H. L. ZABRISKIE.

BRUSH FOR DYNAMO ELECTRIC MACHINES.

APPLICATION FILED AUG. 19, 1908.

973,836.

Patented Oct. 25, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

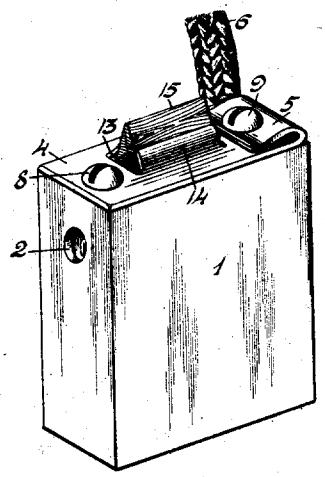
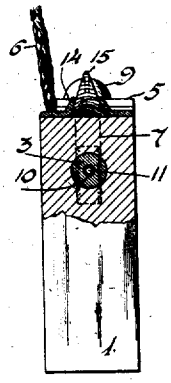


Fig. 2.



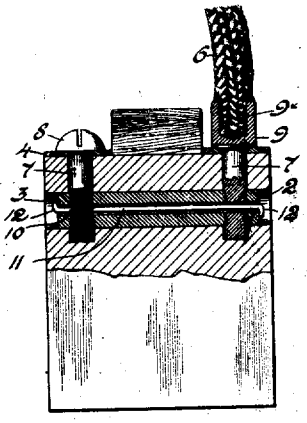


Fig. 3.

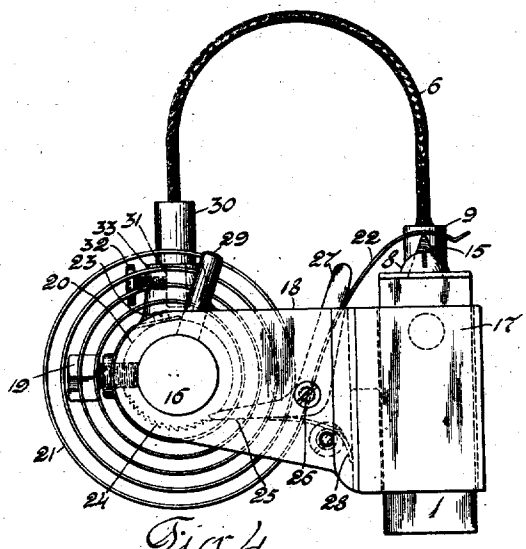


Fig. 4.

WITNESSES

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2 SHEETS—SHEET 2.

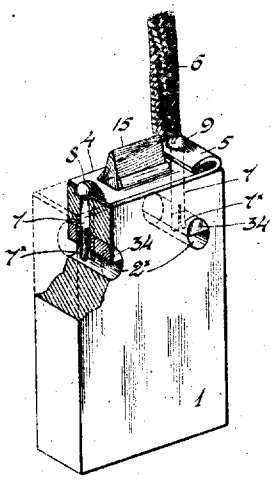

Fig. 5.

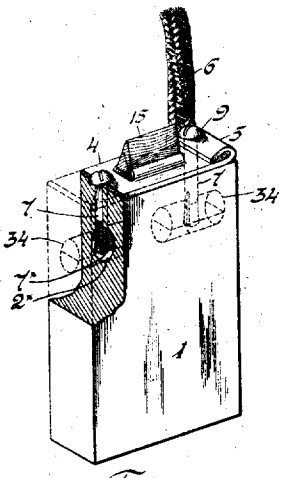

Fig. 6.

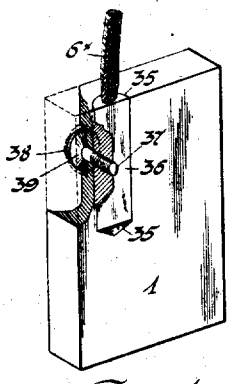

Fig. 7.

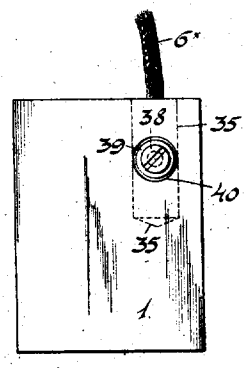

Fig. 8.

