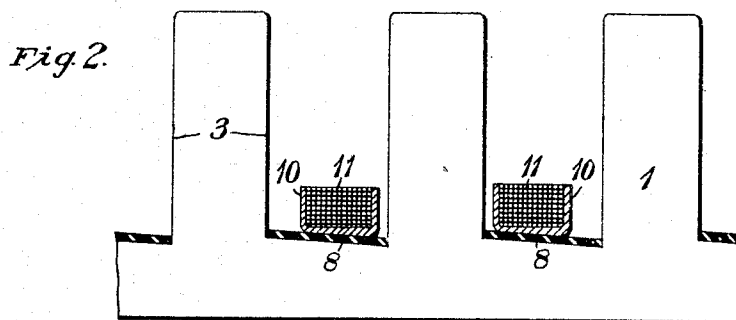
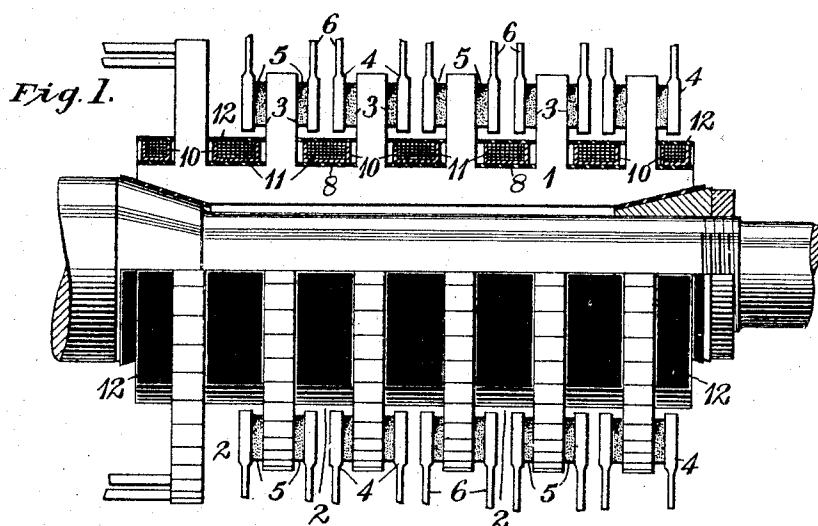


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COMMUTATOR FOR DYNAMO ELECTRIC MACHINES.  
APPLICATION FILED FEB. 2, 1907.

949,103.

Patented Feb. 15, 1910.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

MILES WALKER, OF MANCHESTER, ENGLAND, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

COMMUTATOR FOR DYNAMO-ELECTRIC MACHINES.

949,103.

Specification of Letters Patent.

Patented Feb. 15, 1910.

Application filed February 2, 1907. Serial No. 355,459.

*To all whom it may concern:*

Be it known that I, MILES WALKER, a subject of the King of Great Britain, and a resident of Manchester, in the county of Lancaster, England, have invented a new and useful Improvement in Commutators for Dynamo-Electric Machines, of which the following is a specification.

My invention relates to commutators for dynamo-electric machines, and it has particular reference to such commutators as are adapted for use with machines which are driven at high rates of speed.

In operating dynamo-electric machines at very high speeds, considerable difficulty has heretofore been experienced in collecting currents by means of cylindrical commutators on account of the difficulty of maintaining the brushes in contact with the cylindrical surfaces. To avoid such difficulty, it has been proposed to so locate the brushes at the end of the commutator, that they shall make contact with a plane surface provided for that purpose. Such arrangement has been found successful to some extent, as the vibrations of a shaft longitudinally are generally not very rapid, but the surface provided for collecting the current is limited and, consequently, is not suitable for dealing with large currents unless the diameter of the commutator is made very great, which is obviously objectionable, for many reasons. It has also been proposed to cut grooves in the commutator cylinder and to press the brushes partly against the inclined surfaces and partly against the cylindrical face. This method has been only partially successful, as it does not prevent chattering of the brushes when the commutator cylinder is slightly unsymmetrical. Another difficulty which has arisen in connection with commutators intended for operation at high speeds has been to so design them as to enable very large currents to be collected without making the commutator cylinders of unwieldy length. The diameter is limited by the permissible peripheral speed, so that the necessary space for the brushes and the necessary cooling surface has to be provided by increasing the length. Moreover, when steel shrink rings are added to hold the commutator segments together, the length is still further

increased by the combined width of the rings and by the necessary insulating space between the brushes and the rings.

