(No Model.)

S. H. SHORT.

DYNAMO ELECTRIC MACHINE.

No. 473,367. Patented Apr. 19, 1892.

FIG. I.

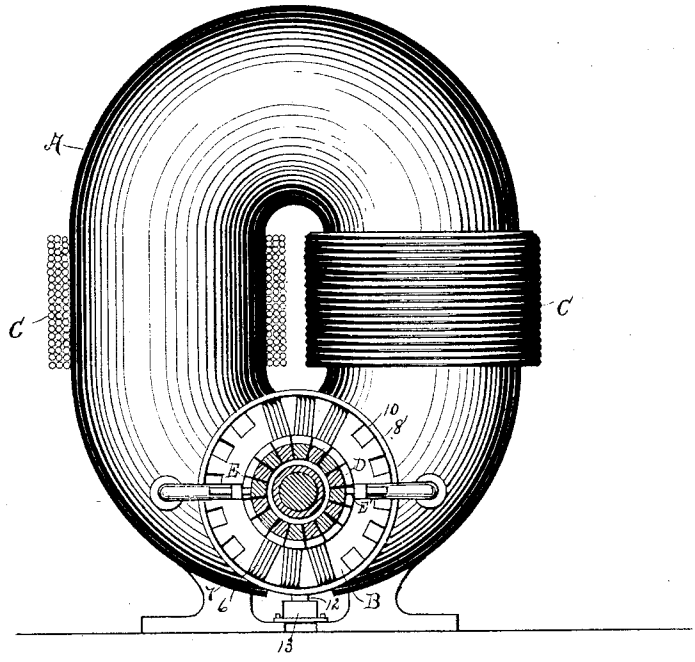
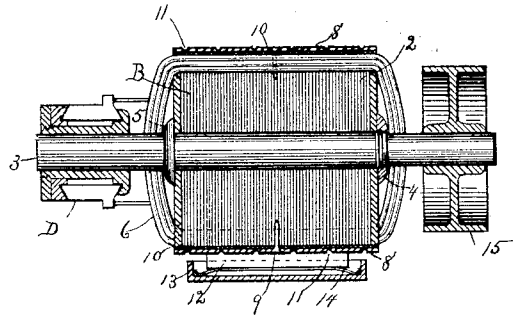


FIG. II.



Witnesses.

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DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 473,367, dated April 19, 1892.

Application filed June 24, 1891. Serial No. 397,369. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY H. SHORT, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Dynamo-Electric Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to dynamo-electric machines for use as generators or as motors, and has particular reference to slow-speed machines; but each of the improvements constituting the invention is included for all the uses to which it may be adapted.

Heretofore it has been customary to provide an air-space between the armature and the field-poles, the armature being mounted on a shaft which is suitably supported, so that the armature may turn in proximity to, but out of contact with, the field-poles. In accordance with the present invention this air-space is dispensed with and the armature is allowed to turn in contact with the field-poles, thus diminishing the magnetic resistance of the interpolar space and increasing the relative number of the lines of force passing through the armature, and consequently enabling the field-magnets to be reduced in size and to be excited with a less number of ampère-turns while exercising an equal effect in the machine. The armature and field-poles may be so arranged that there is no break in the continuity of the magnetic material, or there may be such breaks as may be necessary to preserve the lamination of an armature-core or to diminish friction or the like. In the case of machines having the field-poles presented to the periphery of the armature the latter is journaled in bearings constituted by the field-poles themselves. Any convenient disposition of parts may be adopted. An advantageous disposition, which constitutes a special feature of invention, is to so place the field-magnets that their attraction is opposed to the action of gravity, thus the pressure on the bearing-surfaces being minimized.

In the practical application of the new or improved dynamo without interiron air-space various constructions may be adopted and still be within the general features of the present invention. The latter also comprises certain particular improvements in this regard, among which may be here specified the following: Iron is provided on the armature outside the bobbins. The iron is in the form of a continuous ring. The armature is provided with magnetic teeth or bobbin separators on the core between the bobbins, and the said ring is in contact with said teeth or separators (these being in one piece with the armature-core) or is in close proximity thereto, being insulated therefrom when it is desired to interpose insulation to stop eddy-currents. The bearing between the armature and poles is adapted to be lubricated so as to diminish friction. Other means for lessening friction may be used.

In the accompanying drawings, which form part of this specification, Figure I is a side elevation, partly in section, of a dynamo-electric machine in accordance with the invention, part of the bobbins being omitted; and Fig. II is a longitudinal section of the armature and lubricating-cup removed.

The machine shown has the poles of the field-magnets A presented to the periphery of a drum-armature B; but the invention is applicable to other styles of machine, (as those with ring-armatures and field-magnets presented to the periphery and those with ring-armatures and field-magnets presented to the sides of the armatures,) the description of the style illustrated being sufficient to enable the application to be made to other styles.

The field-magnets A are excited by the coils C. The armature B has a laminated toothed core composed of a number of soft-iron plates 2, strung on a shaft 3 and pressed together by the nut 4, tapped on said shaft and forcing the plates against the head 5, fixed on said shaft. The bobbins 6 are wound in the spaces between the teeth 7 on said plates 2. Outside the bobbins is the iron ring 8, which is fastened to the armature-core by a central row of bare rivets 9 and is in close proximity to the ends of the teeth 7, but is separated electrically therefrom by the insulation 10. The armature-core might be made solid and the ring 8 might rest directly on the ends of the teeth 7, or the teeth 7 might project beyond the bobbins and form the iron

outside of the same. The omission of insulation would, however, in the machine, as shown, establish circuits for eddy-currents, and the interruption of the magnetic surface of the armature (as by having the teeth turn in contact with the field-magnets) would tend to make the machine run less smoothly than with the continuous outside ring.