WITNESSES

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BRUSH FOR DYNAMO-ELECTRIC MACHINES.

973,836. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed August 19, 1908. Serial No. 449,212.

To all whom it may concern:

Be it known that I, HENRY L. ZABRISKIE, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Brushes for Dynamo-Electric Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its primary object to provide a carbon brush-block with detachable means for conducting electric current to the brush-holder or some suitable part of the dynamo electric machine; also to provide the brush with insulation to prevent the conduction of current through the pressure spring by means of which the same is normally pressed upon the commutator.

Many of the devices heretofore constructed for connecting a flexible conducting lead to the brush are permanently secured to the latter, and cannot therefore be detached from a worn out brush-block and applied to a new brush-block. Other connecting devices between the flexible lead and the brush-block include a conducting plate extending down the sides of the brush-block, thus necessitating the milling away of the adjacent portions of the brush in order that such plate may be flush with the side faces of the same to permit its free movement within the socket to which it is slidingly fitted. Owing to the hardness of the carbon of which these non-metallic brush-blocks are normally formed, the construction of such form of connection is difficult and unsatisfactory. Still other devices heretofore employed involve the drilling of holes in the brush-block and insertion therein of expansible plugs which are liable to burst the brush, or rely upon the use of solder which is liable to be softened in case the brush becomes overheated, thus destroying the effective contact between the brush and the conducting lead.

According to the present improvement, in its preferred form, a transverse recess or cavity is formed at a point remote from the operative end of the brush-block in which is inserted a metallic conductor forming an anchorage which is connected by one or more metallic screws or studs with an external plate or cap upon the end of the brush-block to which is in turn secured the metallic lead. To insure against the use of the pressure spring of the brush-holder in conducting the current from the brush to the operative part of the dynamo electric machine, a non-conducting block is preferably seated upon the inoperative end of the block and secured thereto by means formed upon the metallic cap-plate, and the pressure spring is permitted to bear upon its insulating block.

From the foregoing, it will be observed that the essence of the present improvement resides in applying the so-called "anchorage" to the body of the brush-block as near as possible to the operative end, or that resting in contact with the commutator, consistent with durability, while retaining sufficient stock intermediate the same and the point of connection of the conductor to afford the necessary length of the block after it has become shortened by wear to insure its proper guidance in the socket of the brush-holder.

It has been common heretofore to attach to the end of the brush-block a metallic cap-plate by means of a fastening screw or screws passing through an aperture in the body of the same, but the present improvement has the advantage over such construction of means for drawing the transversely disposed anchorage firmly against the wall of the aperture in the body of the brush-block so as to mechanically secure a perfect electrical contact between the parts thus forced together. By employing a metallic cap-plate to which the flexible lead is connected, and providing longitudinally arranged clamping screws electrically connecting the cap-plate with the anchorage, and drawing these parts forcibly together to firmly clamp between them the intermediate portion of the brush-block, the effectiveness of the electrical connection between the commutator and the lead is made highly efficient, while the component parts, being merely mechanically connected together, are readily detachable for renewal of the brush-block without affecting the parts which are not subjected to wear. It is evidently very desirable that the conductive anchorage should be arranged transversely of the length of the brush-block and of the flow of current therein in order to provide the greatest possible area for flow of current from the contact end of the block to the surface of the anchorage

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

Figure 1 is a perspective view of one embodiment of the improvement and Fig. 2 an end view of the same partly in section. Fig. 3 is a side view, partly in section, of a slightly modified form of the improvement. Fig. 4 is a side elevation of a brush-holder, containing a brush similar to that represented in Fig. 3. Figs. 5 and 6 are perspective views, partly in section, of two modified forms of the improvement. Fig. 7 is a perspective view, partly in section, of still another form of the present improvement, and Fig. 8 a side elevation of the same.

