No. 696,488. Patented Apr. 1, 1902.

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

COMMUTATOR.

(Application filed Nov. 30, 1900.)

(No Model.)

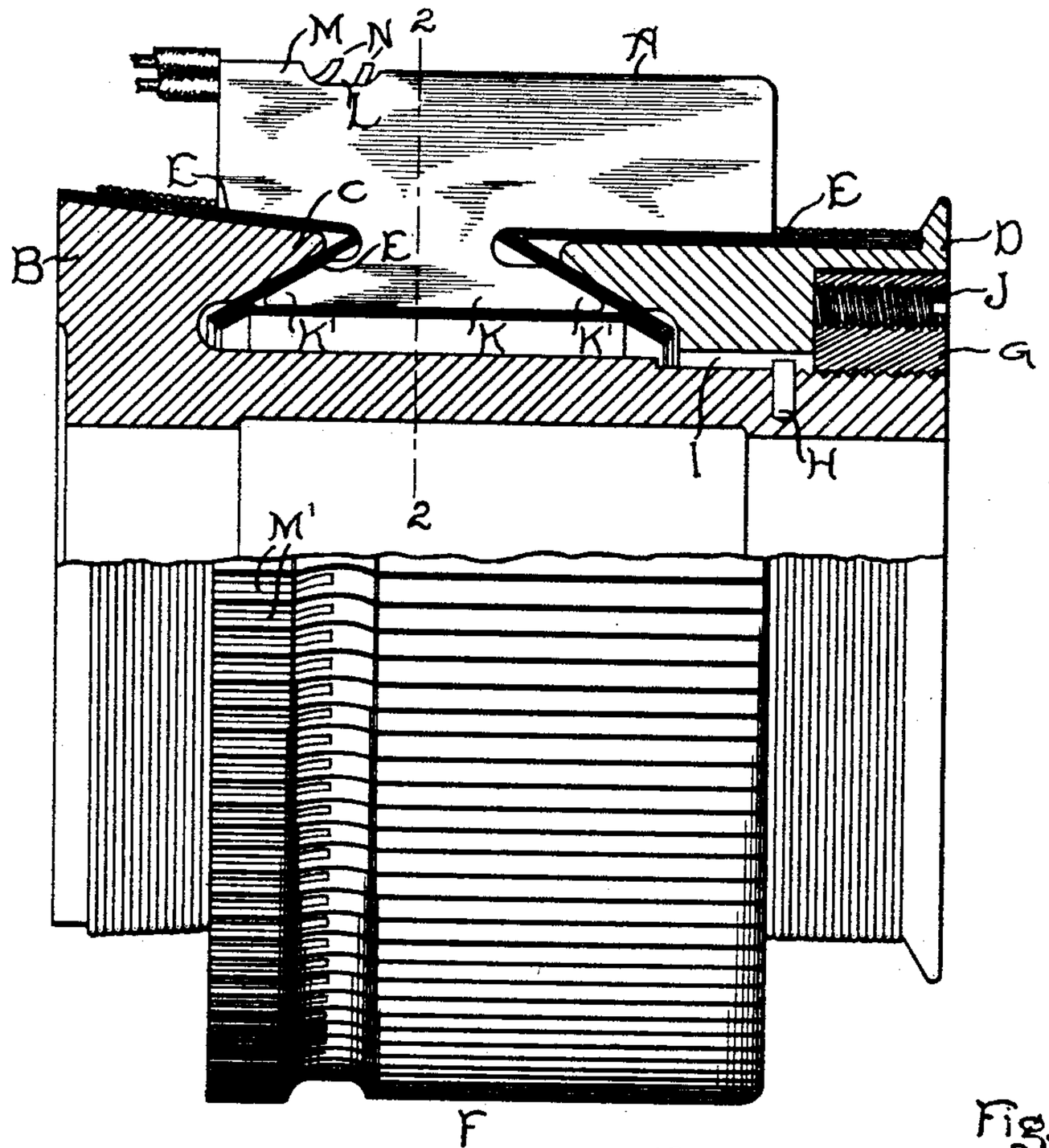

Fig. 1.

Fig. 2.

Fig. 3.

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UNITED STATES PATENT-OFFICE.

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

COMMUTATOR.

SPECIFICATION forming part of Letters Patent No. 696,488, dated April 1, 1902.

Application filed November 30, 1900. Serial No. 33,242. (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. 1,760,) of which the following is a specification.

Our invention relates to commutators such as are commonly used on dynamo-electric machines.

It consists of an improved insulation for such devices by the use of which arcing and wear are materially reduced.

