(No Model.)

G. FORBES.

COMMUTATOR BRUSH FOR DYNAMOS.

No. 529,784. Patented Nov. 27, 1894.

Fig. 1.

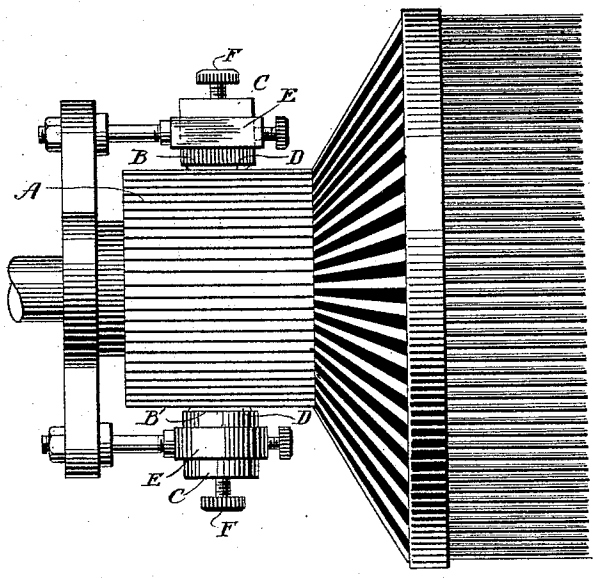


Fig. 2.

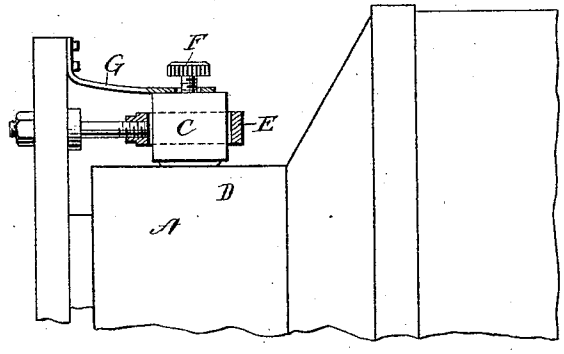
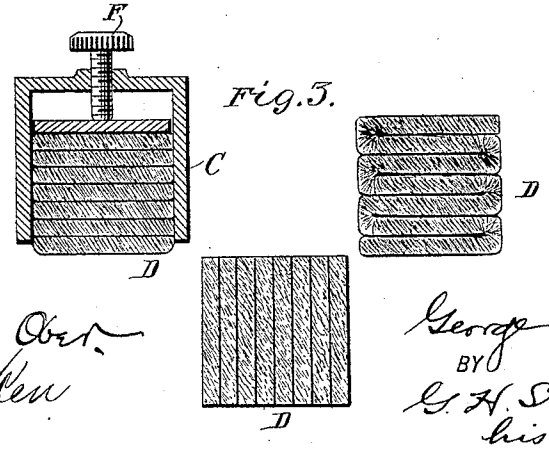


Fig. 3.



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GEORGE FORBES, OF LONDON, ENGLAND.

COMMUTATOR-BRUSH FOR DYNAMOS.

SPECIFICATION forming part of Letters Patent No. 529,784, dated November 27, 1894.

Application filed August 8, 1892. Renewed April 14, 1894. Serial No. 507,605. (No model.)

To all whom it may concern:

Be it known that I, GEORGE FORBES, a subject of the Queen of Great Britain and Ireland, residing in the city of Westminster, London, England, have invented certain new and useful Improvements in Electrical Collecting Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Electrical collecting devices, such as the brushes for dynamos and motors, have hitherto been made either of metal or rigid carbon. When made of metal, they generally consist of a bundle of wires, each one of which makes a separate contact, and has an independent springiness of its own to assist in maintaining contact. Thus, when any inequality of the commutator, or jarring of the machinery, tends to throw some of these wires out of contact, a certain number of them, owing to their independence, still maintain the contact. The carbon brushes hitherto used do not possess this property to the same extent. Generally each brush consists only of one or two blocks of carbon, pressed against the commutator by a spring, and a powerful spring is required to maintain the contact. In the case of street railway motors, subject to violent oscillations, the carbons are often jolted away from the commutator, thus causing sparks and burning of the commutator. The most which has been done to mitigate this is to introduce several carbon blocks, each with an independent spring.

