(No Model.)

E. A. SPERRY.

COMMUTATOR.

No. 453,822. Patented June 9, 1891.

Fig. 1.

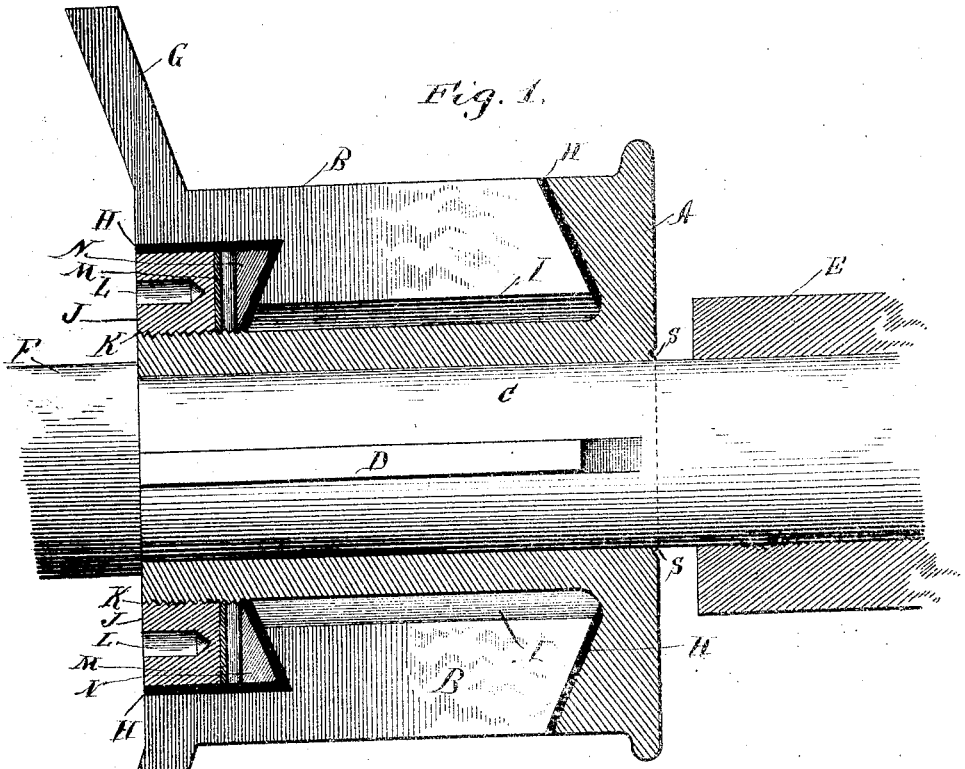


Fig. 2.

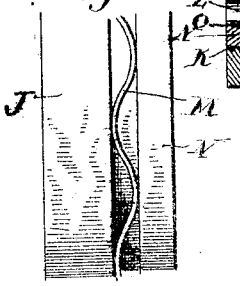


Fig. 3.

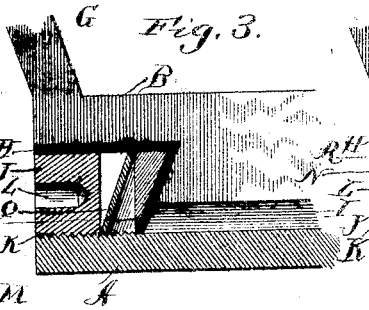


Fig. 4.

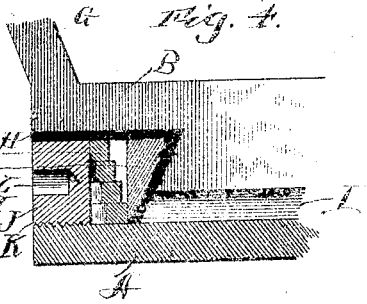
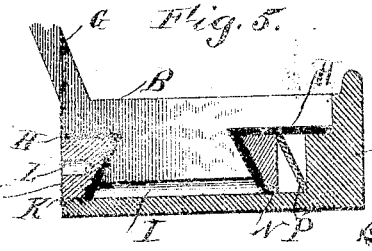


Fig. 5.



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UNITED STATES PATENT OFFICE.

ELMER A. SPERRY, OF CHICAGO, ILLINOIS.

COMMUTATOR.

SPECIFICATION forming part of Letters Patent No. 453,822, dated June 9, 1891.

Application filed February 20, 1891. Serial No. 382,152. (No model.)

To all whom it may concern:

Be it known that I, ELMER A. SPERRY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Commutator, of which the following is a clear, full, and exact specification.