Referring more particularly to Figs. 1, 2 and 3, the carbon brush-block 1 is formed in its upper or outer end portion with a transverse hole or cavity 2 extending parallel with its longer sides, in which is inserted a conducting plug or anchorage 3, preferably of copper of substantially the size of said hole or cavity. Upon the flat adjacent end of the brush-block is seated a metallic cap-plate 4, which may be of sheet brass, one end of the same being, as represented in Figs. 1 and 2, reduced in width to form a tongue which is turned backwardly upon the top of the plate to afford a socket 5 in which is inserted one end of the flexible metallic conducting lead 6, whose opposite end is connected with the brush-holder or a suitable part of the machine to which the same is applied. Through longitudinal holes formed in the upper end of the brush-block intersecting the hole or cavity 2 are inserted the screws 7 entering threaded transverse holes in the opposite end portions of the plug 3, with their heads 8 and 9 seated upon the opposite ends of the cap-plate 4, the screw 7 in Figs. 1 and 2 passing through the lead-end socket 5 with its head 9 seated thereon, whereby the lead is clamped firmly in position and the cap-plate is bound securely to the conducting plug 3. In the form of the brush represented in Figs. 3 and 4, the head 9 of the conducting screw 7 is formed with a cavity 9^x in which is introduced one extremity of the lead 6 which is in practice secured therein by means of solder. In order to prevent the loosening of the screws 7, a hole 10 is drilled axially through the conducting plug 3 and fastening screws 7 and a metallic wire 11 is inserted through the same with its ends turned over at 12, thus locking the parts securely against working loose in the action of the machine. The cap-plate 4 is provided intermediate the screws 7 with a rectangular opening 13 having along opposite edges the inwardly inclined lips or flanges 14 which embrace the base portion of a wedge-shaped insulating block 15, of wood or other suitable material, with its base seated upon the top of the brush-block. The apex of the block 15 thus affords an insulated bearing for the pressure spring of the brush-holder, and insures against the conduction of current from the brush-block to the brush-holder through the spring, which would tend to heat the latter and thus draw its temper and render the holder ineffective.

In Fig. 4 is represented a brush-holder of the sliding socket type applied to the supporting rod or arbor 16 of a dynamo electric machine. This brush-holder is constructed substantially in accordance with that represented in my pending application Ser. No. 223,811, filed Sept. 9, 1904, and comprises a brush-socket 17 open at both ends and provided with a pair of laterally projecting spaced rigid arms 18 having alined transverse apertures fitted to and entered by the stud or mandrel 16 and fixed upon the same by means of the set-screw 19, a tubular sleeve 20 being loosely fitted upon the stud or mandrel intermediate said arms and encircled by a coiled spring 21 one end of which is secured by means of a screw 23 upon said sleeve and the other end portion of which is formed into a lateral arm 22 extended into line with the socket 17 and adapted to rest upon the apex of the insulating block 15 of the brush-block 1. The sleeve 20 is formed with a segmental series of ratchet-teeth 24 adapted for engagement with the pawl 25 forming one arm of an angular lever fulcrumed at 26 upon one of the side arms 18 of the brush-holder frame and having a second arm 27 accessible for shifting the pawl-arm 25 temporarily out of engagement with the ratchet-teeth 24 of the sleeve 20 in opposition to the spring 28 to permit the circular adjustment of the sleeve bearing the inner end of the spring 21 by means of the radial pin 29.

As described in relation to Fig. 3, one end of the flexible lead 6 is secured within a socket therefor within the screw-head 9 of the brush, and the opposite end of the lead is similarly secured in a like socket 30 of a pin whose shank 31 is secured by means of the set-screw 32 within a socket in the boss 33 formed upon one of the spaced arms 18 of the brush-holder frame, whereby an effective electrical connection is established between the brush-block 1 and the stud or mandrel 16 forming a rigid member of the dynamo electric machine.

In the modified forms of the present improvement represented in Figs. 5 and 6, the brush-block is provided with short holes or cavities, and each of the fastening screws 7 is provided with an anchorage afforded by a semi-cylindrical metallic block 34 through which the split threaded end 7^x of the screw passes into the open space of the cavity beneath, where it is spread or flared slightly by means of a suitable wedge-pointed tool inserted in one end of the transverse hole or

cavity. In Fig. 5 the holes 2^x are shown disposed in parallel relation crosswise of the block, while in Fig. 6 the holes are drilled in substantial alinement inwardly from the narrower faces of the block and parallel with the cap-plate 4.

