

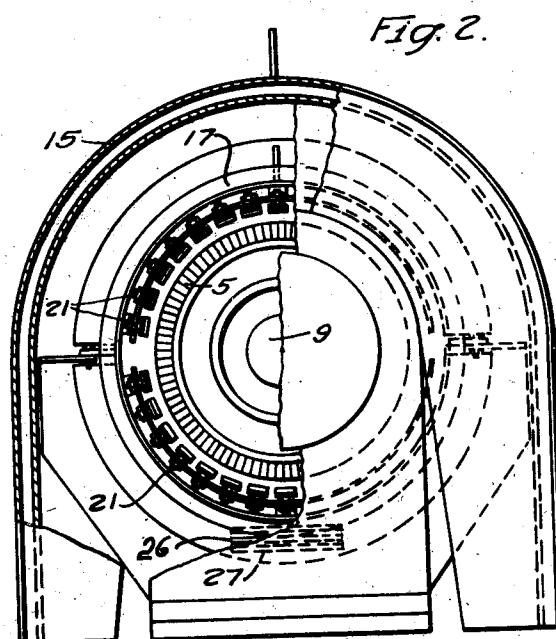
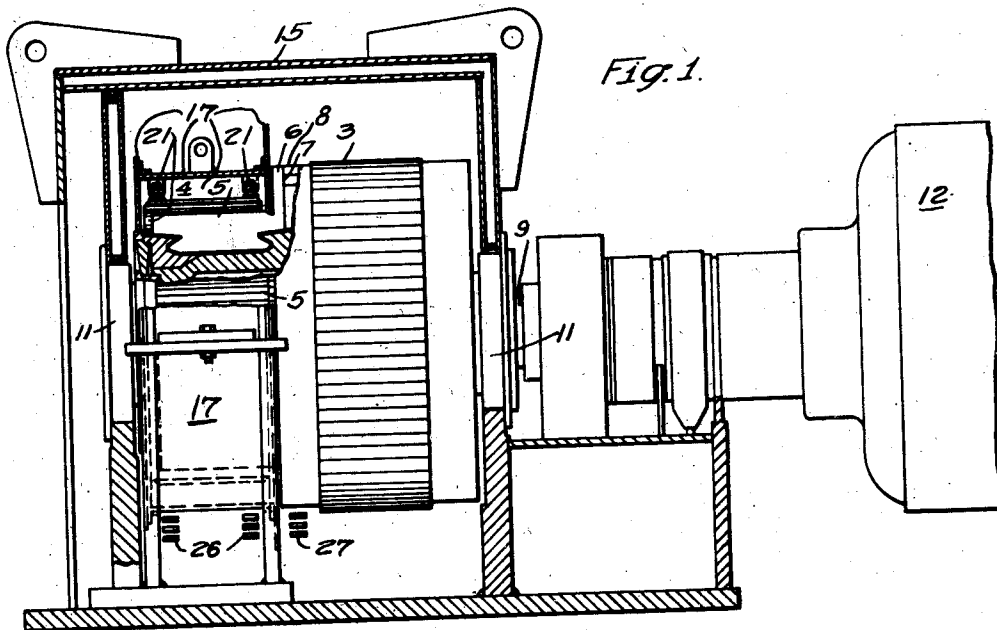
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COMMUTATOR-SEASONING APPARATUS

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WITNESSES:

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COMMUTATOR-SEASONING APPARATUS

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Our invention relates to improvements in the processing of cylindrical-type commutators for dynamo-electric machines. Such commutators comprise a plurality of copper segments, separated by mica insulation, and supported on mica-covered V-rings, and it is desirable to give each commutator several seasoning cycles after its final assembly on the rotor-member of the dynamo-electric machine, and after the electrical connections have been completed between the commutator-necks and the armature-conductors. Such seasoning cycles consist of alternate heatings and coolings, while rotating the commutator at full speed or overspeeds, and this treatment is needed in order to complete the flowing adjusting of the copper and of the mica with its insulating binder, so that the surface of the commutator may be as smooth and perfect a cylinder as possible, at all speeds and temperatures reached during service.

Various methods of heating the commutator during this seasoning process have been utilized heretofore. At one time, wooden blocks were pressed against the commutator-surface, while it was being rotated, to heat the commutator by friction, but this process was not only slow and erratic, but it deposited various gums and wood-sap products on the commutator, and was altogether not very satisfactory.

