(No Model.)

C. BATCHELOR.

DYNAMO ELECTRIC MACHINE.

No. 341,990. Patented May 18, 1886.

Fig. 1.

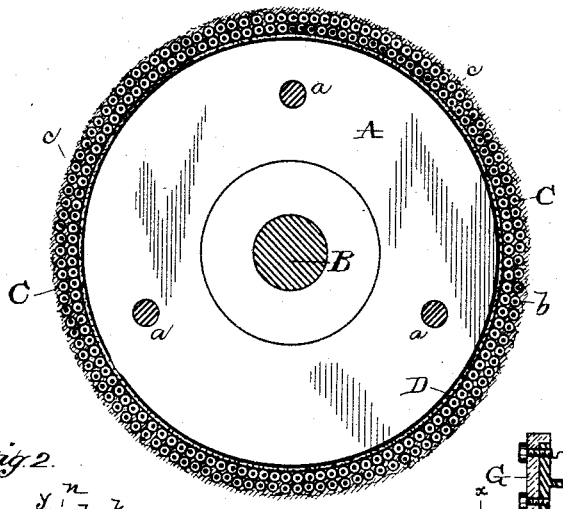


Fig. 2.

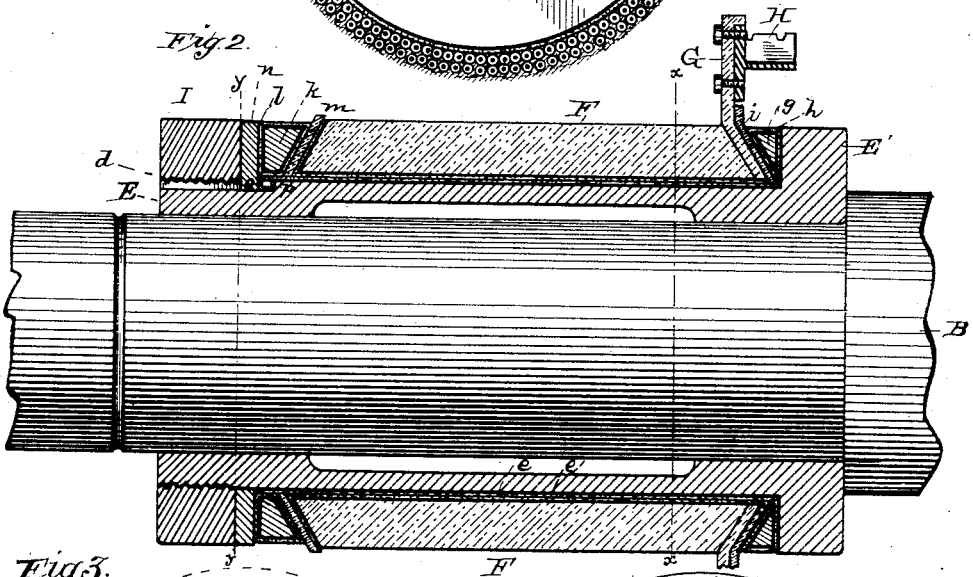


Fig. 3.

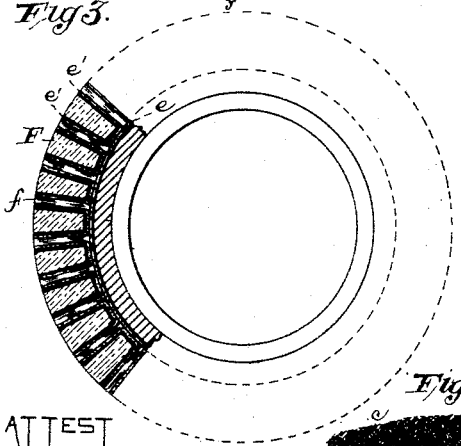


Fig. 4.

