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METHOD OF BUILDING COMMUTATORS

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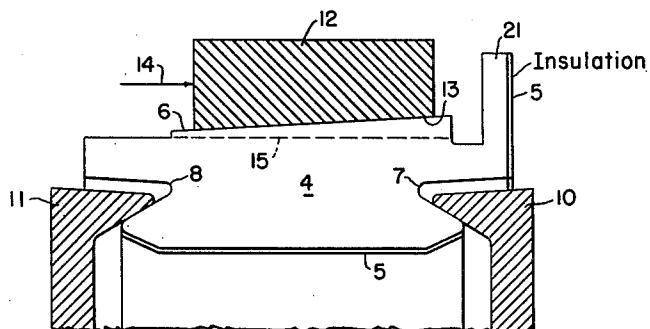


Fig. 1.

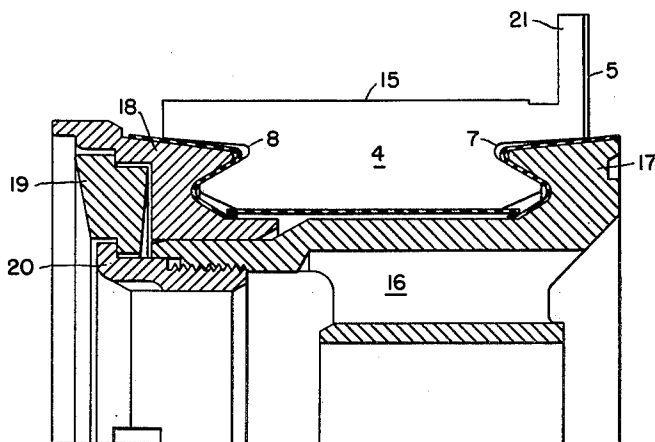


Fig. 2.

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METHOD OF BUILDING COMMUTATORS

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1 Claim. (Cl. 29—155.54)

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Our invention relates to commutator-structures, seasoning-assemblies, and methods of building a V-ring commutator for dynamo-electric machines.

The present practice in building cylindrical commutator-assemblies is shown in Graybrook Patent 2,379,145, granted June 26, 1945. According to this practice, the cylindrical assembly of commutator and mica bars or segments are seasoned by first surrounding the cylindrical surface with a split ring having a tapered outer surface, and then tightening the same, around the commutator, by axially pressing a solid ring over the tapered outer surface of the split ring, for the purpose of decreasing the diameter of the cylindrical commutator-assembly, as the mica segments become seasoned, and compress during the process.

This general split-ring practice, with variations, has been in use for a long time, but it has some disadvantages, including the fact that, as the solid ring advances axially on the split ring, and decreases the diameter of the split ring, there results a circumferential sliding action on the cylindrical surface of the copper and mica segments. From time to time, in building commutators, this sliding or dragging action has caused much trouble, by skewing and bowing the copper bars in the direction of the closing-in movement of the split ring. At too-frequent intervals, it has been necessary to straighten the commutator-bars and restack the commutator-assembly, in order to correct the skewed bars. The friction between the contracting split ring and the commutator-assembly is different for each commutator, and this causes each set of commutator-segments to be skewed or pulled to a different degree.

Our present invention overcomes this difficulty in the simplest of all manners. Instead of punching the commutator bars with parallel top and bottom surfaces, they are punched with a tapered top or outer surface, so that, when the commutator bars and insulating bars are assembled, they are disposed in the form of a truncated cone or conical frustum. With this construction, it is not necessary to use a split ring having a tapered outer surface, because the outer surface of the commutator-assembly thus formed is itself tapered. The solid ring is simply pressed axially onto this commutator-assembly, during the seasoning process. At the end of the seasoning process, the solid ring is removed, and the commutator surface is turned down into a smooth cylindrical surface. It has practically always been necessary

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to turn down the commutator surface, anyway, after the seasoning process, even with the old practice in which the commutator had a cylindrical outer surface to start with. Now, according to our practice, the truncated cylindrical surface of the seasoned commutator-assembly is turned down to form a cylindrical surface, thus completing the treatment of the commutator-assembly.

Our invention is shown, in an exemplary manner, in the accompanying drawing, wherein

Figure 1 is a fragmentary longitudinal sectional view illustrative of the seasoning process, and

Fig. 2 is a similar view of the top half of a finished commutator-cylinder, assembled in a commutator spider which is ready to be pressed onto the shaft of a dynamo-electric machine (not shown).

As shown in Fig. 1, our initial commutator-structure consists of a plurality of copper commutator-bars or segments 4, separated by thin mica insulating-bars or segments 5, disposed in a truncated conical formation. It will be noted, from the drawing, that each of these bars has a tapered outer surface 6, and each of these bars also has V-grooves 7 and 8 in its ends. During the seasoning process which is shown in Fig. 1, a temporary or dummy supporting-structure is used, including V-rings 10 and 11, engaging the V-groove to clamp the bars together in a commutator structure.

To tighten the commutator bars together, during the seasoning-process, when the mica segments are in the process of flowing and contracting to some extent, we simply use a solid ring 12, having a tapered inner surface 13, surrounding the truncated conical surface 6 of the commutator-structure, and we provide any suitable means, represented by the arrow 14, for forcing the solid ring 12 axially with respect to the commutator-structure, for compressing the same.

After the seasoning process is over, that is, after the mica bars 5 have compressed substantially all they are going to, the solid ring 12 is removed, and then the truncated conical surface 6 is turned down to form a substantially cylindrical commutator-surface, as indicated by dotted lines 15 in Fig. 1.

After the manufacture of the commutator-assembly has thus been completed, the assembly is clamped in its final V-ring clamping-assembly; or this may be done while the solid ring 12 is still in place, and before the turning-operation. At any rate, in the final assembly, as shown

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in Fig. 2, there is usually provided a steel commutator-spider 16 which carries one of the clamping V-rings 17. The other V-ring 18 is a movable steel ring which is held in place by means of a disk-spring 19 which is held in its deflected position by means of a nut 20. The commutator-spider 16 is then ready to be pressed onto the shaft of a dynamo-electric machine (not shown).

Usually, the commutator bars are provided with necks 21 for attachment to the armature-winding (not shown) of the machine.

It will be noted that our commutator-building method does not produce any circumferential movement or twisting-effect on the surface of the commutator, and thus we altogether avoid any possibility of skewing or bowing the commutator bars during the tightening-process when the commutator is being seasoned in the factory.

While we have illustrated and described a simple form of our invention, it is obvious that we are not limited to the precise structures and procedures herein shown, and we desire that our appended claim shall be accorded the broadest construction consistent with its language.

We claim as our invention:

The method of building a V-ring commutator-assembly, comprising the steps of shaping a plurality of commutator bars and insulating bars to produce a tapered upper surface and to produce V-grooves in the ends of each, providing a supporting-structure including V-rings, assembling an unfinished commutator-structure comprising a plurality of said commutator bars and insulat-

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ing bars disposed in the form of a truncated cone, causing said V-rings to engage in said V-grooves to clamp the bars together in a commutator-structure, placing a solid ring having a tapered inner surface around said commutator-structure so as to surround the truncated conical surface thereof, seasoning said unfinished commutator-structure and simultaneously forcing the solid ring axially with respect to the commutator-structure for compressing said commutator-structure, later removing said solid ring, and thereafter turning down the truncated conical surface of the commutator-structure to form a finished substantially cylindrical surface.

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