Later on, the wooden blocks were replaced with carbon brushes, large numbers of brushes being pressed tightly against the commutator-surface to create frictional heat, and in order to expedite this heating-process, which was at best rather slow, special high-friction brushes were utilized in this process, which not only resulted in commutator-wear, necessitating refinishing of the commutator-surface, and leaving detrimental carbon-deposits from the brushes, but it was also rather slow, even when supplemented by auxiliary heaters, and at best it was variable and unreliable, necessitating frequent stoppages to increase or decrease the number of brushes utilized, or the brush-pressure, in order to hold the commutator-surface anywhere near a desired predetermined temperature.

Because of these and other difficulties encountered in the frictional methods, a gas-flame heating-method has more recently been developed and applied, wherein the commutator-surface is heated by a flame, but this flame is likely, at

times, to cause a change in the chemical composition of the copper bars, necessitating a rather elaborate and meticulous control-method and equipment for constantly guarding against over-temperatures, and for maintaining desired temperature-conditions on the commutator-bars.

The object of our present invention is to provide a different type of apparatus and method for processing commutators, whereby means are provided, within the commutator-processing compartment, out of rubbing-contact with the commutator, for applying heat to the cylindrical commutator-surface at a moderate, fairly steady rate, suitable for approaching and reaching the seasoning temperature at a controlled rate, without abrasion or disturbance of the finish of the commutator-surface, and without the risk of suddenly increasing the commutator-temperature to a point considerably beyond the desired seasoning temperature. The heating-means for the commutator consist of space-heaters, or other electrical heating-elements, preferably composed of a series of approximately parallel, elongated, electrical heating-elements, either longitudinally or spirally disposed, and mounted in a substantially cylindrical arrangement, preferably substantially completely surrounding the commutator, in close spaced relation thereto, but out of contact with the commutator-surface, for heating said commutator mainly by radiation, and for supplying most of the heat necessary for carrying out the heating seasoning cycles within the desired time-limits.

In some cases, we prefer to provide, as a further refinement of our invention, means for heating the main body-portion of the rotor-member of which the commutator is a part, or means for confining the heat of said main rotor-portion, so as to limit the rapid conduction of heat away from the commutator-segments by way of the electrical connections between the commutator-segments and the armature-winding. This limitation of the heat-conduction away from the commutator is accomplished by raising the temperature of the armature member, which constitutes the rest of the rotor-member, and reducing the radiation of heat away from the armature member. By this means, we reduce the amount of heat which must be put into the commutator-member to maintain its seasoning temperature,

and we considerably reduce the likelihood of melting the soldered connections at the commutator necks.

With the foregoing and other objects in view, our invention consists in the apparatus, combinations, parts and methods hereinafter described and claimed, and illustrated in the accompanying drawing, wherein:

Figure 1 is a longitudinal sectional view of the complete apparatus; and

Fig. 2 is a transverse sectional view through the commutator-processing compartment.

Our commutator-seasoning apparatus, as shown in the drawing, is utilized in the heat-treatment of the rotor-member of a dynamo-electric machine, said rotor-member comprising an armature-portion 3 which comprises the main body-portion of the rotor-member, and a cylindrical-type commutator-member 4 which is electrically and mechanically connected in place at one end of the armature. The commutator consists of a plurality of insulated copper segments 5 having necks 6 which are soldered at 7 to the leads 8 of the armature-winding. The rotor-member is provided with a shaft 9 which is journaled in suitable bearings 11, and rotated by any suitable means such as a motor 12.

For the heat-treatment of the commutator, we preferably provide a hood 15, or an open-bottomed hood-forming housing which may be let down over the entire rotor-member, so as to more or less completely enclose both the armature-member and the commutator-member, thus constituting an oven therefor. Said hood has an opening within at least one of its ends for fitting over the bearings 11, as shown in Fig. 1. Disposed within or underneath said hood 15, we preferably provide a special compartment 17 for heat-treating the commutator, said compartment being conveniently made in separable upper and lower halves for convenience in assembling around the commutator. This compartment comprises annular shields or baffles disposed transversely with respect to the shaft 9 in such position as to shield or baffle the commutator necks and the armature-portion of the machine from the heat which is applied to the commutator-cylinder, while at the same time the entire commutator-processing compartment is located within the oven-hood 15 and is in air-communication therewith, so that the entire oven is heated to some extent.

