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No. 736,048. PATENTED AUG. 11, 1903.

C. WIRT.

COMMUTATOR BRUSH.

APPLICATION FILED JAN. 31, 1900.

NO MODEL.

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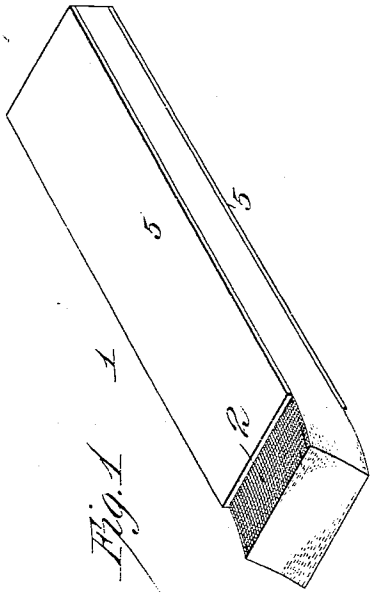
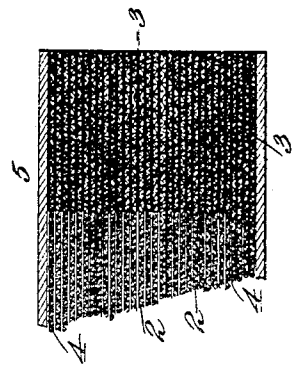


Fig. 1.



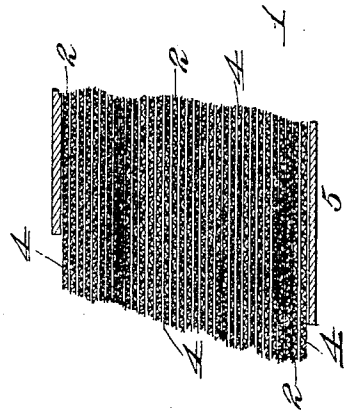


Fig. 2.

Witnesses:

Jas. F. Coleman

Jno. Robt Taylor

Inventor

Charles Wirt

by Dyer Edmunds & Dyer

Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 736,048. Patented August 11, 1903.

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UNITED STATES PATENT OFFICE.

CHARLES WIRT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE WIRT ELECTRIC COMPANY, INCORPORATED, A CORPORATION OF DELAWARE.

COMMUTATOR-BRUSH.

SPECIFICATION forming part of Letters Patent No. 736,048, dated August 11, 1903.

Application filed January 31, 1900. Serial No. 3,422. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WIRT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Commutator-Brushes, of which the following is a description.

My invention relates to various new and useful improvements in commutator-brushes; and the object of the invention is to improve the efficiency of the brushes heretofore used.

It may be accepted as a general rule that the best performances will be obtained with a brush having the highest resistance consistent with the amount of current to be carried. As is well known, carbon is largely used for this purpose, owing to its high resistance. In most cases, however, the resistance of the carbon is so high that it becomes necessary to provide either a large number of brushes or a large brush-surface and cross-section to do the work.

By means of my improved brush any desired high resistance can be obtained and at the same time the brush will be more compact, have a smaller cross-section, and be cheaper than a carbon brush of the same capacity. I prefer to also make my improved commutator-brush of such a character that it will have a polishing or burnishing effect upon the commutator, whereby the contact-surfaces both of the brush and of the commutator will be kept always bright and clean. Such a brush also will effect a more uniform wear between the mica and the copper bars of the commutator, owing to its polishing or burnishing action. I prefer also to make my improved commutator-brush of such a character that it will possess lubricating and smooth-running qualities.

The several advantages to which I have referred and which my invention in its preferred form possesses are preferably combined in one and the same structure, or, in other words, the commutator-brush is constructed so as to be of high resistance and to possess polishing or burnishing and lubricating or smooth-running qualities; but it will be possible to construct a commutator-brush which will be within the spirit of my present invention which may not possess all of such advantages and which will still be an efficient and valuable article of manufacture.

In carrying out my invention I prefer to construct the improved brush of a large number of very thin metal plates or gauze superimposed, some or all of which are coated on one or both sides with a very thin coating of a substance which is a poor electrical conductor and which also, preferably, is of such a character as to produce the desired burnishing or polishing effect and to offer in action the desired lubricating or smooth-running qualities. The said thin superimposed plates are preferably rigidly secured together at one end by means of solder under pressure, and they are also preferably given the desired rigidity by means of heavier clamping-plates extending on one or both sides of the completed brush.

In order that my invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a perspective view of a commutator-brush embodying my present improvements, and Fig. 2 a longitudinal section of portions of the said brush on a very much larger scale.

