(No Model.)

J. J. WOOD.

COMMUTATOR FOR DYNAMO ELECTRIC MACHINES.

No. 384,816. Patented June 19, 1888.

Fig. 2.

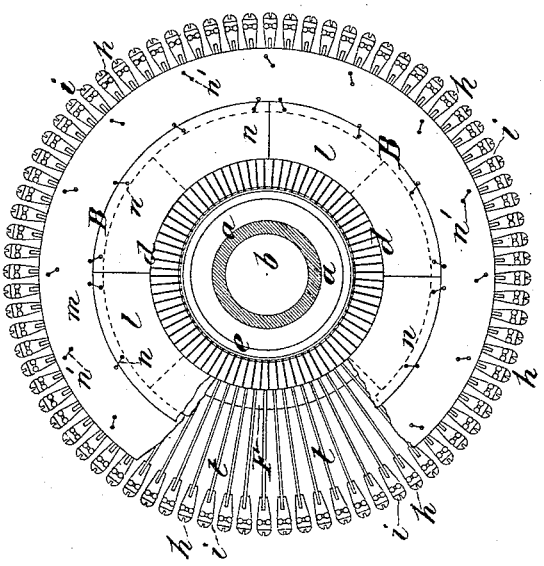
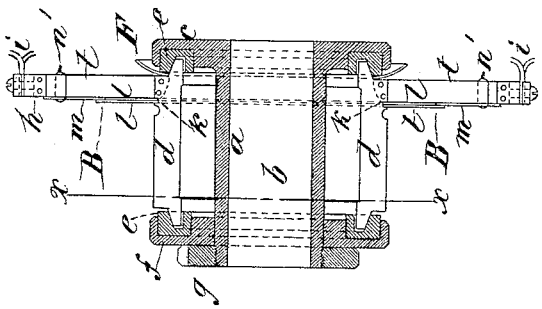


Fig. 1.



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COMMUTATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 384,816, dated June 19, 1888.

Application filed April 20, 1887. Serial No. 235,455. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. WOOD, of Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

My invention applies specially to the armature or commutator of dynamo-machines of the Gramme type, in which the armature is in the form of a cylindrical ring open at each end, with the commutator fixed on the central shaft at one end of the armature, and connected with the sections of the armature by a radial series of copper strips which extend over the open end of the armature from the commutator-segments to the ends of the armature-coils.

My present improvements are essentially embodied in the commutator itself, or on the commutator end of the armature, and their prime object is to prevent the metallic dust which is worn off the commutator from lodging within the armature or between parts of the commutator or armature, and thus causing short circuits, and at the same time allow a free circulation of air through the hollow of the armature. To these ends I affix a shield over the radial series of connecting-strips, fitting closely to the commutator and extending out over the strips to near the coupled ends thereof, thereby covering the hollow of the armature endwise, but leaving it open at the periphery at the coupled ends of the bars, by which means the copper dust is effectually excluded from the armature, yet a free centrifugal circulation or discharge of air is allowed through the hollow of the armature and the peripheral opening between the coupled ends of the strips, which is important in preventing cumulative heating of the armature. This shield is preferably made of plates of mica in segments, thus rendering the shield proof against atmospheric changes, and also fireproof, or proof to flashing or sparking from the brushes. I preferably make the inner part of the shield of two layers of mica segments, while the outer part is made of one layer of paperboard, which secures certain advantages. I also provide the commutator with a flaring insulating-rim clamped between the segments of the commutator and the insulating-ring of the hub, and extending out over the iron foundation-hub, thereby preventing short circuits or copper deposits between the segments and the hub.

My invention therefore consists, mainly, in the features above outlined, as hereinafter fully set forth and claimed.

In the annexed drawings I have shown only the commutator of a Gramme armature, as my invention is embodied solely therein, the armature not being shown, as it is presumed to be of the usual construction, which is well understood.

Figure 1 shows a longitudinal partial section of the commutator embodying my improvements, and Fig. 2 is an end elevation thereof, the body of the commutator being in section on *x x*.

Referring to Fig. 1, *a* indicates the foundation-hub of the commutator, which is formed, as usual, of cast-iron, having the central bore, *b*, to fit over the armature-shaft, and the base-flange *c*, against which the copper commutator-segments *d* are clamped in the usual way—that is, the copper segments *d* fit at one end into a grooved wooden ring, *e*, which fits into a groove in the base-flange *c*, while the other end of the segments fit into a similar grooved wooden ring, *e'*, which fits into a grooved iron washer or ring, *f*, which slides over the end of the hub *a*, and against which abuts a nut, *g*, which, being screwed tightly on the threaded end of the hub, clamps the entire structure firmly together, as will be readily comprehended from Fig. 1. Now, from each segment of the commutator there issues, as usual, a radial copper strip or bar, *t*, which extends out to about twice the radius of the commutator, or to near the periphery of the armature, as is usual, and each strip is tipped with a two-part clamp, *h*, the two parts or sections of which are connected by a clamp-screw, and between the grooved jaws of which are clamped the ends *i* of the armature-coils in the ordinary manner, as well shown in Figs. 1 and 2.

