(No Model.)

W. L. VOELKER.

Dynamo Electric Machine.

No. 239,685. Patented April 5, 1881.

Fig. 1.

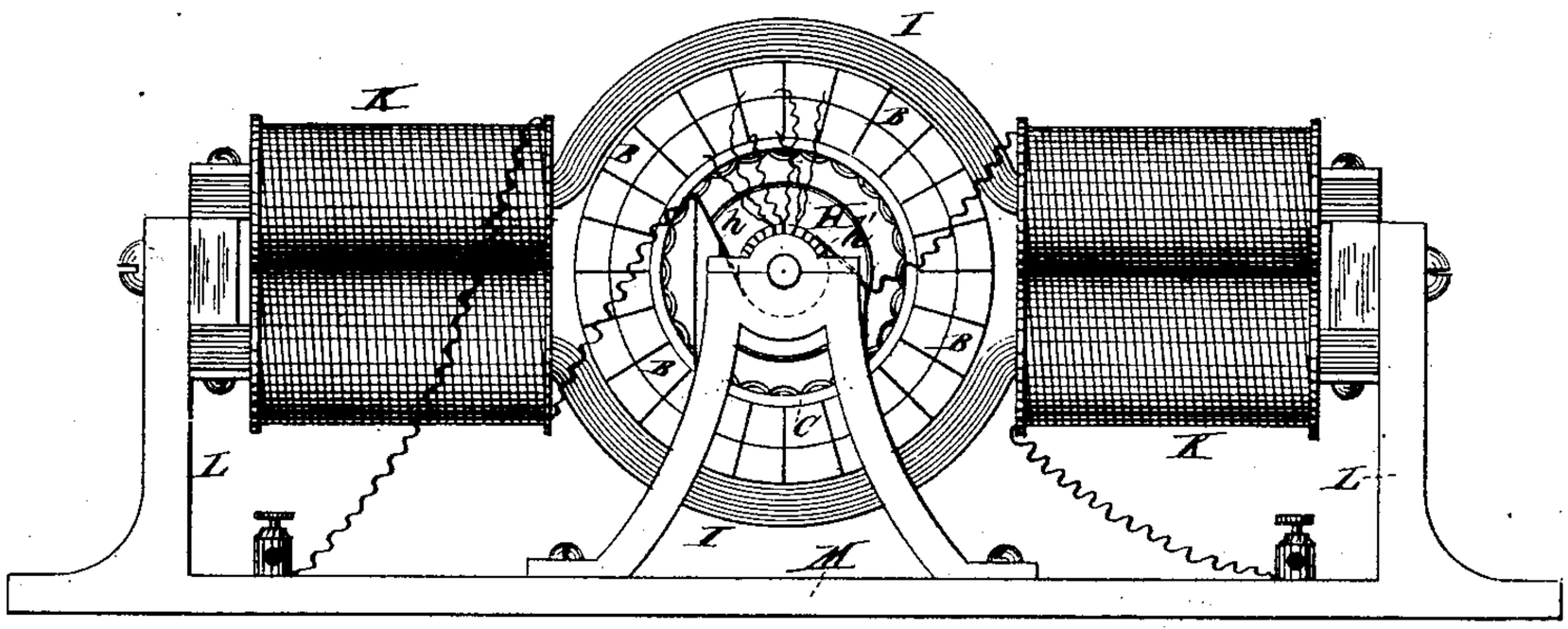


Fig. 2.

