No. 729,175. PATENTED MAY 26, 1903.

H. M. HOBART.

DYNAMO ELECTRIC MACHINERY.

APPLICATION FILED FEB. 6, 1902.

NO MODEL.

Fig. 1.

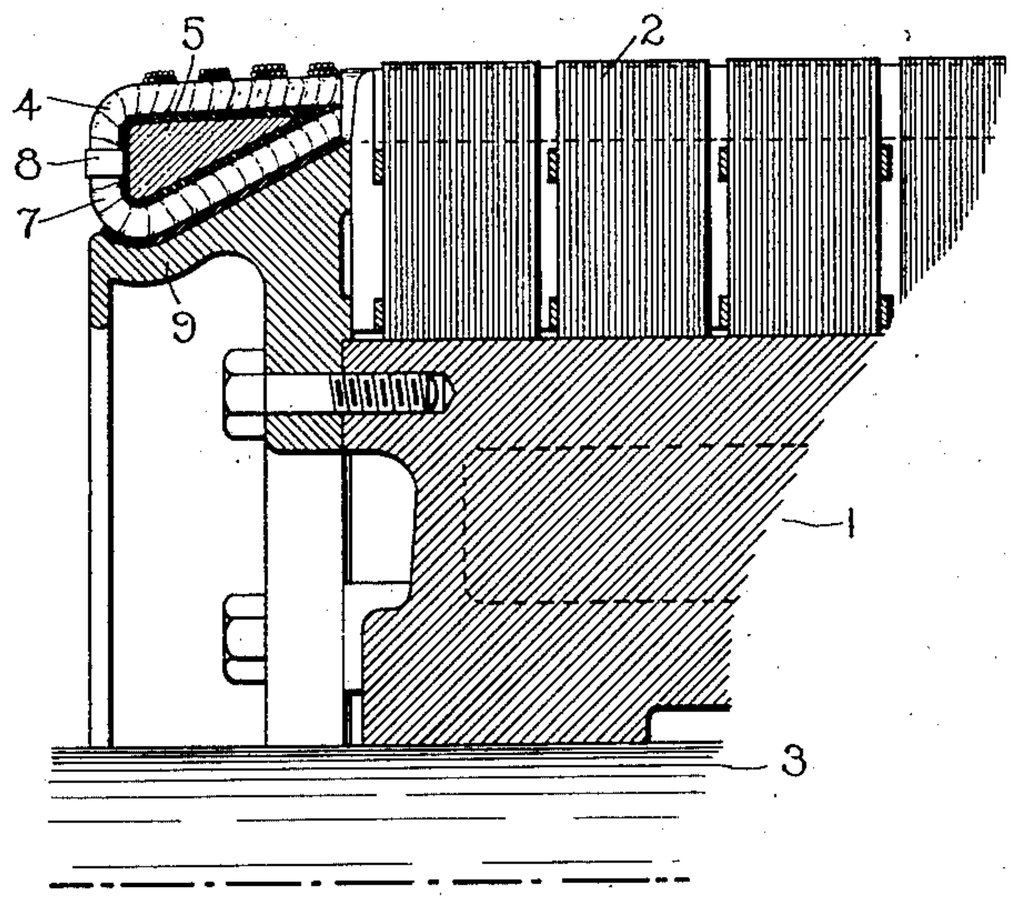


Fig. 2.