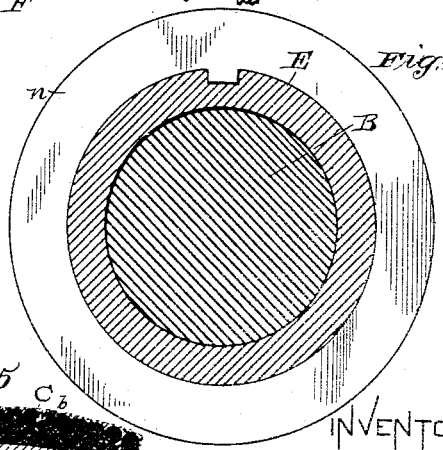
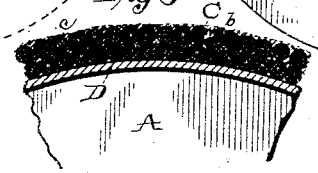


Fig. 5



ATTEST

E. L. Rowland

H. W. Riddle

INVENTOR

Charles Batchelor

By Dyer & Lacey

Attys.

UNITED STATES PATENT OFFICE.

CHARLES BATCHELOR, OF NEW YORK, N. Y.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 341,990, dated May 18, 1886.

Application filed January 20, 1886. Serial No. 189,116. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BATCHELOR, of New York city, in the county and State of New York, have invented a certain new and useful Improvement in Dynamo-Electric Machines, of which the following is a specification.

This invention relates to dynamo-electric machines designed to generate currents of high electro-motive force, such as are used with series or multiple-series systems of electric lighting. In such a machine when a sudden change is made in the load, or when the external circuit is broken, the discharge of the suddenly-demagnetized armature sometimes causes a destructive spark, which passes from one coil to another on the armature, or from a coil to the iron core, through any ordinary insulation, and so injures or destroys the armature. Similar destructive sparks also may occur on the commutator-cylinder, passing from the conducting-bars to the body of the cylinder.

The object of my invention is to remedy this difficulty by so constructing the armature and commutator that the sparks cannot pass to the core of the former or to the body of the latter or from one coil to another.

In the accompanying drawings, Figure 1 is a cross-section of the armature of a dynamo-electric machine embodying my invention; Fig. 2, a longitudinal section of the commutator on a much larger scale than Fig. 1; Fig. 3, a cross-section of the commutator on line *x x* of Fig. 2; Fig. 4, a cross-section on line *y y* of Fig. 2 and Fig. 5, an enlarged segment of the armature cross-section.

A is one of the disks of which the armature cylinder or core is composed, B being the armature-shaft, and *a a* the bolts which secure the disks together.

C C are the wires coiled longitudinally upon the armature-cylinder.

The manner of constructing the armature to accomplish the object above named is as follows: I have found that the high-tension spark will not penetrate an insulation consisting of linseed-oil or other drying-oil dried upon the part to be insulated, or of paper saturated with such oil and then dried. I therefore, in constructing the armature, wrap the cylinder A with paper, D, which has been first dipped into boiling linseed-oil and then dried or baked thoroughly in an oven. The wire which is to be wound upon the armature, which has any ordinary insulation *b*, of fibrous or similar material, is itself soaked in the boiling linseed-oil and dried, after which it is wound in the ordinary manner upon the cylinder and connected to the commutator placed upon the same shaft. The armature thus completed is then dipped bodily into the receptacle of boiling linseed-oil, the commutator and connections being kept above the surface of the liquid, and such liquid entering between the wires completely fills all the interstices between the wires, and between them and the core, thus completing the thorough insulation of these parts in such a manner that the high-tension spark cannot act in the manner described. The fine shade-lines *c c* are intended to represent the coating of oil.

The commutator which I use in this machine is built up as follows:

E is a metal cylinder placed upon the shaft B, formed with a collar, E′, at its inner end, and screw-threaded, as shown at *d*, at the other end. Upon the body of the cylinder I wrap paper *e*, coated with linseed-oil, as above described.

F F are the conducting-bars, which are placed around the surface of cylinder E. From each of these bars rises strip G, to which the armature-wires are connected by means of connecting device H. Each of the bars F is wrapped upon its bottom and sides with linseed-oil paper *e′*, and between the bars are placed strips of mica *f*, to make a stronger and more durable wearing-surface than if the paper alone were placed between them. Between the ends of the bars and the collar E′ is a loose metal ring, *g*, which is wrapped entirely with linseed-oil paper *h*. The inner side of the ring is beveled to correspond with the shape of the ends of the bars. Between the bar ends and the ring *g* is placed mica *i*. At the other end of the bars is placed another loose beveled ring, *k*, wrapped with linseed-oil paper *l*. Between the bars and ring *k* is mica *m*.