The commutator is the most delicate part of a dynamo or motor, inasmuch as its parts are held together only through the medium of insulating substances, which at best are compressible and liable to shrink. The unequal expansion of the copper segments and the steel containing-sleeve is such as to crush the insulation when hot, leaving the parts of the commutator loose when cool. This insulation is also easily ruined by oil from the journals. The containing-sleeve usually protrudes back of the commutator, so as to occupy much space thereon, not allowing the commutator-segments themselves to come in close proximity to the armature. These difficulties I overcome in the manner shown in the accompanying drawings, wherein—

Figure 1 is a view of a commutator, shaft, and journal-bearing, partially in section. Figs. 2, 3, 4, and 5 are details of various forms of an elastic medium to protect the insulation from being crushed.

Similar letters of reference indicate the same parts throughout the several views.

A is the commutator-sleeve containing the segments B and mounted upon the shaft C, to which it is rigidly secured by the key D.

E is the journal-bearing.

F is an enlarged portion of the shaft for receiving the coils of the armature, the terminals of which coils are attached to the segment-arms G. The segments B, shaped as shown in Fig. 1, are separated from the containing-sleeve A by the layers of insulating material H and the air space I, and are secured firmly in position by means of the nut J threading with the sleeve at K.

L L are holes, in which may be inserted a spanner-wrench to turn the nut J.

It is known that the substances used as electric insulators are also thermal insulators. It will therefore be seen that the segments of the commutator upon which bear the brushes of the dynamo or motor becoming rapidly very hot in operation will communicate their heat but slowly to the thermally-insulated containing-sleeve. Thus the segments will expand more rapidly than the sleeve and crush the layer of insulation between, and upon cooling will shrink away from it. This operation of crushing and shrinking due to the heating and cooling will rapidly render the parts loose and destroy the commutator. This defect I remedy by inserting an elastic medium in the space between the inner surface of the nut J and the opposing face of the segments, or, as in Fig. 5, between the segments and the containing-sleeve. I have shown several ways of accomplishing this result; but obviously many more could be employed embodying the same idea, and I do not, therefore, propose to limit myself to the specific forms shown.

In Figs. 1 and 2 a circular spring M, curved as shown in Fig. 2, is employed. This bears against the follower N and the nut J, and upon the metal of the segments expanding laterally is compressed. In Fig. 3 is shown a dished washer O, which bears against the follower N and the nut J. Fig. 5 shows a similar washer arranged at the end of the commutator next the journal-bearing, in which case the washer P bears against the follower N and the containing-sleeve A. In Fig. 4 is shown a spiral spring R in the space between the follower N and the nut J. It will be seen that in all these forms, when from the unequal expansion or contraction of the segments and containing-sleeve or from any other cause there is exerted a pressure tending to crush the insulation, the interposed spring will take up the strain and maintain a pressure sufficient to hold the parts firmly together at all times. The same would be true if any other elastic medium were employed instead of a spring.

Another feature of my invention consists in so shaping the portion of the commutator next the armature as to permit of the winding of the wire in close proximity to the segments of the commutator, thus utilizing space which would be otherwise wasted.

It has been heretofore considered necessary to have the containing-sleeve A project beyond the segments on the armature end of the commutator in order to protect the segments and insulation from the injurious effect of oil which would pass from the journal between

the commutator and the shaft and so reach the inner end of the commutator. Oil will pass any ordinary slip-fit that can be used, and the objection to the use of shellac or any non-soluble substance is that it cements the commutator to the shaft, so that it is almost impossible to get it off for repairs or replacement. This difficulty I have remedied by the simple expedient of calking the containing-sleeve onto the shaft, as shown at S, thereby making so close a fit between the sleeve and shaft as to prevent the oil from passing between.

I claim as new and desire to secure by Letters Patent—

1. A commutator for a dynamo or motor, containing an elastic medium to relieve the insulation from compression strains due to the expansion or contraction of the parts.

2. In a commutator for a dynamo or motor, a containing-sleeve, segments therein, layers of insulating material between the sleeve and segments, and an elastic medium to relieve the insulation from strains due to the contraction or expansion of the parts.

3. In a commutator for a dynamo or motor, a containing-sleeve, segments therein, layers of insulating material between the sleeve and segments, and an elastic medium between the sleeve and the insulating material to take up any strains of compression due to the expansion or contraction of the parts.

4. In a commutator for a dynamo or motor, a containing-sleeve, segments, shaped as shown, separated from the sleeves by a layer of insulation, a nut to secure the parts firmly together, and an elastic medium between the nut and the segments to keep the parts at all times pressed firmly together.

5. A commutator for a dynamo or motor, consisting of a containing-sleeve, segments contained therein but insulated therefrom, and a shaft, the said containing-sleeve being calked onto the shaft to prevent the passage of oil.

6. In a commutator for a dynamo or motor, insulated segments, a containing-sleeve mounted on the shaft and bearing upon the ends of the segments, projections on the commutator-segments which protrude at one end beyond the point of bearing between the sleeve and the segments, with the joint between the sleeve and the shaft calked to form an oil-stop between the journal and the inner ends of the commutator-segments.

Executed this the 9th day of February, 1891.

ELMER A. SPERRY.

In presence of—
A. M. HEYL,
H. E. GOODMAN.