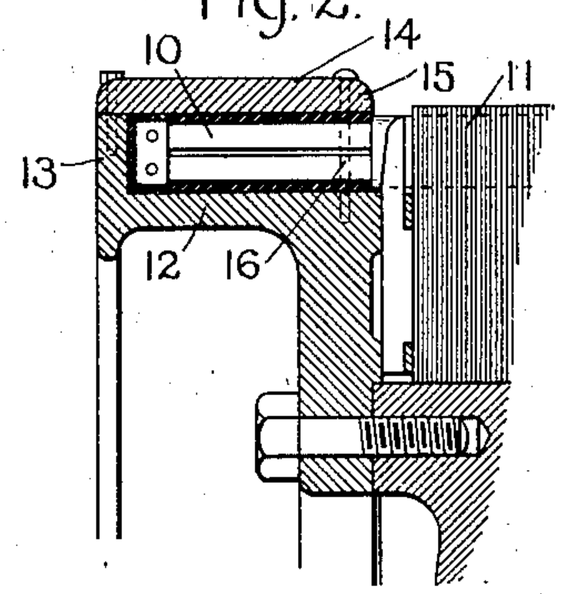
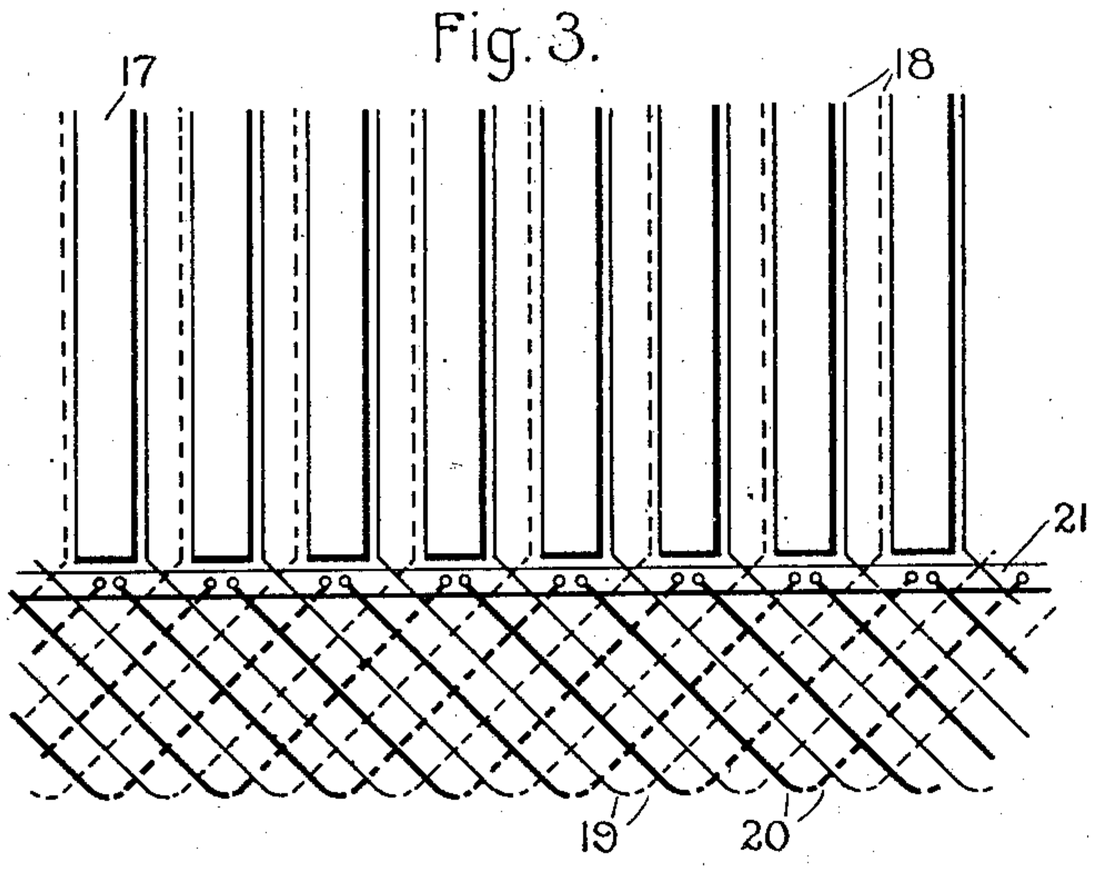


Fig. 3.



Witnesses.
J. Ellis Glenn.
Benjamin B. Hull.

Inventor:
Henry M. Hobart.
by Albert G. Davis
Atty.

No. 729,175. Patented May 26, 1903.

UNITED STATES PATENT OFFICE.

HENRY M. HOBART, OF BERLIN, GERMANY.

DYNAMO-ELECTRIC MACHINERY.

SPECIFICATION forming part of Letters Patent No. 729,175, dated May 26, 1903.

Application filed February 6, 1902. Serial No. 92,794. (No model.)

To all whom it may concern:

Be it known that I, HENRY M. HOBART, a citizen of the United States, residing at Berlin, Germany, have invented certain new and useful Improvements in Dynamo-Electric Machinery, of which the following is a specification.

My present invention relates to means for reducing sparking at the commutator in dynamo-electric machines of the commutating type. To secure this result, I provide means for reducing the self-induction of coils undergoing commutation.

The novel features which I believe characterize my invention I have pointed out with particularity in the appended claims. The invention itself, however, its construction and mode of operation, will be better understood by reference to the following description, taken in connection with the accompanying drawings, in which—

Figure 1 represents one embodiment of my invention, and Figs. 2 and 3 modified forms thereof.

The various embodiments of my invention which I have shown in the drawings will be found to be characterized by the existence of short-circuited conductors placed in good inductive relation to the end connections of the armature-windings. These conductors perform the function of short-circuited secondaries and by their reaction upon variable currents in the said end connection act to reduce the self-induction of the armature coil or coils of which the end connections are a part. This reduction in the self-induction of coils undergoing commutation reduces the sparking which takes place as the commutator-segments connected to the winding pass out of contact with the commutator-brushes. The decrease in self-induction which may be made by the use of my invention may be considerable, since in modern machines, and particularly in those having short armatures of large diameter, a very large proportion of the total inductance of the coil undergoing commutation resides in the end connections, for although these parts are not embedded in slots they constitute a very high percentage of the total length of the coil.

