(No Model.)

T. A. EDISON.

COMMUTATOR FOR DYNAMO OR MAGNETO ELECTRIC MACHINES.

No. 263,149. Patented Aug. 22, 1882.

Fig. 1.

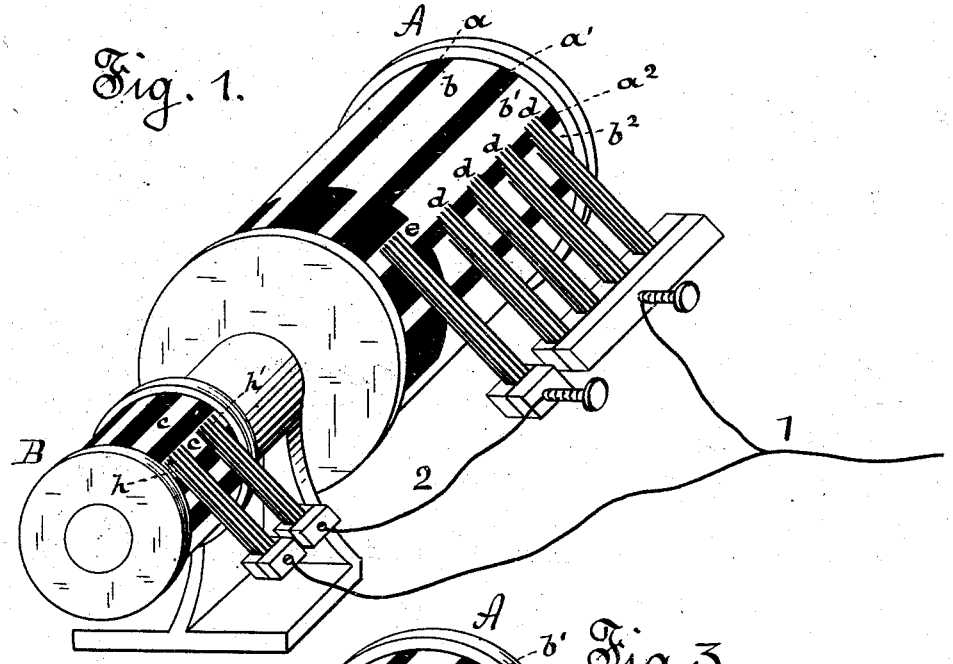

Fig. 3.

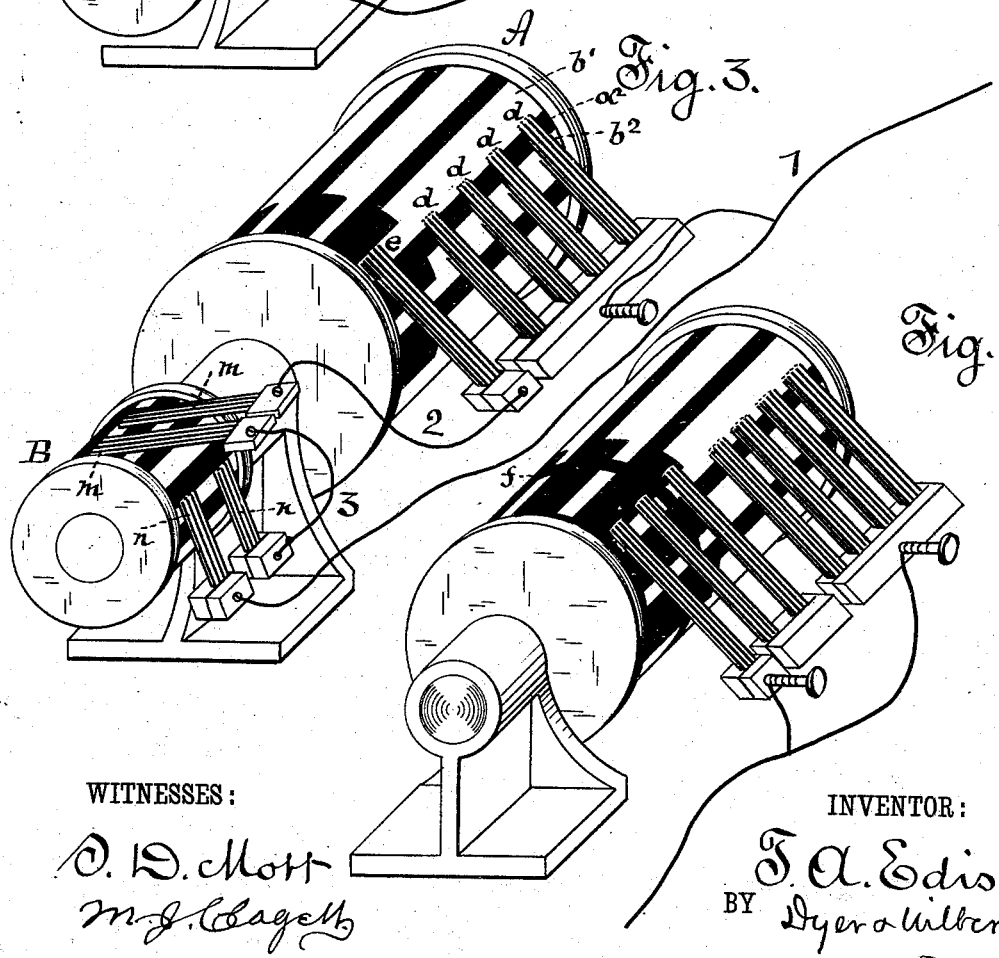

Fig. 2

WITNESSES:

O. D. Mott

M. J. Cagell

INVENTOR:

T. A. Edison

BY Dyer & Wilber

ATTORNEYS.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE EDISON ELECTRIC LIGHT COMPANY, OF NEW YORK, N. Y.

