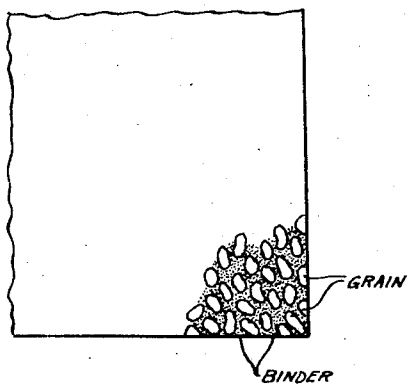


Fig. 3.



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UNITED STATES PATENT OFFICE

WARREN C. KALB, OF BRADFORD, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NATIONAL CARBON COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

BRUSH FOR DYNAMO-ELECTRIC MACHINERY

Application filed May 19, 1925. Serial No. 31,410.

My present invention relates to commutator brushes and processes for making same. In certain types of electrical machines it is desirable to employ brushes having a relatively high specific electrical resistance measured in the longitudinal direction. In accordance with the present invention I propose to obtain such relatively high longitudinal resistance by using a bond which in its final state is relatively non-conducting. At the same time it is desirable to maintain a high ratio of transverse to longitudinal specific electrical resistance in order to reduce as far as possible the leakage of current from one commutator segment to an adjoining one through the brush or brushes with which they are in similtaneous contact.

To the attainment of the foregoing and related ends, I preferably employ as the basis of my improved product graphite in flake form, the particles of which may be bonded by means of an organic binder which, however, in the final product is only partially carbonized whereby the electrical resistance of the product is increased. By employing flake graphite I take advantage of the fact that when compressed the individual flakes or laminæ arrange themselves flatwise to the direction of pressure, whereby the electrical resistance in the line of pressure is rendered greater than in a direction at right angles thereto for the reason that a greater number of contacts are formed in the transverse direction.

I have illustrated one embodiment of my invention in the accompanying drawing in which Figure 1 is a perspective view of the plate from which brushes constructed in accordance with my invention are cut;

Fig. 2 is a diagrammatic top view of one of the brushes; and

Fig. 3 is a side view of the same.

It should be remembered that for the sake of clearness the flakes or grains of graphite and the binder are drawn to a greatly exaggerated scale.

In carrying out my invention I may mix two and one-half pounds flake graphite with four fluid ounces of black strap molasses diluted with four ounces of water, the mixing being carried out at a temperature of 150° F. and continued until the moisture is nearly all driven off and lumps disappear leaving the entire mixture in the form of a loose powder. Plates of desired size are now made at a pressure of thirty tons per square inch applied flatwise thereof as shown by the arrow P in Fig. 1, a hydraulic press of suitable type being used for this purpose. The plates are then baked at a temperature of 420° F., the temperature rise being spread over an interval of about twenty-four hours. The plates thus made are then cut into brushes of the desired size and shape along lines *a* and *b* and other lines parallel thereto.

In lieu of a partially carbonized bond, I may employ other bonding media of comparatively high electrical resistance. Thus I may use sodium silicate for this purpose either alone or in connection with an organic binder such as tar or the like. The action of the sodium silicate is to coat the particles of graphite or other base material with a thin film whereby the overall specific electrical resistance of the brush is increased, while at the same time the mechanical strength of the final product is improved.

In cutting up the plates into brushes, the cutting is carried out so that the flatwise dimension of the plates corresponds to that of the brushes. When the flake material, such as flake graphite, is compacted, the particles tend to arrange themselves so that they are disposed flatwise to the line of pressure whereby the specific electrical resistance measured along the direction of the original pressure is greater than that measured at right angles thereto. The reason for this is that due to the flat shape of the particles there are more contacts in the line of pressure than in the direction at right angles to such line. Hence in the finished brush, the specific electrical resistance measured transversely will be greater than that measured in the longitudinal direction.

My improved product is characterized by comparatively high longitudinal electrical resistance, i. e., between .0010 and .0020 ohms per inch cube and a high ratio of transverse

to longitudinal specific electrical resistance, as for example 25:1 or higher.

It will be understood that the above specific example is given by way of illustration and that I do not limit myself to the exact quantities and values given. Thus, other organic bonding agents than the ones mentioned may be used, examples being sulphite liquor, sugar, etc.

What I claim is:

1. The process of making a commutator brush which comprises forming a mixture of 10 parts of flake graphite, one part of molasses and one part of water, partially drying the mixture, forming the mixture into plates, compressing the plates in one direction by a pressure of at least 25 tons to the square inch, baking the plates and cutting the plates into brushes in such a direction that the direction of pressure will be along the thickness of the brush.

2. The process of making a commutator brush which comprises forming a mixture of 10 parts of flake graphite, one part of molasses and one part of water, drying the mixture at a temperature of 150° F. until most of the moisture is driven off, forming the mixture into plates, compressing the plates in one direction by a pressure in excess of 25 tons to the square inch and baking the plates at a temperature of 420° F.

In testimony whereof I have affixed my signature to this specification.

WARREN C. KALB.