In both of the above views corresponding parts are represented by the same numerals of reference.

The brush in its entirety is represented by the numeral 1. Said brush comprises, essentially, a large number of thin metal plates or gauze 2, which are superimposed and extend parallel, being shown as secured together at one end by solder 3, after the application of which the brush is subjected to pressure, so that its upper end will be slightly contracted to enable it to be more easily introduced into the brush-holder. The plates 2 2 are preferably composed of some good conducting material, such as copper or brass; but by reason of their extreme thinness they offer the desired longitudinal resistance to the current. This longitudinal resistance may of course be increased by increasing the length of each of the plates or by decreasing their thickness. I find in practice that good results are obtained with a brush of the usual dimensions when

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the said plates are each about .004 of an inch in thickness. Some or all of the plates 2 are coated on one or both sides with a thin coating 4, which in practice and with the thickness of plates mentioned may be about .003 of an inch in thickness. The coating 4 is of low electrical conductivity, and it also preferably is of such a character as will give to the completed brush the polishing or burnishing effect desired and also the lubricating or smooth-running qualities referred to. When all of these properties are to be utilized, the coating 4 may consist of a suitable binding material capable of forming an adherent coating which will harden with time or the application of heat—such, for example, as varnish or shellac, to which is added a small amount of graphite or other form of carbon or finely-divided metals to make the coating slightly conductive and at the same time effect the necessary lubrication, together with some polishing material, such as crocus or other metallic oxids. In order that the brush may possess the desired stiffness, I prefer to employ two heavy plates 5 5 on either side thereof, and which are secured in place by the solder 3 during the manufacture of the brush. As the brush wears away these plates may be filed off, so as not to come in contact with the commutator.

By applying separate coatings of material of low electrical conductivity, as explained, to some or all of the plates the latter retain their individuality, so as to be properly flexible. In this respect my improved brush is distinguished from the composite brushes heretofore suggested, which have been made either by folding or bending the plates upon each other or else by dipping the plates in a coating material which serves to stick them together. With the prior devices, therefore, the plates have not been capable of independent movement, so that the brushes have been lacking in flexibility.

By constructing the commutator-brush of very thin metal plates or gauze, between which are interposed coatings of poor conducting material, any desired transverse resistance may be obtained with all the advantages attendant on such construction and which will be appreciated by those skilled in the art. By mixing with such a coating a lubricating material, such as graphite, the desired smooth-running qualities will be secured, while by adding to such coating a polishing material the commutator-brush serves also as a burnisher of the commutator and in action will serve to keep the commutator and the contact-surface of the brush always smooth and clean.

It will be understood that instead of combining all the advantages explained in a single structure it will be possible to dispense with both the lubricating and polishing substances in the coating 4, in which case the brush will possess all the advantages of a carbon brush in its high longitudinal resistance. It will also be possible for some purposes to use only a lubricating coating between the conducting-plates without regard to obtaining low longitudinal conductivity, but solely with regard to securing smooth-running qualities, and it will, furthermore, be understood that it will be possible to employ between the conducting-plates a polishing or burnishing substance without regard either to obtaining low longitudinal conductivity or smooth-running qualities. It will be self-evident, however, that when the advantages enumerated are combined in a single article a more desirable commutator-brush in every way will be produced.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. An improved commutator-brush, comprising a plurality of thin, separate, superimposed plates, some or all of said plates being provided with a thin separate coating of poor electrical conducting material, substantially as set forth.

2. An improved commutator-brush, comprising a plurality of thin, separate, superimposed plates, some or all of said plates being provided with a thin separate coating of poor electrical conducting material to which is added a polishing substance, substantially as set forth.

3. An improved commutator-brush, comprising a plurality of thin, separate, superimposed plates, some or all of said plates being provided with a thin separate coating of polishing material, substantially as set forth.

4. An improved commutator-brush, comprising a plurality of thin, separate, superimposed plates, some or all of said plates being provided with a thin separate coating of lubricating material, substantially as set forth.

5. An improved commutator-brush, comprising a plurality of thin, separate, superimposed plates, some or all of said plates being provided with a thin separate coating of poor electrical conducting material to which is added a polishing substance and a lubricating substance, substantially as set forth.

6. An improved commutator-brush, comprising a plurality of thin, separate, superimposed plates, some or all of said plates being provided with a thin separate coating of poor electrical conducting material, and stiffening plates on either side of the superimposed plates, substantially as set forth.

This specification signed and witnessed this 3d day of January, 1900.

CHARLES WIRT.

Witnesses:
ARCHIBALD G. REESE,
JNO. R. TAYLOR.