COMMUTATOR FOR DYNAMO OR MAGNETO ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 263,149, dated August 22, 1882.

Application filed October 4, 1881. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Commutators, (Case No. 338;) and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

In the operation of magneto or dynamo electric machines a spark is produced at each set of commutator-brushes as they pass from one bar of the commutator-cylinder to another. This spark is caused, first, by the breaking of a strong local current produced by the brushes bridging the insulation between two bars; and, second, by breaking a portion of the main current at the same time. Since it is extremely difficult, if not impossible, to adjust the brushes so that they will leave a commutator-bar exactly together, this spark at each set of brushes is usually taken principally by one brush until that is reduced in length by the heat of the spark, when it is taken by another brush. In large and powerful dynamo or magneto electric machines the sparks produced in this manner are exceedingly large, the result being a considerable waste of energy, which is converted into heat and injures the face of the commutator and the brushes that bear thereon.

The object, therefore, of my invention is to produce means for reducing the sparks at the commutators of these machines to the minimum.

In carrying out my invention I widen the insulation and narrow the conducting-bars at one end of the commutator-cylinder, and I arrange to bear upon this portion of said cylinder, on each side thereof, a single commutator-brush whose bearing end is noticeably behind the ends of the main brushes beside which it is placed—that is to say, the end of this brush bears upon the commutator-cylinder at a point which has already passed the main brushes. This brush, which I term for purpose of distinction the "isolated" brush, is not connected with the main brushes directly, but is connected with a series of breaking-points resting on a "breaking-cylinder," which breaking-cylinder has conducting-bars and insulating-spaces corresponding with those upon which the isolated brush bears. This cylinder may be a separate cylinder mounted on the end of the shaft of the machine, or it can be a continuation of the commutator-cylinder, its conducting-bars being insulated from those of the commutator-cylinder. There may be two or four, or any other desired number of these breaking-points connected with the isolated brush on each side of the machine, the first point of each series being connected with the isolated brush and the last point with the main wire.

In the working of the machine the local circuit and a portion of the main circuit are continued through each isolated brush after the main brushes have left each commutator-bar, so that no spark is produced at the points of the main brushes. When each isolated brush leaves a commutator-bar the current passing through it is also broken at a number of points on the breaking-cylinder simultaneously with the breaking of the current on the commutator-cylinder by the isolated brush. In this manner the spark is divided up and the total spark greatly reduced, it being a discovery of mine that the spark at each point is reduced about as the square of the number of points at which the circuit is broken. Hence if two breaking-points are connected with each isolated brush, the spark at each point will be about one-ninth of what the entire spark would ordinarily be. It is evident that this same arrangement could be used for the commutators of electro-motors, and for other machines where the bad effect of a large spark is to be obviated.

In the annexed drawings, Figure 1 represents a commutator in which a separate breaking-cylinder is used; Fig. 2, one in which only one cylinder is used; and Fig. 3 shows the manner of connecting a large number of breaking-points.

In Figs. 1 and 3, A is the commutator-cylinder, a a' a^2 being insulating-spaces, and b b' b^2 conducting-bars of its surface. The conducting-bars are narrowed and the insulating-spaces widened at the outer end of the cylinder.

B is the breaking-cylinder, whose conducting-bars c c' correspond to those at the outer end of the commutator-cylinder.

d d are the main commutator-brushes, which take off the current and convey it to the wire 1.

e is the isolated brush, connected by the wire 2 to the brushes *h h'*, Fig. 1, on the breaking cylinder. The conducting-bars of the breaking-cylinder, are of such width that the brushes *h h'* break circuit simultaneously with the brush *e*.

In Fig. 3 four brushes, *m m n n*, are used, all making and breaking circuit simultaneously with *e*, the last brush *m* being connected by wire 3 to the first brush *n* and the last brush *n* to the main wire 1.

In Fig. 2 only one cylinder, C, is used, divided by an insulating-section, *f*, into two parts, one part forming the commutator-cylinder and the other the breaking-cylinder. The arrangement and connection of the brushes are similar to the construction shown in Fig. 1. In all these cases similar brushes or sets of brushes are of course placed at the opposite side of the commutator to correspond with the other pole of the machine.

What I claim is—

1. A series of commutator-brushes, one of which is set noticeably behind and is connected with the main conductor, independent of the other brushes, through breaking points, substantially as and for the purpose described.

2. The combination, with the commutator brush or brushes of a dynamo or magneto electric machine, of two or more circuit-breaking points arranged in series and breaking circuit simultaneously with the breaking of the circuit at the commutator, substantially as set forth.

3. A commutator-cylinder having parallel conducting-spaces which are narrower at one end, the insulating-spaces being then proportionately wider, in combination with positive and negative brushes bearing on both the narrower and wider portions of said spaces, substantially as set forth.

4. The combination, with the commutator-cylinder and its brushes, of a breaking-cylinder mounted on the same shaft and provided with means for breaking the circuit at several points simultaneously with the breaking of the circuit at the commutator, substantially as set forth.

5. The combination, with the isolated brush of the commutator, of two or more brushes on the breaking-cylinder, which break circuit simultaneously with the isolated brush, substantially as set forth.

This specification signed and witnessed this 22d day of July, 1881.

THOMAS A. EDISON.

Witnesses:
RICHD. N. DYER,
H. W. SEELY.