No. 662,465. Patented Nov. 27, 1900.

E. D. PRIEST & G. L. SCHERMERHORN.

COMMUTATOR.

(Application filed June 30, 1900.)

(No Model.)

Fig. 1.

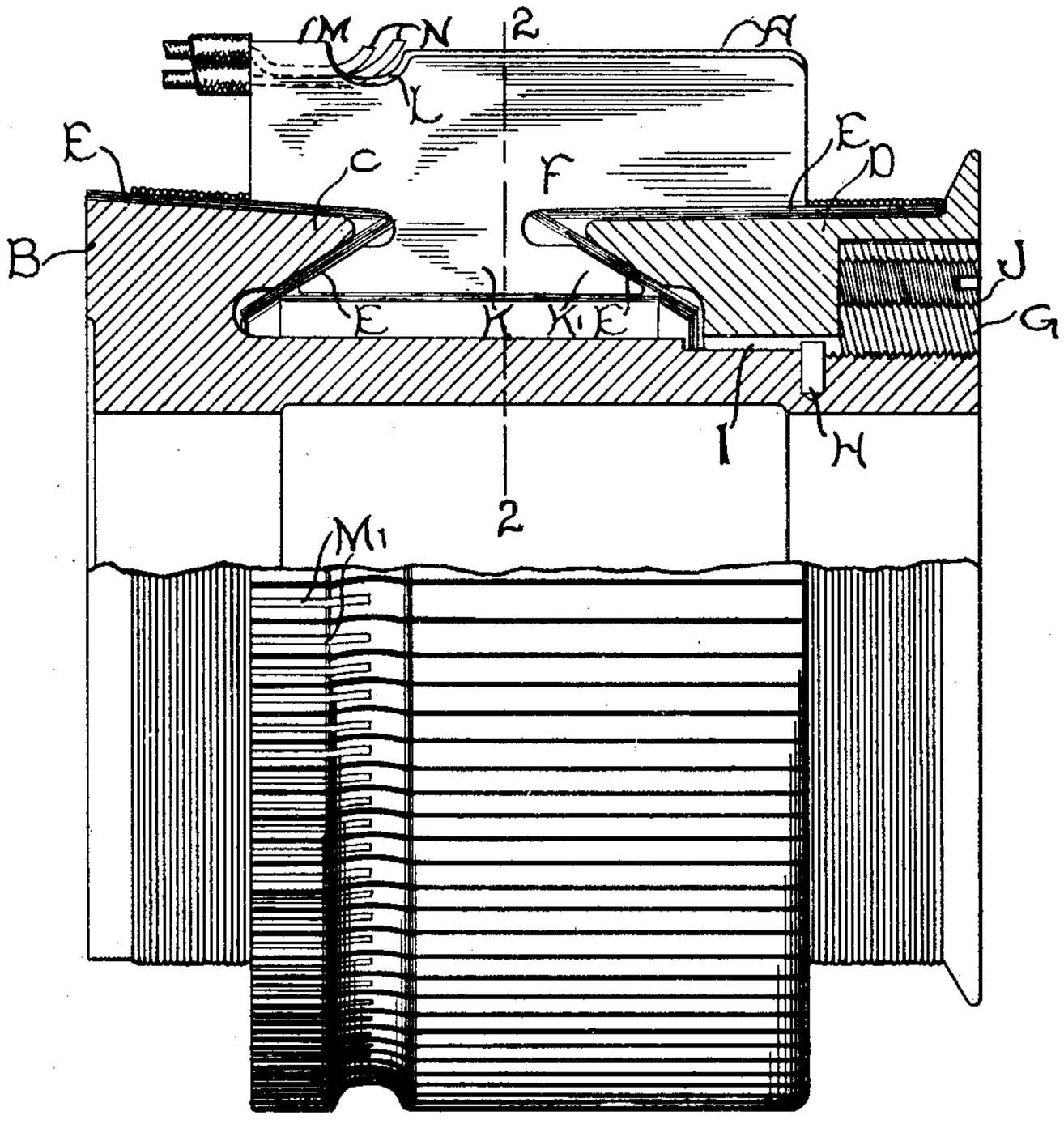
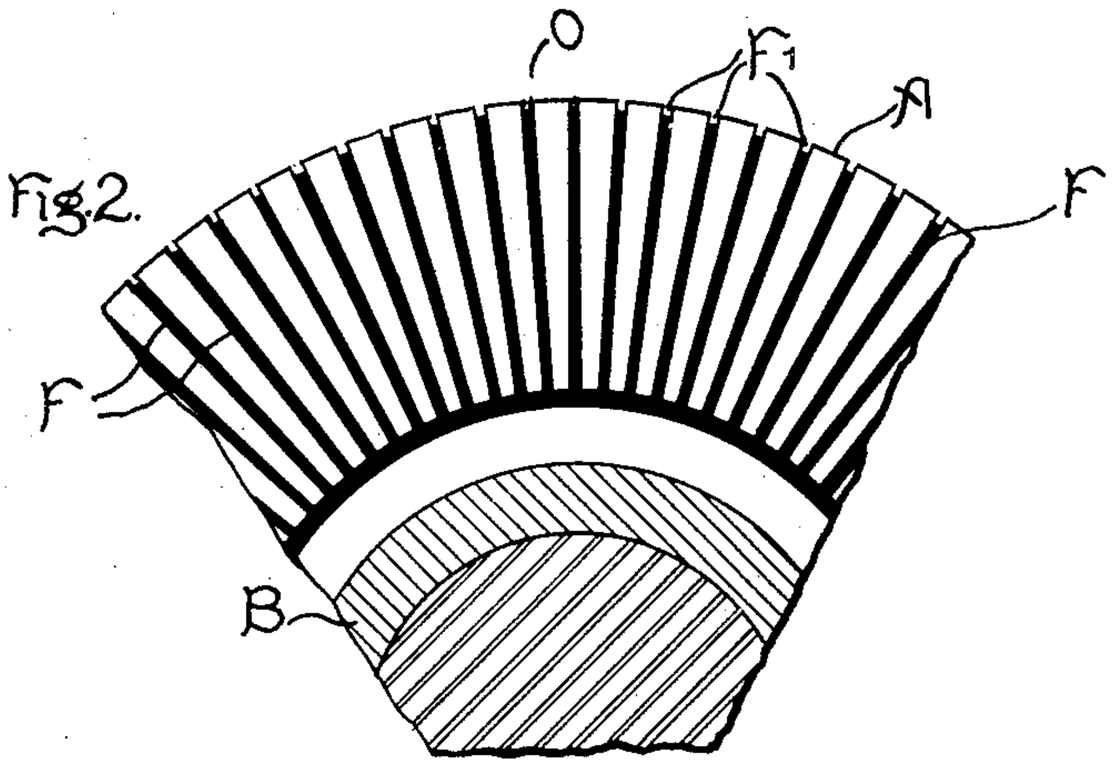