Commutators for dynamo-electric machines are usually constructed of alternate strips of copper and mica, the mica being used, as is well understood, to insulate the copper strips or segments from each other. Mica is used because it is a good insulator and because it will endure the high temperatures at which commutators are necessarily run in practice, particularly in railway-motors. It is, however, as we have discovered, open to the serious objection that it is very hard and does not wear down and burn off like the copper segments, whereby it results that after the commutator has been working a reasonable time some or all of the mica strips tend to project above the general level of the commutator and to cause the brushes to jump slightly many times each revolution. This persists until the mica strips rise so far above the level of the commutator that they are actually broken off by the brushes, and the result is frequently that the commutators arc or spark excessively during the operation of the machine.

Our improvement, broadly speaking, consists in the substitution for the mica insulation generally employed of some softer heat-resisting material—as, for example, asbestos. We find that commercial sheet-asbestos if cut to the proper shape and used in the manufacture of commutators in place of the mica ordinarily employed will resist the temperatures at which commutators are run and will furnish good and reliable insulation; but as it sometimes happens that asbestos contains impurities—such, for example, as traces of iron—we further find it advantageous to use, in addition to the asbestos, a thin strip of mica, preferably one on each side of the asbestos. These mica strips are so thin that they have no appreciable strength and are readily broken off by the brushes, so that they do not cause the objections above noted, while at the same time they tend to prevent the possibility of the existence of conducting-paths from segment to segment, which might otherwise occur by reason of some impurity in the asbestos.

In the drawings attached to this specification, Figure 1 is an elevation, partly in section, of a commutator. Fig. 2 is a cross-section on the line 2 2 of Fig. 1, and Fig. 3 is a detail on a large scale.

The particular commutator to which our invention is here shown as being applied is that set forth in the patent to W. B. Potter, No. 608,299, August 2, 1898; but it will readily be understood that our invention is capable of application to almost any existing type of commutator.

The commutator-segments A are mounted on a cast-metal shell B, which shell is provided 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 segment is slotted at M' to receive the armature-leads N, and between the portion

M and the wearing-surface is a circumferential slot or groove L, into which the leads N extend.

The commutator as thus far described is identical with that shown in the patent to Potter above mentioned. In accordance with our present invention we insulate the copper segments from each other by strips F of asbestos or other material which will wear down or crumble off at least substantially as fast as the copper wears. As above stated, we find it useful in practice to place on each side of the asbestos strips F a thin strip of mica F′ F′. In commutators for railway-motors constructed in accordance with our invention we have used asbestos strips of a thickness of thirty millimeters and mica strips of five millimeters thickness, though in other commutators constructed in accordance with our present invention we have entirely omitted the mica with successful results. We find it unnecessary, as before stated, to use the mica in certain cases, and these cases would naturally be where the potential difference between two adjacent bars was comparatively small—as, for example, five volts. We further find it advantageous to fill the asbestos with linseed-oil, varnish, or with some resinous substance which will neutralize the natural hygroscopic tendency of the asbestos, as it will be evident that the presence of moisture in the commutator would be objectionable.

By means of our present invention we have been enabled to greatly reduce the sparking on various commercial dynamo-electric machines and have in many cases largely reduced the rate at which the commutators wear down and have improved the service of the commutators in a marked degree.

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

1. A commutator built up of alternate strips of conducting and of heat-resisting insulating material, the insulating material being of such a nature that it wears or tends to wear as fast as, or faster than, the conducting material.

2. A commutator for dynamo-electric machines, consisting of conducting-segments separated by soft insulating material which will wear or crumble away at least as fast as the segments.

3. A commutator for dynamo-electric machines, composed of alternate strips of copper, and of asbestos which will wear or crumble away at least as fast as the copper strips.

4. A commutator for dynamo-electric machines, consisting of conducting-segments separated by soft insulating material, and thin highly-insulating reinforcing-strips in connection with the insulating material.

5. A commutator for dynamo-electric machines, composed of conducting-segments separated by asbestos, with one or more thin mica strips reinforcing the asbestos.

6. A commutator for dynamo-electric machines composed of conducting-segments separated by asbestos, with a thin strip of mica on each side of each strip of asbestos.

7. A commutator comprising alternate conducting and insulating strips, the latter being of such nature that they will wear away at least as fast as the conducting-strips, and being treated with a water-shedding substance.

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

EDWARD D. PRIEST.
GEORGE L. SCHERMERHORN.

Witnesses:
BENJAMIN B. HULL,
MARGARET E. WOOLLEY.