Referring to Figs. 7 and 8, which represent a construction more suitable for the smaller sizes of brush, a longitudinal hole or cavity is drilled between two brush-blocks temporarily clamped together so as to form a semi-cylindrical cavity 35 in each, and a correspondingly shaped plug or anchorage 36 is applied thereto and secured therein by means of a transverse screw 37 whose head 38 with an interposed washer 39 is led into a countersink 40 in the opposite face of the brush-block. A longitudinal socket is formed in the outer end of the conducting plug 36, in which is secured preferably by solder, the end of the flexible conducting lead 6^x. As will be readily observed, after the body of the brush-block has become worn by long continued use sufficiently to require its disuse, the metallic portions of the brush as represented in Figs. 1 to 4 inclusive, which are subjected to wear, may be readily detached therefrom, by straightening one end of the locking wire 11 and withdrawing the same to permit the removal of the fastening and conducting screws 7, whereby the anchoring plug 3 and cap-plate 4 may be readily detached for application to a new brush-block similarly drilled for introduction of the members 3 and 7. This disconnection of the parts also affords a means of renewing the insulating block 15, should occasion require.

In the forms of the improvement represented in Figs. 5 and 6, the withdrawal of the screws 7 for detachment of the parts thus connected may be effected with equal facility, by merely inserting a suitable tool to press the expanded ends of the screws away. In case the expansion of the same to lock from turning has been slight, the spread extremity may be sufficiently compressed for the purpose by merely forcibly turning the screws for their withdrawal by a suitable implement.

As will be evident by reference to Figs. 7 and 8, the form of the improvement therein represented may be readily dismembered by the mere withdrawal of the screw 37, which is not shown provided with locking means although adapted to be formed like those of the preceding figures in which case a countersink would be provided in the flat face of the conducting plug 36 in order that the metallic parts should be flush with the flat side of the brush-block.

One of the essential features of the present improvement is the provision in the body of the brush-block of a metallic anchorage of high conducting power, such as copper, between which and the adjacent end of the conducting lead is interposed the metallic connection composed of members of high conductivity, together with means whereby said anchorage is detachably secured within its cavity in the brush-block so that it may be applied interchangeably to different brush-blocks in succession as they become worn in operation.

As herein shown and described, the present improvement is capable of embodiment in many forms all of which have their advantages under certain conditions, and it is to be understood that the improvement is not therefore limited to any of the several embodiments herein shown and described, but is susceptible of modification to suit the conditions of each particular case in which its employment is desired.

Having thus set forth the nature of the invention what I claim herein is:—

1. The combination with a brush-block formed with a recess, of an anchorage of high conductivity disposed within said recess, means for clamping said anchorage firmly in electrical contact with the wall of said recess of the brush-block, a flexible conducting lead, and a connection intermediate the lead and said anchorage.

2. The combination with a brush-block provided in its body portion with a transversely disposed seat, of an anchorage of high conductivity embedded within the same adjacent said seat, clamping means acting transversely of said seat for removably securing said anchorage upon and in electrical contact with said seat, a flexible conducting lead, and a connection intermediate the lead and said anchorage.

3. The combination with a brush-block for dynamo-electric machines, of an anchorage of high conductivity embedded within the same, a metallic cap-plate applied to the exterior of said brush-block and embracing between itself and the latter a portion of the body of said brush-block, conducting fastening means extending between said cap-plate and the anchorage and adapted to clamp both of said parts firmly upon the interposed portion of the brush-block, and a flexible conducting lead attached to said cap-plate.

4. The combination with a brush-block for dynamo electric machines, of an anchorage of high conductivity embedded within and disposed transversely of the same, a metallic cap-plate, applied to the exterior of said brush-block, a metallic screw arranged lengthwise of said brush-block for detachably securing together said cap-plate and the embedded anchorage, and a flexible conducting lead attached to said cap-plate.