Now, in the circle of commutator-segments is cut a narrow peripheral groove, *k*, (see Fig. 1,) close up to the edge of the strips *t*. Into this groove is fitted the inner edge of an annular

shield, B, which abuts flatwise against the radial series of strips *t*, and, closely embracing the commutator at the center, extends out to the clamp end of the strips, and thereby effectively closes the hollow of the armature at the end, and prevents the possible passage of any metallic dust between the strips *t* or into the armature, and thereby prevents the possibility of any short circuits from this cause, which frequently happens in unshielded armatures. It will be further seen that the shield B, while it will effectively exclude metallic dust, yet will not entirely stop or close up the hollow or air-space of the armature, which will be left freely open at the periphery of the clamp-strips, between and above the clamps *h*, through which opening a free centrifugal discharge of air passing through the hollow of the armature can take place when the armature is in motion, thus preventing any overheating of the armature, which would be very liable to happen if the ends of the strips were covered up or no opening made to let the air escape. This shield B is preferably made in a compound manner—that is, the inner part consists of mica, *l*, and the outer part of paper-board, *m*, or of hard rubber or similar material. The mica part is made in segments, *l*, in two layers, which break joints with each other, as shown by full and dotted lines in Figs. 1 and 2, the inner edge of the segments being tightly socketed in the groove *k*. The rear layers of the mica segments *l* are a little shorter or of less radius than the outer segments, while the paper portion *m*, which is preferably made in one continuous annular piece or ring, abuts closely against the edge of the short layers, while the longer segments overlap the joint of the two, as fully shown in Figs. 1 and 2. The mica and paper layers are now held firmly in place by one circle of little wire loops or stitches, *n*, which pass through the paper and outer mica layers at the junction thereof, as seen in Fig. 2, and are twisted around the strips *t*, as seen in Fig. 1, thus holding the mica segments and the paper ring securely in position. An outer circle of loops, *n'*, secures the outer edge of the paper ring *m* to the outer end of the bars, as well shown in Figs. 1 and 2.

Now, in order to still further protect the parts of the commutator and armature from short-circuit, or from the deposit or lodgment of metallic dust between conducting parts, I interpose an insulating ring or guard, F, between the copper segments *d* and the base-flange *c*. This guard is preferably in the form of a flaring ring, which extends in a curved diverging hood over the base-flange *c*, and is clamped at its inner edge between the commutator-segments *d* and the insulating-ring *e*. Consequently the gap or groove between the segments and base-flange, into which copper dust frequently falls in the ordinary armature, and over which the current is subject to flash or short-circuit, is by my improvement closed up by the flaring guard F, which is preferably made of pressed paper or other insulating material, and which thus prevents any flashing of the current between the two metallic parts *d c*, and which also prevents the lodgment of any conducting particles between the said parts, as any such particles tending to fall into the space between the parts will become deflected and thrown out centrifugally by the deflecting or dissipating action of the ring F when the armature is in motion, as will be readily appreciated, thus forming an effective protection to the commutator.

The guard F might be radially straight or flat, instead of flaring; but the flaring form is obviously preferable.

I do not of course confine myself to the particular compound construction of the shield B herein detailed, as it may of course be formed all of mica or wholly of paper or other material. Mica, however, has great special advantages for the purpose in being a perfect insulator, proof to shrinkage or atmospheric or temperature changes, and also fire or spark proof. By making the shield of mica and paper combined, as shown, efficiency, simplicity, and cheapness are combined.

My improvements may of course be used in arc or incandescent machines, or on generators or motors.

What I claim is—

1. In a dynamo-electric machine, substantially such as set forth, a shield-plate of insulating material laid upon and secured to the commutator-strips, and embracing the commutator, and extending over the commutator-strips or hollow of the armature, leaving the space between the strips or hollow of the armature open at the periphery, substantially as and for the purpose set forth.

2. In a dynamo-electric machine, the combination, with the commutator, of a shield of fire-proof material embracing the same, and covering the commutator-connections and the end of the armature, substantially as and for the purpose set forth.

3. The combination, with an electric commutator and armature, substantially such as set forth, of an annular shield of mica closely embracing the commutator, and covering the connection between armature and commutator, substantially as and for the purpose set forth.

4. The combination, with an electric commutator, substantially such as shown, of a shield made in segments, *l*, embracing the commutator, and covering the connection between commutator and armature, substantially as shown and described.

5. The combination, with an electric commutator, of a shield made in segments, *l*, in two layers, embracing the commutator and overlying each other, covering the connection between commutator and armature, substantially as shown and described.

6. The combination, with an electric commutator, of the shield B, made in two portions of different materials, the inner part of which

is made of mica, and the outer part of paper or its equivalent, substantially as shown and described.

7. The combination, with an electric commutator, of a shield, B, embracing the commutator and resting against the commutator-strips, and loops *n* or *n'*, securing said shield to the strips, substantially as shown and described.

8. The combination, with an electric commutator formed with a peripheral groove, *k*, of a shield-plate or septum let into said groove, and embracing the commutator and extending radially therefrom, forming a septum between commutator and armature, substantially as shown and described.

9. The combination, with an electric commutator, of the shield or septum B, formed of the inner segmental layers, *l l*, and the outer ring, *m*, substantially as shown and described.

10. The combination, with an electric commutator having the groove *k* and strips *t*, of the layered shield-segments *l l* and ring *m*, with the loops *n n'*, substantially as shown and described.

11. The combination, with an electric commutator, substantially such as set forth, of the insulating-ring F, interposed between the segments *d* and base-flange *c*, substantially as and for the purpose set forth.

12. In an electric commutator, substantially such as set forth, a flaring and deflecting ring arranged between the segments and the base flange or hub, substantially as shown and described.

13. In an electric commutator, substantially such as set forth, the ring F, made of insulating material in a flaring form, arranged between the segments and the base flange or hub, substantially as shown and described.

14. In a commutator, the combination of the hub *a*, segments *d*, insulating-ring *e*, base-flange *c*, and guard-ring F, clamped between the segments *d* and ring *e*, substantially as shown and described.

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