No. 847,284. PATENTED MAR. 12, 1907.

J. R. GRINDROD.

COMMUTATOR.

APPLICATION FILED AUG. 1, 1904.

Fig. 1.

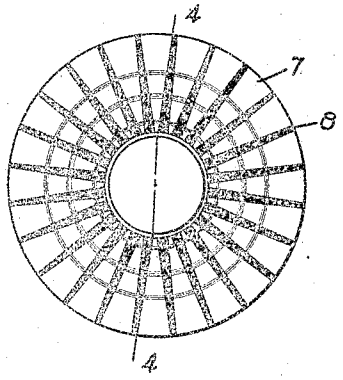


Fig. 2.

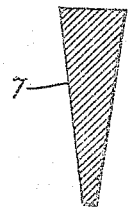
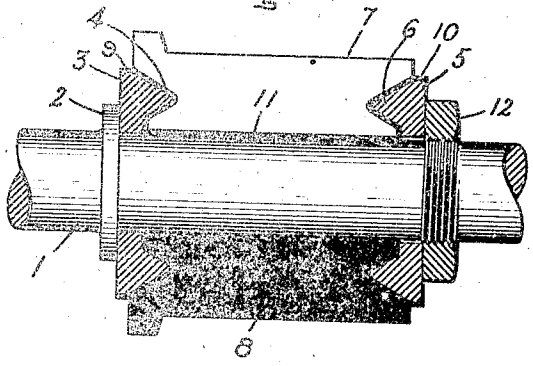


Fig. 3.

Fig. 4.



Witnesses:

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Atty.

UNITED STATES PATENT OFFICE.

JOHN R. GRINDROD, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

COMMUTATOR.

No. 847,284. Specification of Letters Patent. Patented March 12, 1907.

Application filed August 1, 1904. Serial No. 218,980.

To all whom it may concern:

Be it known that I, JOHN R. GRINDROD, a subject of the King of Great Britain, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Commutators, of which the following is a specification.

In ordinary commutators for dynamo-electric machines radially-extending segments formed of conducting material are separated by layers or segments of insulating material. In the operation of such commutators there is a tendency for the insulating layers or pieces to become loose and work out, owing to the expansion of the parts produced by the heat generated and the centrifugal forces developed by the rotation of the commutator. The effect produced by the latter cause is particularly noticeable, of course, in connection with commutators rotated at high speeds, which are now common with many classes of electrical apparatus, notably those in which generators are directly connected to steam-turbines. The working loose of the pieces of insulation weakens the commutator construction, produces an uneven commutator-surface, the fault being technically known as "high mica," and is generally objectionable and injurious to the proper operation of the commutator. The method of locking the members of conducting material in place cannot ordinarily be employed with these segments or layers of insulating material, as the mechanical strength of the latter is insufficient for that purpose. I have found, however, that if the layers or segments of insulating material are tapered in cross-section with the inner edge of each insulating-segment wider than the outer edge and the conducting-segments are reversely tapered, the trouble from loose segments or high mica is averted, as owing to their shape it is impossible for the insulating-segments to work loose.

For a better understanding of my invention reference may be had to the accompanying drawings and description, in which I have illustrated and described one embodiment of my invention.

Of the drawings, Figure 1 is an end elevation of the commutator. Fig. 2 is a sectional elevation of the commutator-segments. Fig. 3 is a similar sectional view of an insulating-segment or layer; and Fig. 4 is a section of the commutator taken on the line 4 4 of Fig. 1.

In the drawings, 1 represents the shaft on which the commutator is mounted. The shaft 1 is formed with a collar 2, against which the end clamping ring or member 3 of the commutator abuts. The end member 3 is formed with an annular rib 4 on its right-hand side, as viewed in Fig. 4. A clamping-ring 5, similar to the clamping-ring 3, is formed with a rib 6 on its left-hand side, as viewed in Fig. 4. The body of the commutator is in the form of an annular member or shell surrounding the shaft 1 and is composed of segments 7, formed of conducting material, and segments or layers 8, of insulating material, interposed between adjacent conducting-segments held between the clamping members 3 and 5, the conducting and insulating segments both being notched at their ends to receive the ribs 4 and 6. Suitable layers of insulating material 9, 10, and 11 are employed to insulate the edges of the conducting-segments 7 from the end clamping members and shaft 1. The clamping member 5 is forced against the right-hand end of the segments 7, as viewed in Fig. 4, by a nut 12, threaded on the shaft 1. Viewed sidewise the conducting-segments 7 and insulating-segments 8 may be the same in outline. In cross-section, however, adjacent segments 7 and 8 appear in the form of sections of alternately-inverted truncated cones, the outer edge of each conducting-segment 7 being thicker than its inner edge, while the outer edge of each insulating-segment 8 is thinner than its inner edge. The segments 8 may be formed in any suitable manner. For instance, they may consist of dry mica which has been shaped by milling or otherwise to the desired form, or they may consist of mica scales cemented together by varnish and molded to the form desired.

It will be obvious to all those skilled in the art that the embodiment of my invention described and illustrated in detail is but one of many forms in which my invention may be embodied.

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

1. A cylindrical commutator formed of conducting members separated by separable insulating members, the conducting members and insulating members being reversely tapered radially with respect to each other.

2. In a cylindrical commutator, conducting-segments and separable interposed layers

of insulating material, the inner edges of said insulating-layers being wider than their outer edges.

3. In combination, a shaft, a plurality of segments arranged about said shaft and secured thereto, adjacent commutator-segments being shaped to form intervening spaces narrower at the periphery of the commutator than at points nearer the center of the commutator, and a separate piece of solid insulating material located in each of said spaces.

4. A cylindrical commutator comprising conducting members separated by strips of sheet-mica, the conducting members and strips of mica being reversely tapered radially with respect to each other.

5. A cylindrical commutator the brush-engaging portion of which is composed of strips or members of conducting material and interposed strips of insulating material, the strips of insulating material being separable from each other and tapered in cross-section with their outer edges narrower than their inner edges, and the conducting members being reversely tapered.

6. A cylindrical commutator formed of a plurality of independent conducting members separated from each other by separable insulating members, the conducting members and insulating members being reversely tapered with respect to each other.

7. A cylindrical commutator comprising a plurality of independent conducting members separated from each other by strips of sheet-mica, the conducting members and strips of mica being reversely tapered with respect to each other.

In witness whereof I have hereunto set my hand this 29th day of July, 1904.

JOHN R. GRINDROD.

Witnesses:

JOHN A. MCMANUS,

ARTHUR H. SHATTUCK.