Fig. 2.



Witnesses
W. E. Jones
Benjamin B. Hull.

Inventors
Edward D. Priest;
George L. Schermerhorn
by Albert G. Davis
Atty.

UNITED STATES PATENT OFFICE.

EDWARD D. PRIEST AND GEORGE L. SCHERMERHORN, OF SCHENECTADY, NEW YORK, ASSIGNORS TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

COMMUTATOR.

SPECIFICATION forming part of Letters Patent No. 662,465, dated November 27, 1900.

Application filed June 30, 1900. Serial No. 22,128. (No model.)

To all whom it may concern:

Be it known that we, EDWARD D. PRIEST and GEORGE L. SCHERMERHORN, citizens of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Commutators, (Case No. 1,571,) of which the following is a specification.

Our present invention relates to commutators for dynamo-electric machines, and comprises certain improvements by which the wear of such devices is minimized and sparking is greatly reduced.

Commutators for dynamo-electric machines are constructed of bars of copper arranged usually in a cylindrical structure, and it is necessary that each bar should be insulated from the adjacent bars of the commutator. It is common in the construction of commutators to produce this insulation by the insertion of strips of mica, each strip cut to a shape similar to that of the commutator-segments. The commutator is built up by alternating mica strips with copper bars. Such a commutator in a form now largely used in commercial work is shown in the patent to William B. Potter, No. 608,299, August 2, 1898. We have found that in commutators of this and other usual types great difficulty has been experienced by reason of the hardness of the mica, which is the only insulating material commonly used. Such commutators are usually run in connection with carbon brushes, and in practical operation the copper segments wear down faster than the mica strips, owing to the fact that mica is an exceedingly hard and tenacious material and is not dissipated, as is the copper, by the minute arcs which exist on even the best commutators. The result is that after a certain time some or all of the mica strips project slightly, perhaps only one-half to three-hundredths of an inch, above the general surface of the commutator. It will be obvious that when this occurs the brushes will tend to jump more or less each time they strike one of these projecting mica strips, and each time that this jumping occurs there must necessarily exist a powerful arc. For example, in a railway-motor each brush will frequently carry during acceleration more than one hundred amperes at five hundred volts, and the very slightest interruption of the continuity of a circuit carrying such current is sure to result in destructive arcing. We have found in actual commercial work that numerous unexplained difficulties with the commutation of railway-motors and other pieces of apparatus have been directly traceable to this cause.