I is a nut screwed upon the screw-threaded end of the commutator-cylinder to secure the parts all tightly together.

In order to prevent the bars and intermediate mica strips from turning when the nut is

screwed on, and so being twisted out of line, I provide a ring, *n*, which has an inner lug, *o*, entering a slot in the cylinder E, so that the turning of the nut cannot cause any of the other parts to turn also.

Heretofore in commutators of this character the body of the commutator has been provided with longitudinal slots or grooves in which the insulating material separating the conducting-bars is placed. Strips of such material have also been placed underneath each bar. With this construction the insulation acted to hold the bars in place, and hence the devices just described for this purpose were not employed. With the body having a continuous surface on which the bars are laid there is nothing to prevent their displacement, and I therefore provide the devices described. With this old construction it has been found exceedingly difficult to thoroughly protect the parts from the high-tension spark or disruptive discharge when the high-tension current is broken, the insulation not being continuous and the bars being brought close to the cylinder at points where there might be crevices between the insulating parts; but with the continuous wrapping which I provide upon the bars, the cylinder, and the other metal parts of material impenetrable by the spark, I accomplish a complete insulation. The linseed-oil paper between the bars and cylinder prevents the spark from passing between them. The intermediate rings, *g* and *k*, interpose such a distance between the ends of the bars and those of the cylinder that the spark cannot pass between these parts, as it might ordinarily where the bars come near to the cylinder ends with only a narrow filling of mica between them. As an additional safeguard, I extend the mica *i* a short distance above the bars up against the radial strips G. The mica *m* is also made to project above the bars and ring *k* for the same purpose. It will be seen that thus the whole armature and commutator are thoroughly and completely protected from the ill effects of the discharge-spark. As an additional precaution, however, I may, before wrapping the core of the armature, the body of the commutator, and the bars and rings of the latter with the prepared paper, cover all such parts with Japan varnish, which is baked thereon, as shown by the heavy black lines surrounding these parts. This may, however, be dispensed with.

I do not claim herein the method of insulating the armature by dipping it into liquid insulating material, since I am required by the Patent Office to embody this in a separate application.

What I claim is—

1. In a commutator for a dynamo-electric machine, the combination of a cylindrical metal body having a continuous surface, an insulating-wrapping for said body, and conducting-bars placed thereon, substantially as set forth.

2. In a commutator for a dynamo-electric machine, the combination of a cylindrical metal body having a continuous surface, a wrapping for said body of paper impregnated with linseed or other drying oil, and conducting-bars placed thereon, substantially as set forth.

3. In a commutator for a dynamo-electric machine, the combination of a cylindrical metal body having a continuous surface, an insulating-wrapping for said body, and conducting-bars placed thereon, each having an insulating-wrapping upon its bottom and sides, substantially as set forth.

4. In a commutator for a dynamo-electric machine, the combination of a cylindrical metal body having a continuous surface, a wrapping for said body of paper impregnated with linseed or other drying-oil, and conducting-bars placed thereon, each wrapped upon its bottom and sides with the same material, substantially as set forth.

5. In a commutator for a dynamo-electric machine, the combination of the cylindrical metal body having a continuous surface and provided with a flange at one end and a nut or screw-ring at the other, the bars resting upon the surface of said cylinder, and the loose insulated metal rings between the ends of said bars and said flange and nut or ring, substantially as set forth.

6. In a commutator for a dynamo-electric machine, the combination, with the cylindrical metal body having a continuous surface, of the bars resting upon the surface thereof, the tightening-nut or screw-ring, and the keyed ring between the nut and bars, substantially as set forth.

7. In a dynamo-electric machine, the combination, with the commutator-body and the bars thereon, of the insulation at the ends of said bars projecting above their surface, substantially as set forth.

This specification signed and witnessed this 14th day of January, 1886.

CHAS. BATCHELOR.

Witnesses:
A. W. KIDDLE,
E. C. ROWLAND.