5. The combination with a brush-block for dynamo electric machines, of a metallic anchorage of high conductivity embedded

in and disposed transversely of the body of the same, a metallic cap-plate applied to the exterior of said brush-block parallel with said anchorage, spaced metallic screws arranged lengthwise of said brush-block for connecting said cap-plate with the anchorage through the intervening portion of the brush-block, and a flexible conducting lead attached to said cap-plate.

6. The combination with a brush-block for dynamo electric machines, of an anchorage of high conductivity embedded within the same transversely of its length, a metallic cap-plate applied to the exterior of said brush-block, a metallic screw provided with locking means to prevent loosening and adapted to secure together said cap-plate and the embedded anchorage, and a flexible conducting lead attached to said cap-plate.

7. The combination with a brush-block for dynamo electric machines, of an anchorage of high conductivity embedded within the same, a metallic cap-plate applied to the exterior of said brush-block, a metallic screw having a split and expanded threaded end and adapted to secure together said cap-plate and the embedded anchorage, and a flexible conducting lead attached to said cap-plate.

8. The combination with a brush-block for dynamo electric machines formed with a transverse cavity, of an anchorage of smaller cross-section than said cavity disposed within the latter, a metallic cap-plate applied to the exterior of said brush-block, a metallic screw having a split threaded end passing through said cap-plate and anchorage and expanded beyond the latter within said cavity, and a flexible conducting lead attached to said cap-plate.

9. The combination with a brush-block for dynamo electric machines, of an anchorage of high conductivity embedded within the same, a metallic cap-plate applied to the exterior of said brush-block and formed with a tongue bent over upon the same to form a socket, a flexible conducting lead having an end secured within said socket and the cap-plate, and conducting fastening means for securing said cap-plate to the embedded anchorage.

10. The combination with a brush-block for dynamo-electric machines, of an anchorage of high conductivity embedded within the same, a metallic cap-plate applied to the exterior of said brush-block and formed with a tongue bent over upon the same to form a socket, a flexible conducting lead having an end secured within said socket and the cap-plate, and metallic screws inserted respectively through the body of said cap-plate and the lead-end socket formed therein and tapped into said embedded anchorage for securing the same together and clamping the end of the lead within its socket.

11. The combination with a brush-block for dynamo-electric machines, of an anchorage of high conductivity embedded within the same, a cap-plate of conducting material secured upon the brush-block and having a metallic connection with said anchorage, a flexible lead secured to said cap-plate, and an insulating block secured upon said brush-block adjacent the lead by means of said cap-plate and adapted to receive the thrust of the pressure-spring of a brush-holder.

12. The combination with a brush-block for dynamo electric machines, of an anchorage of high conductivity embedded within the same, a metallic cap-plate applied to the exterior of said brush-block and provided with an aperture, a flexible lead attached to said cap-plate, an insulating block having its base seated upon said brush-block and a reduced portion passing through the aperture in said cap-plate, and conducting fastening means for securing said cap-plate to the embedded anchorage.

13. The combination with a brush-block for dynamo electric machines, of an anchorage of high conductivity embedded within the same, a metallic cap-plate applied to the exterior of said brush-block and provided with an aperture with convergently inclined lips, a flexible lead attached to said cap-plate, an insulating block having its base seated upon said brush-block and a reduced portion passing through the aperture in said cap-plate and fitted to said inclined lips, and conducting fastening means for securing said cap-plate to the embedded anchorage.

14. The combination with a brush-holder comprising an open-ended socket and a pressure spring having its operative extremity arranged adjacent to and in alinement with said socket, of a brush-block slidingly fitted to said socket, a flexible lead having one end connected with the brush-block and the other end connected with the brush-holder, and an insulated contact piece interposed between the operative portion of said spring and the brush-block.

15. The combination with a brush-holder comprising an open-ended socket and a pressure spring having its operative extremity arranged adjacent to and in alinement with said socket, of a brush-block slidingly fitted to said socket, a flexible lead having one end connected with the brush-block and the other end connected with the brush-holder, and an insulated contact piece carried by said brush-block and affording a bearing thereon for the operative portion of said spring.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

HENRY L. ZABRISKIE.

Witnesses:

JOSEPH F. JAQUITH,

HENRY J. MILLER.