In carrying out our invention, we provide electrical heating-elements which are disposed close to, but spaced from the cylindrical commutator-surface, and preferably these heaters are in the form of a series of approximately parallel, elongated, electrical heating-elements 21, which are mounted in a substantially cylindrical arrangement within the compartment 17. Preferably, these electrical space-heaters are disposed all the way around the cylindrical surface of the commutator, although obviously, in some cases, it may not be necessary to surround the entire periphery of the commutator with such heaters. The elongated heating-elements 21 may be disposed in any convenient manner, either extending in spaced spirals or convolutions around the commutator, or preferably, as shown, in spaced longitudinally extending straps around the commutator.

Preferably, in addition to the space-heaters which are grouped closely around the cylindrical commutator-surface, we provide additional means for heating the oven or furnace-space which is

enclosed by the hood 15, and this additional heating-means is most conveniently located in the bottom of the compartment 17, as shown at 26, where it heats the entire oven-space by means of circulating convectional air-currents, but we may also provide, either in lieu thereof or in addition to the general compartment-heaters 26, other heaters 27 located in the main space within the hood 15, underneath the armature-member 3, or we may simply rely upon the hood itself as adequate means for limiting the radiation of heat from the armature-member to the surrounding atmosphere, so as to avoid the necessity for putting excessive amounts of heat into the commutator-bars, which might involve the risk of softening the soldered connections 7, particularly during the heating-up stage of the commutator-treatment.

We have found, as a result of our invention, that, because the surface of a commutator is undisturbed by wear or by flame, we can readily detect any unusual disturbance in the commutator-surface and determine its causes. Furthermore, we have found that the progress of the seasoning can be much more readily ascertained at all times, and suitably controlled, without, however, having to rely upon extremely sensitive and constant automatic supervision for guarding against momentary flashes of overheat such as are possible in the flame-method of commutator-seasoning. Our seasoning apparatus and method have considerably improved the commutator-processing treatment, avoiding the necessity for much of the commutator-refinishing which has been required heretofore, avoiding much of the damage which has heretofore been done to the soldered joints between the commutator-necks and the armature-leads, and removing much of the guess-work and chance from the commutator-seasoning process.

While we have described our invention in a simple illustrative form, we desire it to be understood that our invention is by no means limited to this precise form, and we desire that our appended claims may be accorded the broadest construction consistent with their language.

We claim as our invention:

1. Heat-treatment apparatus, adapted to treat a rotatably supported rotor-member of a type comprising a relatively large-diameter, wound armature-member part of a dynamo-electric machine, and a relatively smaller-diameter cylindrical commutator-part having a commutator-neck portion which is electrically secured to a winding on said armature-member, said armature-member and said commutator-part having a common shaft, and said heat-treatment apparatus being characterized by comprising a hood-means adapted to substantially surround said rotor-member, partitioning means for at least partially shieldably separating the space adapted to contain said commutator-neck portion and said armature-member from a compartment adapted to contain said commutator-part, and compartment-heating means adapted to supply radiant heat to the cylindrical commutator-surface of the commutator-part within said compartment, said compartment-heating means being out of rubbing-contact with said commutator-part, said compartment-heating means having a rate of heat-input suitable for approaching and reaching the seasoning temperature at a controlled rate without the risk of suddenly increasing the commutator-temperature to a point considerably beyond the desired seasoning temperature,

and said partitioning means comprising annular baffle-means disposed transversely with respect to the rotor-shaft in such position as to shield the commutator-necks and the armature-portion of the rotor-member from the heat within said compartment. 5

2. The invention as defined in claim 1, in combination with heating-means adapted to supply heat to said armature-member in addition to the heat which flows from said commutator-part to said armature-member of said rotor-member. 10

3. The invention as defined in claim 1, characterized by said compartment-heating means comprising heaters adapted to heat said commutator-part mainly by radiation, said heaters 15

being mounted within said compartment in a substantially completely surrounding, close, spaced relation to the cylindrical commutator-surface, out of contact with said surface.

4. The invention as defined in claim 1, characterized by said compartment-heating means comprising a series of approximately parallel, elongated, longitudinally extending, electrical heating-elements mounted in a longitudinally extending cylindrical arrangement within said compartment, the outer diameter of said cylindrical arrangement being approximately the same as the diameter of said armature-member.

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