By my invention I am able to dispense with the powerful pressure generally required to maintain the contact, and, though gaining all the advantages of using carbon, I am able to obtain even a greater number of points of contact than when wire brushes are used. I attain this object by employing flexible carbon, such as carbonized cloth, compressed into a metal case open at the side facing the commutator. This case serves both as a holder for the flexible carbon, and also as a terminal for the electric circuit.

My invention will be understood by reference to the accompanying drawings, in which—

Figure 1 is an elevation of a commutator having a pair of my brushes applied to it. Fig. 2 illustrates a different method of hanging or supporting the brushes; and Fig. 3 shows detail views of different forms of brush.

Referring to the drawings by letter, A, is the commutator of an electric motor, or a dynamo-electric machine, and B, B′, are the cooperating brushes. Each brush is composed of a metal case, C, and flexible carbon, D, within the case, the said case being supported by a suitable holder, E. I prefer to fix the metal case in such a position that the edges of it surrounding the carbon are only about one-sixteenth of an inch from the commutator. I push the flexible carbon against the commutator by means of a thumb-screw, as F, or a spring, as G. The flexible carbon may be arranged in superposed layers, or in folds, or in sheets or laminæ placed side by side within the case, all of which arrangements are illustrated in Fig. 3. Moreover, the boxes or cases themselves may be either cylindrical, as at B′, or rectangular in cross-section, as at B. It will be observed that the spring, G, presses the whole brush, including the box or case and the flexible carbon, against the commutator.

To prepare the flexible carbon, I prefer to use the process adopted by Varley and others, which consists mainly in calcining or charring vegetable or other fibers saturated with a hydrocarbon fluid. Sometimes it is necessary to submit the substance to the action of a caustic alkali of high temperature, after which it has to be rinsed or washed to remove the alkali, and then dried, then submitted to the action of sulphuric acid, and again rinsed and dried. When thus prepared the substance is immersed in a hot solution of petroleum and tar, or other suitable hydrocarbon, until saturated, then placed in a carbonizing chamber, and heated in either a stream of coal gas or hydrocarbon gas, or in a vacuum. The substance is removed while warm, immersed in the liquid hydrocarbon, and reheated again, as often as necessary to produce the required degree of solidity, the heating being continued as long as the requirements of each case necessitate.

When cloth is treated in this manner it acquires electric conductivity, though otherwise it retains most of the properties of the cloth,

and, owing to its flexibility, maintains contact with the commutator at an infinite number of points. By this means a much better contact is maintained, which is not broken, or even varied, by the jolting on a railway car. Owing to this, the variations in strength of current which interfere with the working of telephones, &c., are largely reduced, and the further advantage gained that a brush made in this way does not wear the commutator. When the metal box is mounted, not rigidly, but with a spring pressing it toward the commutator, the springiness of the flexible material has still a certain amount of play, besides affording an innumerable number of points of contact, which gets over the difficulty met with when using solid blocks of carbon.

Having now described my invention, what I claim is—

1. A brush for electro-motor and dynamo electric machines, the same consisting of conducting fibrous or textile material.

2. A brush for electric motors and dynamo electric machines, consisting of flexible carbonized material.

3. A brush for electric motors and dynamo-electric machines, consisting of a mass of flexible carbonized material, and a metal box serving as a holder therefor, as and for the purpose set forth.

4. The combination with a circuit terminal, of a mass of flexible carbonized material, which forms a cooperating terminal, as and for the purpose set forth.

5. The combination with a circuit terminal of a mass of flexible carbonized material, and a metal box, serving both as a holder for the flexible material, and as a cooperating terminal.

6. The combination with a mass of flexible carbonized material, of a metal box, serving both as a holder for the said flexible material, and as a terminal for an electric circuit.

7. The combination with a mass of flexible carbonized material, and a metal box, serving as a holder therefor, the said flexible material forming one terminal of an electric circuit, of a corresponding terminal, and a thumb-screw for pressing the flexible material against the corresponding terminal, as and for the purpose set forth.

8. The combination with a mass of flexible carbonized material, and a metal box, serving as a holder therefor, the said flexible material forming one terminal of an electric circuit, of a corresponding terminal, and means for pressing the flexible material against the said corresponding terminal, as and for the purpose set forth.

9. A brush for electric motors and dynamo electric machines, consisting of flexible or fibrous material, such as cloth, made into an electrical conductor.

In testimony whereof I have signed my name, in the presence of two witnesses, this 14th day of July, A. D. 1892.

GEORGE FORBES.

Witnesses:

HERBERT E. MITCHELL,

CHARLES ROCHE.