No. 646,476. Patented Apr. 3, 1900.

E. THOMSON.

CARBON BRUSH.

(Application filed May 5, 1897.)

(No Model.)

FIG. 1.

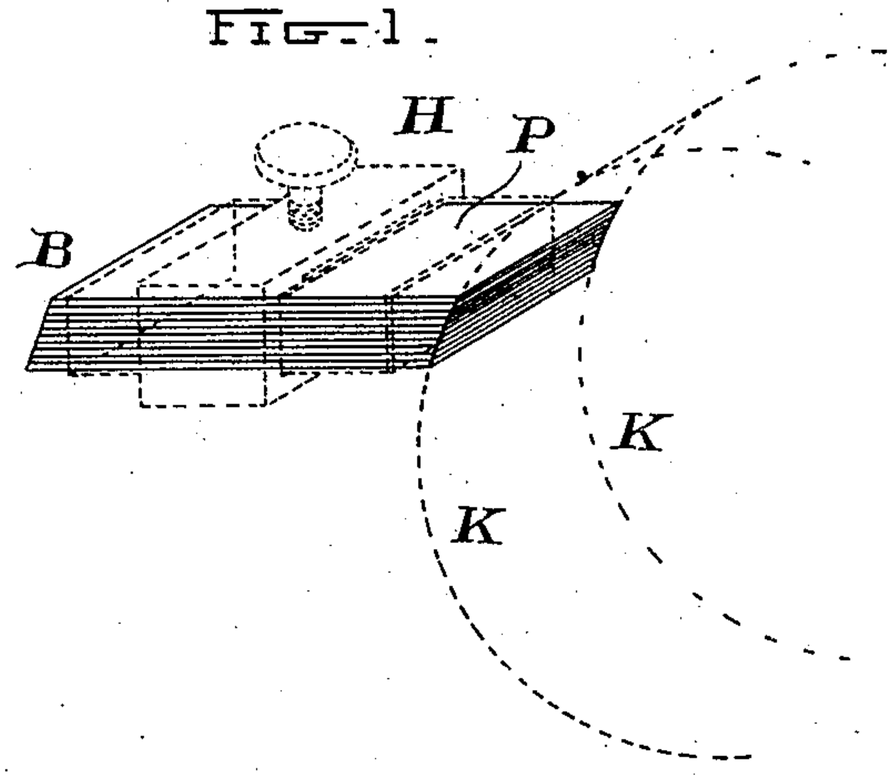


FIG. 2.

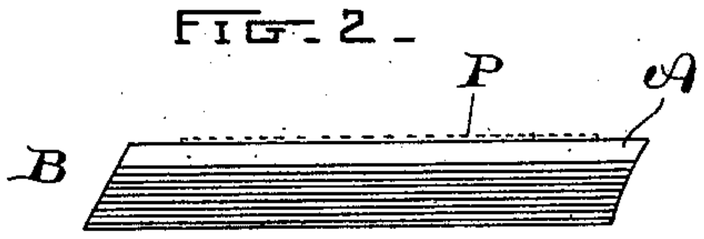
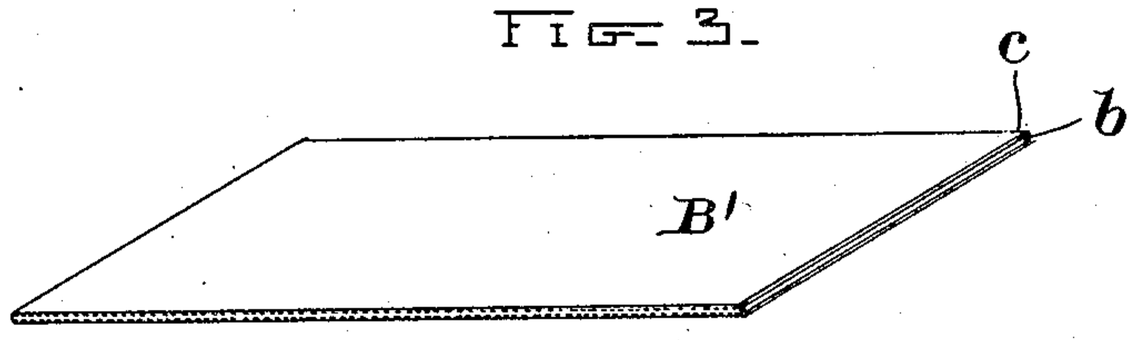


FIG. 3.



WITNESSES.
Henry W. Weidard.
John H. Gibbons.

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Elihu Thomson, by
Geo. R. Blodgett,
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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

CARBON BRUSH.

SPECIFICATION forming part of Letters Patent No. 646,476, dated April 3, 1900.

Application filed May 5, 1897. Serial No. 635,165. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Swampscott, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Carbon Brushes, (Case No. 564,) of which the following is a specification.

My invention relates to improvements in carbon brushes or collectors for dynamo-electric machines composed of a suitable form of carbon, such as gas-carbon, and has particular reference to overcoming the difficulty caused by the longitudinal resistance of the brushes without at the same time diminishing the lateral resistance tending to lessen the spark due to opening the short-circuited coils by the revolution of the commutator. In my Patents Nos. 539,453 and 539,454, dated May 21, 1895, I have shown brushes which are well adapted to this purpose. One of these patents shows strips or small pieces of carbon plated with metal and united by soldering or sweating into a mass. The other shows brushes made of carbonized fibrous material having a certain resilience and united at one end, the fibrous material being free at the end next the commutator and plated with metal, so as to insure sufficient stiffness and resilience and to obtain high longitudinal conductivity.