In Fig. 1 a longitudinal section of a portion of an armature is shown. This armature is of ordinary construction so far as concerns the spider 1, the ventilated laminated core 2, and the shaft 3 by which they are carried. At 4 is represented a conventional view of one of the end connections of the armature-winding. It will of course be understood that the upper and lower portions of this end connection do not pass through the same slot in the armature, although for convenience of illustration it might be supposed from the drawings that such is the fact. The main feature which this figure is intended to illustrate is, however, not the connections of the armature-coils, but the fact that the end connections are of loop form, such as to produce an annular space within the end connections. This space is filled, except for room taken up by insulation, by a ring-shaped mass 5 of good conducting material, such as copper or brass. This mass, if desired, might be made hollow, the latter construction being intended for use where the weight or cost of the additional material is for any reason prohibitive. Whichever construction is employed, the ring acts as a short-circuited secondary for the end connections looped about the same and acts to reduce the self-induction of these end connections while they are undergoing commutation and also under any other conditions which cause fluctuations of current therein. The short-circuited ring 5 may be built into the annular space in the end connections in any suitable manner during construction of the machine. In the particular arrangement shown the upper and lower parts of the loops 4 are disconnected while the armature is in course of construction, the ring being put in place after the lower portions 7 of the end connections are assembled and the ends of the loop then joined by suitable connecting means, such as indicated at 8. In order to increase still further the amount of secondary conductors inductively related to the end connections, I may make the supporting-drum 9 for the end connections of good conducting material, such as copper. The drum itself then becomes the seat of more or less strong induced currents, and thereby reacts to reduce the self-induction of the end connections, which operate as the primary inducing-windings.

In Fig. 2 a somewhat different arrange-

ment is shown. In this instance the end connections 10 are not looped, as in Fig. 1, but extend out from the armature-core 11 and are supported by the cylindrical end drum 12, carried by the armature. This drum is formed of copper, brass, or other good conducting material and is provided with a flange 13, which extends outwardly and to which is secured one edge of a ring 14, which surrounds the outer surface of the end connections. The inner edge 15 of this ring is electrically connected at numerous points with the conducting-drum 12. One of these connections is indicated in dotted lines at 16; but it is to be understood that these connections are made as numerous and of as large an aggregate current-carrying capacity as is convenient in order that they may complete a good conducting-path for induced currents across the drum 12, the flange 13, and the ring 14. Space for these connecting-conductors may be found opposite each tooth of the armature-core.

Fig. 3 shows an arrangement in which the short-circuited conductors acting as secondaries to the end connections are formed not of masses of conducting metal, but of short-circuited windings interspersed with the end connections. In this figure, which represents a developed view of a portion of an armature and its winding, the teeth of the armature-core are represented by the numeral 17, applied to one of these teeth. The slots between the teeth carry the armature-conductors represented, for example, by the two lines 18, one a light full line corresponding to the outer coils of the armature-slots and the dotted line to the inner coils. The end connections for the respective coils are represented by lines of the same character—as, for example, at 19. Interspersed with these end connections are conductors, (represented in heavy lines at 20,) the arrangement of these conductors being the same as the arrangement of the end connections of the armature-coils. These conductors, which are interspersed with the end connections, instead of passing into the slots of the armature, as in the case of the armature-winding proper, are all connected together by a conducting member or bar 21, located adjacent to the ends of the armature-teeth. The conductors 20 and the connecting-conductor 21 therefore furnish numerous paths closed upon themselves, wherein currents may be induced by the influence of current fluctuations in the end connections. These closed conducting-paths being in very close mutual inductive relation with the end connections form a very effective means for reducing the self-induction of the armature-coils, of which the end connections are a part.

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

1. The combination with an armature-winding, of permanently-short-circuited conductors in close mutual inductive relation to the end connections of said winding and adapted to form the seat of induced currents.

2. In a dynamo-electric machine, the combination of a winding provided with end connections, and permanently-closed circuited conducting-paths in inductive relation to said end connections and adapted to form the seat of induced currents.

3. The combination of an armature-winding provided with end connections, and closed conducting-paths located away from the active portion of the armature-winding but in inductive relation to the end connections thereof, said conducting-paths adapted to form the seat of induced currents.

4. The combination of an armature-winding provided with end connections, and permanently-closed conducting-paths of copper in good mutual inductive relation to said end connections.

5. The combination of an armature-winding provided with end connections portions of which lie on the outside of the armature and other portions thereunder, and good conducting material located adjacent both to the inner and outer portions of said end connections.

6. The combination of an armature-winding provided with end connections of which one portion lies within another portion, and closed circuited conducting-paths located adjacent to both the inner and outer portions of said end connections.

7. In a dynamo-electric machine, the combination of a winding provided with end connections, and means in close mutual inductive relation to the end connections of the winding for reducing the self-induction thereof.

In witness whereof I have hereunto set my hand this 17th day of January, 1902.

HENRY M. HOBART.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.