

No. 849,643.

PATENTED APR. 9, 1907.

C. W. SPEIRS.

COMPOSITION OR COMPOUND FOR BRUSHES OF DYNAMO ELECTRIC MACHINES

APPLICATION FILED JUNE 29, 1905.

Fig. 1.



Fig. 2.

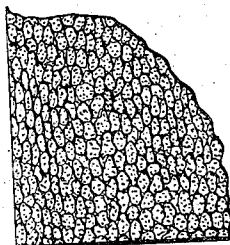


Fig. 3.

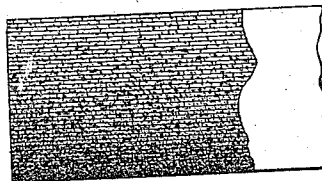
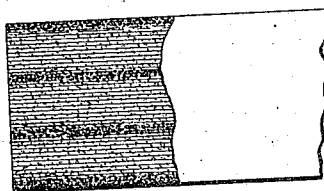


Fig. 4.



WITNESSES.

W. F. Hoyle
J. H. Hubbard

INVENTOR

Charles William Speirs

BY

Whitaker & Devost

Attorneys

UNITED STATES PATENT OFFICE.

CHARLES WILLIAM SPEIRS, OF BATTERSEA, LONDON, ENGLAND, ASSIGNOR
TO THE MORGAN CRUCIBLE COMPANY, LIMITED, OF LONDON, ENGLAND.

COMPOSITION OR COMPOUND FOR BRUSHES OF DYNAMO-ELECTRIC MACHINES.

No. 849,643.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed June 29, 1905. Serial No. 267,662.

To all whom it may concern:

Be it known that I, CHARLES WILLIAM SPEIRS, a subject of the King of Great Britain, residing at Battersea Works, Battersea, London, England, have invented a new and useful Improved Manufacture of Composition or Compound for Brushes of Dynamo-Electric Machines for Bearings and for other Articles; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the manufacture of a composition or compound for brushes of dynamo-electric machines, for bearings, and for other articles, and relates to an improvement in the manufacture described in the specifications of my former applications, dated November 7, 1904, Serial No. 231,820, and May 22, 1905, Serial No. 261,690.

In my former application, Serial No. 231,820, above referred to, I described and claimed a commutator-brush formed of plumbago, (such as may be obtained from Ceylon and which is of such nature that when ground it is in the condition of small flakes,) the ground plumbago being treated with a glutinous substance (such as gelatin in solution, containing one pound of gelatin to one hundred pounds of water and mixed with the ground plumbago in the proportion of one and one-half parts, by weight, of the former to one part of the latter) and then subjected to great pressure (for instance, twenty tons per square inch) in a direction at right angles to that in which the current is to flow through the brush, whereby the flakes will arrange themselves with their planes parallel with the pressing-surface, so that a relatively large number of contacts between the flakes will occur in the thickness of the brush compared with the number of contacts between the flakes in the length of the brush, and in my former application, Serial No. 261,690, above referred to, I described and claimed the method of manufacturing solid stratified blocks of plumbago, consisting of grinding the crystalline or flaked natural plumbago—for example, of the kind which is mined in Ceylon—to a suitable fineness and then subjecting it to such a high degree of pressure

as will cause the flakes to set themselves in stratified planes parallel to the plane of pressure.

In the course of numerous experiments which I have made in the manufacture of commutator-brushes and other articles by compressing crystalline or flaked natural plumbago, as described in the specifications of said patents, with or without the use of a gelatinous substance I have discovered that by the addition of a metal, such as copper or other metallic substance, in a finely-divided state the electrical conductivity of such brushes or other articles can be increased and the wearing properties improved and that metallic surfaces can be formed upon or in connection with such articles which are continuous with the non-metallic portion of the articles.

According to my invention the copper is first incorporated with the plumbago in a dry state, the plumbago being preferably in the form of a powder which will pass through a sieve of about two hundred meshes to the linear inch, and the copper being of any desired grade according to the special purpose in view from the fineness, say, of fine flour to that of the coarser grades of flour. The proportions may be varied according to the special purposes in view and also from point to point of the article. For instance, a layer of copper powder may be placed on one face of the article, next to this a layer containing a small proportion of plumbago, and so on throughout the article as desired. Also in a commutator-brush, for instance, that edge which first makes contact with any segment might contain, say, sixty per cent. of copper, while the edge that breaks contact can be without metal, and the intervening portion can be graded in layers with varying quantities of metal. The graphite and metal having been mixed together and arranged in the desired manner the mass is subjected to a high pressure—say from fifteen to thirty tons per square inch—in order to effect the thorough union or solidification of the mass and so that any face or layer which consists of copper powder only will form a continuous metallic face or layer in the compressed article. When the material is compressed, the flakes of plumbago will arrange themselves in stratified planes on account of the nature

of the plumbago as described in my former applications above referred to.

The plumbago may be treated with a glutinous substance or not, as desired. The mode of treatment with gelatin is described in my said application, dated November 7, 1904, Serial No. 231,820.

To illustrate my invention, I append a sheet of drawings, in which—

Figure 1 is a perspective view of a block of compressed plumbago and powdered metal made in accordance with my invention. Fig. 2 is a partial section, greatly magnified, taken in a plane parallel to the strata of the plumbago. Fig. 3 is a similar view taken in a plane perpendicular to the strata of plumbago and showing the proportion of metal, varying from one edge of the block to the other. Fig. 4 is a view similar to Fig. 3, showing a block in which several completely metallic layers extend throughout the block.

In these figures, *a a* indicate the flakes of plumbago, which are drawn as greatly magnified for the sake of clearness, and *b b* indicate dots which represent the metallic particles.

In Fig. 3 a block is shown in which a continuous copper layer is shown on one side at *b'*, and the succeeding layers of plumbago and metallic particles contain varying proportions of the metal, the proportion of metal decreasing toward the other face of the block, as shown. Such a block can be advantageously used for a commutator-brush.

In Fig. 4 I have shown several layers of metal only, as at *b'*, arranged at intervals

throughout the block and on the outer faces thereof.

The composition hereinbefore described, in addition to its use for dynamo-brushes, can be advantageously employed for the manufacture of other articles, especially in cases where a tough material with a good lubricating surface is desired—as, for instance, bearings for shafting, plungers for the dash-pots of electric-arc lamps, and the like.

In this specification the word “copper” is to be taken to include any equivalent metallic substance having analogous properties to copper for the purposes of the particular article in view.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

A commutator-brush consisting of compressed or crystalline plumbago having incorporated with it metallic copper in finely-divided condition, the flakes of plumbago being arranged in stratified planes parallel to the plane of pressure, and the metallic particles being so arranged as to form at one face of the brush an uninterrupted metallic surface, and being distributed through the mass in graduated proportions, the proportion of copper decreasing toward the opposite face of the brush, substantially as described.

CHARLES WILLIAM SPEIRS.

Witnesses:

WILLIAM WALTER JARVIS,
A. ALBUTT.