The armature B is journaled in a bearing constituted by field-magnets A, the bearing being between the outer surface of the ring 8 and the adjacent surface of the field-poles. The outer surface of the ring 8 is shown as provided with grooves 11 for carrying lubricating material, which is supplied to the bearing by a felt 12, whose lower end dips into the lubricant-cup 13 of non-magnetic material and which is pressed against the ring 8 by a spring 14. Other known or suitable expedients for lessening the friction of sliding surfaces could be adopted. The magnetic attraction will hold the armature from endwise motion.

Upon the shaft 3 is the commutator D, and the power may be applied to and taken from the armature B through a pulley 15 or other transmitting device on said shaft.

At E E′ are the commutator-brushes, the bobbin-wires being suitably led to the commutator-bars, so as to bring the brushes in proper position relatively to the armature.

In operation the armature-bobbins cut the lines of force from the field with the generation of electricity (if the machine be used as a generator) or of power (if the machine be used as a motor) according to known laws, only in the new or improved machine the density of the field is greater and is more easily maintained than in a machine of the same weight which has an interiron air-space, as heretofore customary.

The machine can be run in any position, means being provided to prevent endwise motion of the armature when the magnetic attraction is insufficient to hold it in place in the field or when for any reason such means are considered desirable. By using field-magnets of the form shown or a similar form placed upright so that the lifting of the armature tends to shorten the magnetic circuit the magnetic attraction will act against gravity and gravity against the said attraction, thus minimizing the pressure at the bearing between the armature and field-magnets.

The invention has been shown embodied in a two-pole machine; but it is applicable, also, to machines with four or more poles. Instead of having the armature rotate in the field-magnets, these could turn on the armature, and this reversed arrangement, it will be understood, is included in the invention as a substitute for that particularly described without further specification herein.

The journaling of the armature at the periphery thereof has certain advantages over the ordinary arrangement of a shaft and bearings, irrespective of its utility in enabling the armature to turn in contact with the field-poles or in facilitating such operation. Thus one advantage is that it brings the journal-bearing in the space about the armature, so that the latter with its journal-bearing takes up no more width than the armature itself.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A dynamo-electric machine having the armature turning in sliding contact with the field-poles, substantially as set forth.

2. A dynamo-electric machine in which the field-poles are presented to the periphery of the armature, having the armature journaled at its periphery in bearings constituted by the field-magnets, substantially as described.

3. A dynamo-electric machine having the armature journaled at its periphery in bearings constituted by the field-magnets and so arranged that the magnetic attraction opposes the gravity of the armature, substantially as described.

4. A dynamo-electric machine having the armature journaled at the periphery in bearings constituted by the field-magnets with the iron of the core in magnetic continuity with that of the field-poles, substantially as described.

5. A dynamo-electric machine having an armature turning in contact with the field-poles and provided with iron on said armature outside the bobbins, substantially as described.

6. A dynamo-electric machine having an armature turning in contact with the field-poles and provided with a continuous ring of iron on said armature outside the bobbins, substantially as described.

7. A dynamo-electric machine whose armature is provided with iron outside of the bobbins in sliding contact with the field-poles, substantially as described.

8. A dynamo-electric machine whose armature is provided with a continuous ring of iron outside of the bobbins in sliding contact with the field-poles, substantially as described.

9. A dynamo-electric machine having an armature turning in contact with the field-poles and provided with iron on said armature outside the bobbins and iron teeth or separators between the bobbins, substantially as described.

10. A dynamo-electric machine having an armature turning in contact with the field-poles and provided with a continuous ring of iron on said armature outside the bobbins and iron teeth or separators between the bobbins, substantially as described.

11. A dynamo-electric machine whose armature is provided with iron outside of the bobbins in sliding contact with the field-poles and iron teeth or separators between the bobbins, substantially as described.

12. A dynamo-electric machine whose armature is provided with a continuous ring of iron outside of the bobbins in sliding contact with

the field-poles and iron teeth or separators between the bobbins, substantially as described.

13. A dynamo-electric machine whose armature is provided with iron outside of the bobbins in sliding contact with the field-poles and also with iron teeth or separators integral with the core between said bobbins and in magnetic continuity with said outside iron, substantially as described.

14. A dynamo-electric machine having an armature with a laminated core turning in contact with the field-poles and provided with insulation adapted to prevent the formation of circuits for eddy-currents through such contact, substantially as described.

15. A dynamo-electric machine having a laminated armature-core provided with a continuous iron ring outside the bobbins insulated from the laminated core and turning in contact with the field-poles, substantially as described.

16. A dynamo-electric machine having a laminated armature-core provided with teeth between the bobbins and also with a continuous iron ring outside the bobbins insulated from the laminated toothed core and turning in contact with the field-poles, substantially as described.

17. A dynamo-electric machine having the armature turning in contact with the field-poles and provided with means for lubricating the sliding bearing so formed, substantially as described.

18. A dynamo-electric machine having the armature journaled at the periphery in the field-magnets and provided with means for lubricating such peripherical bearing, substantially as described.

19. A dynamo-electric machine having a laminated toothed armature-core with iron outside the bobbins and insulated from the armature-core, turning in contact with the field-poles and provided with means for lubricating the sliding contact thus made, substantially as described.

20. A dynamo-electric machine having the armature journaled at the periphery in bearings constituted by the field-magnets and held by the magnetic attraction from endwise motion, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

SIDNEY H. SHORT.

Witnesses:
JAS. F. HUGHES,
J. C. BELL.