Our present invention aims at preventing or reducing this action; and it consists in cutting down the mica strips so that they do not tend to reach or rise above the general surface of the commutator. This may be accomplished with an existing commutator by simply grooving down each mica strip with a suitable steel tool or saw until the strip in question is brought from one thirty-second to three thirty-seconds of an inch below the surface of the commutator. In applying our invention to commutators in the course of construction in the factory we may build the mica strips from one thirty-second to three thirty-seconds of an inch narrower than the copper segments and assemble the commutator in such manner as to leave each mica strip the proper distance below the surface, or we may build the commutator as usual and cut down the mica, as above explained. We have been able by this simple expedient to cause the perfectly satisfactory operation of various motors and generators which have heretofore been accustomed to spark very seriously, and we have been able to reduce the wear and add to the life of commutators on such machines and on many other machines.

Referring to the drawings attached hereto, which show a manner in which our invention may be applied, Figure 1 is an elevation, partly in section, of a commutator; and Fig. 2 is a cross-section on the line 2 2 of Fig. 1.

The drawings represent our invention as applied to a commutator of the type shown in the above-mentioned patent to William B. Potter, though it will be clear that our invention may be applied to any known type of commutator in which copper bars alternate with strips of hard insulating material.

The commutator-segments A are mounted on a cast-metal shell B, which shell is pro-

vided at one end with a conical flange C, formed integral therewith, and at the other end with an adjustable clamping-ring D. The clamping-ring and flange are each provided with conical surfaces which engage corresponding surfaces on the segments and hold the latter in place. Between the conical surface of the clamp and the corresponding surfaces of the segments are layers of insulating material E, which insulate the segments from the supporting-shell. The clamping-ring D is held in place and adjusted by the nut G, and is prevented from turning by the pin H, which enters a slot I formed therein. The nut G is prevented from loosening by means of one or more screws J. The under side of each bar is provided with a lug K, having angular or conical clamping-faces K′, with which the conical flange C and the adjusting-ring D engage. The portion M of each magnet is slotted at M′ to receive the armature leads N, and between the portions M and the wearing-surface is a circumferential slot or groove L, into which the leads N extend.

Thus far we have described the Potter commutator as it is used in practice. In accordance with our present invention the mica strip F is cut down slightly below the general surface of the commutator, as is clearly shown in Figs. 1 and 2, whereby the beneficial results above described are obtained. It has been suggested that commutators thus constructed would be open to the objection that the spaces F′, existing over the insulating-strips, would tend to fill with carbon-dust and copper-dust and cause a short circuit. We find in practice that this objection does not exist, provided the strips are only cut down a few thirty-seconds of an inch, the exact amount depending, of course, upon the size of the particular commutator, the thickness of the mica, and other factors.

Though we prefer, as above described, to cut out the whole width of the mica, it is, nevertheless, possible to secure the benefits of our invention in whole or in part by weakening the mica for the distance indicated, or, for example, by grooving out the center of the mica, leaving a strip of, say, five millimeters thickness, extending to the level of the commutator-surface on each side, as indicated roughly at O.

The essential feature is that the mica should be so cut down as to prevent it from extending above the commutator after the segments have worn and producing the harmful action above described. This and other such modifications we aim to include in our claims.

What we claim as new, and desire to secure by Letters Patent of the United States, is—

1. A commutator composed of segments of conducting material separated by insulation not extending to the general level of the segments.

2. A commutator for dynamo-electric machines, consisting of alternate strips of copper and mica, the mica being grooved out for a short distance below the level of the copper.

3. As an article of manufacture, a commutator composed of alternate strips of copper and mica adapted to be clamped upon a shell, the mica strips being narrower than the copper strips.

4. A commutator for dynamo-electric machines, consisting of alternate strips of copper and insulation, the insulation being grooved out for a short distance below the level of the copper.

5. A commutator having the insulation between segments cut down below the surface of the segments.

In witness whereof we have set our hands this 28th day of June, 1900.

EDWARD D. PRIEST.
GEORGE L. SCHERMERHORN.

Witnesses:
BENJAMIN B. HULL,
MABEL H. EMERSON.