My present invention relates to the same class of brush and aims to combine in a single structure the advantages possessed by the two different devices described in my patents. For this purpose I take thin plates or laminæ of gas-carbon preferably, although I do not intend to limit myself to any form of carbon, nor in some features of construction do I intend to be limited to carbon at all. Each one of these laminæ is preferably the entire width of the brush, and I plate them with copper or any other conducting metal, though copper is preferred. I then clamp them in a suitable brush-holder, so that the plates are superposed and individually abut against the commutator in the usual way. Each plate is free to slide in adjusting, and the clamping does not impair the individual resiliency of the different carbon laminations.

As pointed out in my patents already referred to, the coating of copper or conducting metal should be so proportioned in thickness that it will readily wear away at the commutator end, so as to leave substantially a carbon surface on that end of the brush. In practice the brush will combine the advantages of the individual resiliency of the fibrous carbonized material in one of the patents above referred to with the strength of the construction shown in the other. At the same time the brush as herein described has advantages of its own in that the laminations of carbon are free to move one upon the other in adjusting, so that when the brush becomes worn to the curve of the commutator and must be advanced it makes contact at a number of points, the strips being each brought up to abut upon the commutator separately, and the brush soon takes its new curve.

The brush can be used on machines of moderate or low potential, from forty to one hundred and twenty-five volts, without undue loss of current due to the high specific resistance of the carbon, while the short-circuiting of the coils at the commutator is effected through a high resistance.

Brushes of any given thickness may be made by piling up the laminated gas-carbons, which should be perceptibly resilient and which I prefer to make quite thin in proportion to their width and length.

The accompanying drawings show an embodiment of my invention.

Figure 1 shows a brush in solid lines and a suitable clamp and commutator in dotted lines for clearness of apprehension. It is manifest that the detail of these is immaterial. Fig. 2 shows a modified form, and Fig. 3 shows an individual lamination.

In Fig. 1, B is the brush. H is a clamp in which the laminations may be held. A plate P, of metal, may extend over the whole upper surface, if desired. K, in dotted lines, shows the commutator-cylinder.

Fig. 2 shows a modified form, in which the

upper layer A is made of a thicker plate of carbon. In this case the metal plate P (shown in the figure in dotted lines) may be dispensed with, if desired.

Fig. 3 shows one of the individual laminations B′. As seen in the end view, this consists of a thin carbon part *b* and a metal coating *c*.

I prefer for the purposes of my invention strips of carbon of the full width of the brush and of a thickness of, say, one-sixteenth of an inch. The dimensions, however, may be varied without departing from my invention. Ordinarily, even for larger machines, in which my brush may be used, I prefer that the carbon plates or laminations shall not exceed about one-eighth of an inch in thickness, and plates of less thickness than this may be employed.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A carbon brush for a dynamo-electric machine, composed of superposed sheets or plates of carbon, and individually adjustable, each plate or sheet having a coating of good conducting metal.

2. A carbon brush for a dynamo-electric machine, composed of superposed plates or laminations of carbon, the plates being individually adjustable in the holder, and each plate or sheet having a coating of good conducting metal of such thickness as to be readily destroyed at the commutator end of the brush.

3. A collector for electric machines, which comprises a number of adjacent thin laminæ of carbon, and a clamp for said laminæ.

4. A collector for electric machines, which comprises a number of adjacent thin carbon laminæ, a casing therefor, a screw passing through the casing for clamping the laminæ together in the casing, and means for preventing the screw from injuring the laminæ.

5. A collector for electric machines, which comprises a number of adjacent resilient laminæ of conducting material.

6. A collector for electric machines, which comprises a number of adjacent resilient laminæ, each lamina being coated on its surface not engaging the commutator, with good conducting metal.

7. A collector for electric machines, which comprises a number of adjacent resilient laminæ of conducting material, each lamina having a coat of good conducting metal on its surfaces not engaging the commutator.

8. A collector for electric machines, which comprises a number of adjacent independently-movable resilient laminæ of gas-carbon.

9. A collector for electric machines, which comprises a number of adjacent independently-movable laminæ of conducting material, each lamina having a coat of good conducting metal on its surfaces not engaging the commutator.

10. A collector for electric machines, which comprises a number of adjacent laminæ of conducting material, each lamina having a coat of a good conducting metal on its surfaces not engaging with the commutator.

11. A collector for electric machines, which comprises a number of adjacent thin laminæ of conducting material which is readily breakable, one of the outside laminæ being of greater thickness than the others, a casing for the laminæ, and a screw passing through the casing, and bearing on the lamina of greater thickness to clamp the laminæ in the casing.

12. A collector for electric machines, which comprises a number of separate contiguous sheets of gas-carbon, and a clamp for securing and compressing the sheets together.

13. A collector for electric machines, which comprises a number of adjacent carbon laminæ, each lamina having a coat of good conducting material on its surface not engaging with a commutator or collecting ring, and a clamp for securing and compressing the laminæ together.

14. A current-collecting brush, which comprises a plurality of contiguous sheets of resistance-conductors coated with a highly-conducting metal, in such manner that the conducting metal will wear away at the ends with the resistance-conductors, and means for holding the sheets together in such manner that the end of each sheet may be moved independently of the others.

15. A current-collecting brush, which comprises a plurality of contiguous sheets of resistance-conductors coated with a highly-conducting metal in such manner that the conducting metal will wear away at the ends with the resistance-conductors, the sheets being independently adjustable, and means for holding the sheets together in their adjusted positions.

In witness whereof I have hereunto set my hand this 30th day of April, 1897.

ELIHU THOMSON.

Witnesses:
JOHN W. GIBBONEY,
F. O. LEMP.