According to the present invention, I avoid the difficulties above mentioned by providing the commutator cylinder with annular peripheral grooves which are substantially rectangular in cross section and of a depth and width sufficient to contain brush holders provided with brushes to press against the plane radial faces of the commutator bars, thus provided. Since the brushes make contact with the side walls only of the grooves, and vibrations of the commutator cylinder are mainly lateral, substantially all interruption and variation of contact between the brushes and the cooperating surfaces is avoided. In the bottoms of the grooves I place metal bands which are insulated from the bars and are firmly secured in place to hold the bars in position. The brushes are preferably of carbon and very short, being provided with springs to press them in an axial direction against the plane faces of the commutator bars. Each of the annular grooves is preferably made wide enough to contain two brushes, disposed end to end, so that both sides of the grooves may be utilized for collecting the current.

In the accompanying drawings, Figure 1 is a part sectional side elevation of a commutator cylinder constructed in accordance with my invention. Fig. 2 is a part sectional view of a modification of a detail of Fig. 1.

Referring to Fig. 1, the commutator cylinder comprises a number of segments 1, notched as indicated, so that, when assembled, a series of annular peripheral grooves 2 is formed having plane radial faces 3 against which brushes 4 are held under pressure acting in a direction parallel to the axis of the commutator cylinder. The brushes 4 consist of blocks 5 of carbon which are supported in holders 6 pivotally mounted upon a carrier (not shown) in any appropriate way and acted upon by springs, in the usual manner. The blocks 5 may be of rectangular form or they may conform more or less to the outline of the cross section of the individual commutator segments. The widths of the grooves 2 may be only sufficient

to accommodate one row or ring of brushes but, as is preferred, may be of such width as to allow two rows or rings of brushes to be located therein, end to end, one row or ring of brushes acting against one wall of the groove and the other row or ring of brushes acting against the opposite wall. By reason of this construction, a large surface is afforded for current collection and also a large surface for the dissipation of heat, while, at the same time, the length of the commutator, for a given capacity, is lessened. The commutator segments 1 are secured by split or transversely separated rings 10 of channel section located in the bottoms of the grooves 2, in conjunction with retaining bands 11 composed of turns of suitable wire, such as hard drawn steel wire, which are tightly wound on after the ring sections have been placed in position. Bands 8 of insulating material are disposed between the rings 10 and the bottoms of the grooves 2 and, as a further precaution, similar insulating bands 12 are arranged to surround said rings 10 in order to prevent short circuits by reason of carbon or other dust particles. As a modification of this form of commutator, the bottoms of the grooves 2, in lieu of being parallel to the axis of the machine, may incline slightly toward the one or the other end thereof, as shown in Fig. 2, so that each resembles the surface of a truncated cone. After this surface has been insulated, the divided channel-section ring 10 is placed in position upon a portion thereof which is nearer the end of smaller diameter, as illustrated to the left of the figure, and the wire of the band 11 then wound on. Thereafter, the ring 10 and the band 11 are expanded by heat and the whole displaced toward the end of the aforesaid surface which has the larger diameter, as illustrated to the right of the figure. When cool, the ring and band contract and tighten upon the insulating band 8 so as to prevent

the commutator segments from working loose.

Obviously, although the securing bands have been shown as applied to all grooves of the commutator, they need not necessarily be so, as the same may be reduced in number if desired.

I claim as my invention:

1. A commutator cylinder comprising insulated commutator bars and having a series of relatively deep peripheral grooves the side walls of which constitute plane contact surfaces, and clamping bands located in the bottoms of said grooves to hold the commutator bars against displacement.

2. A commutator cylinder having peripheral grooves the side walls of which constitute plane radial contact surfaces, and insulated clamping bands located in the bottoms of a plurality of said grooves.

3. A commutator cylinder having peripheral grooves the side walls of which constitute plane contact surfaces, layers of insulating material disposed on the bottom surfaces of said grooves, and clamping bands surrounding said insulating layers.

4. A commutator cylinder having a plurality of peripheral grooves the bottom surfaces of which are of slightly frusto-conical form, layers of insulating material disposed upon said bottom surfaces, and clamping bands surrounding said insulating layers.

5. A commutator cylinder having peripheral grooves the side walls of which constitute contact surfaces, and insulated clamping bands located in the bottom of some or all of said grooves.

In testimony whereof, I have hereunto subscribed my name this 16th day of January 1907.

MILES WALKER.

Witnesses:

J. C. BOUTFLOWER,  
G. BOUTFLOWER.