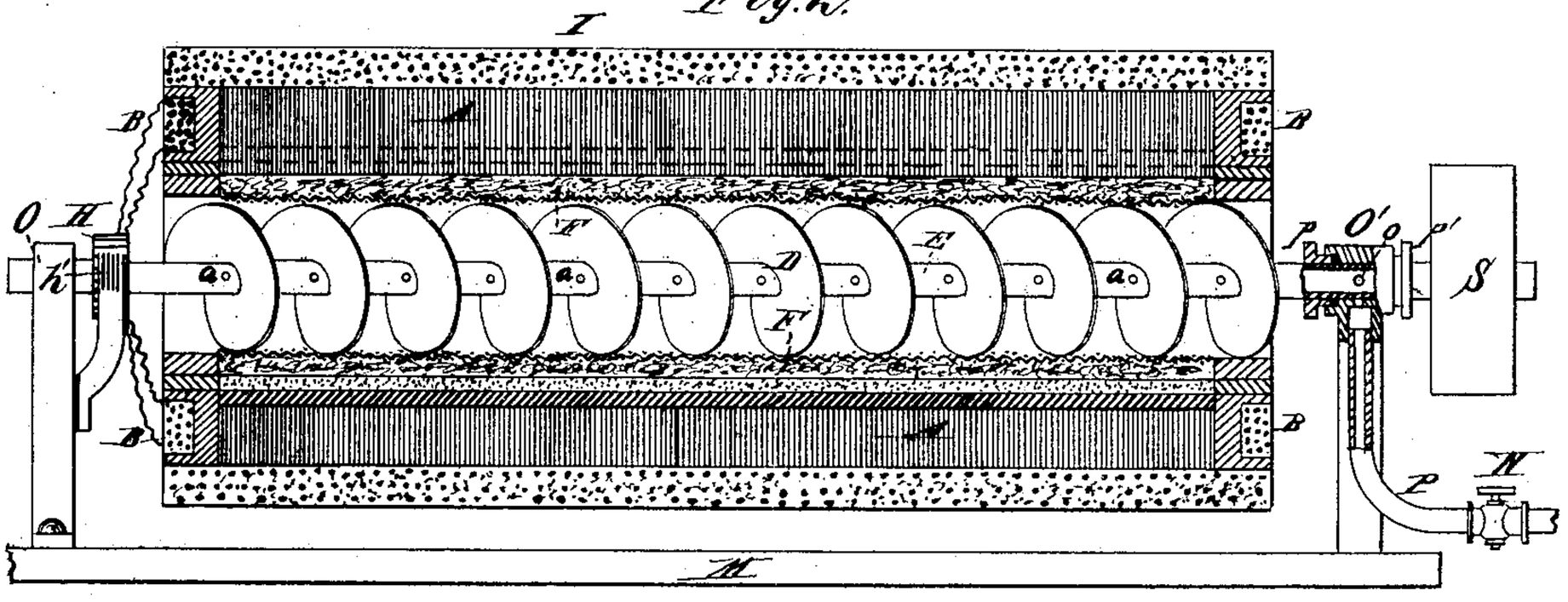


Fig. 4.

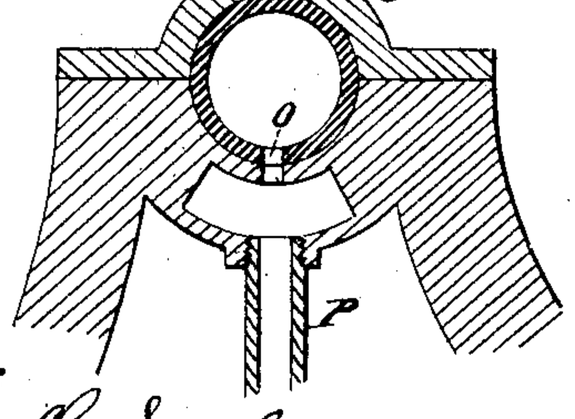
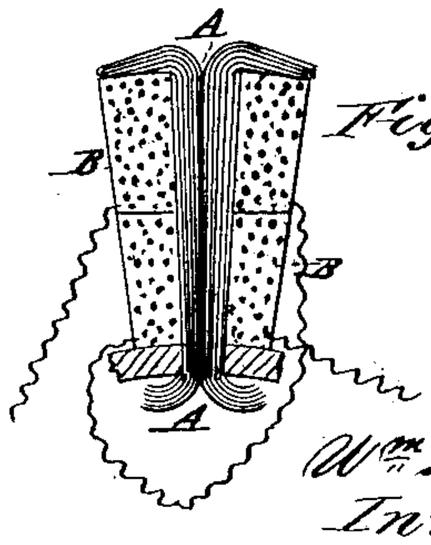


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM L. VOELKER, OF MORTON, PENNSYLVANIA.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 239,685, dated April 5, 1881.

Application filed September 11, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. VOELKER, of Morton, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Dynamo-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention has special relation to that class of devices employed in generating electricity for illuminating purposes, &c., commonly known as "dynamo-machines."

In all dynamo-machines of modern construction it has been found necessary to rotate the armature at a high rate of speed in order to obtain powerful induction-currents and to rectify and give said currents smoothness, so that they may be utilized for illuminating purposes, &c. It is very essential that the armature should be wound with a number of bobbins suitably connected with insulated pieces upon the commutator. The rapid changes of magnetization and demagnetization heat the insulated wire bobbins of the armature, and also the field-magnets, and very materially increase their electrical resistance. In addition to this, heat is generated by the mechanical resistance caused by the rapid rotation of the armature in the field of the exciting-magnets, the quantity of heat being proportionate to the square of the velocity, which very materially limits the quantity of electricity developed in a given length of time. To rotate the armature sufficiently rapid to give its greatest electro-motive force the heat generated would destroy the insulation of the wire bobbins and unfit the same for further use. To obviate this defect I have devised an improved form of armature and field magnets. The armature consists of a hollow iron cylinder of convenient length and diameter. Longitudinal slits or cuts are made therein at equal distances apart around the periphery of the cylinder. Through these slits, from the interior of the cylinder, I introduce U-shaped bundles of iron wire, the ends thereof extending up through alternate slits in the cylinder to a suitable height thereabove. After these are placed in position upon the cylinder the bobbins of the armature are wound thereupon, extending the entire length of the cylinder, parallel therewith. The inside of the cylinder is lined with sponge or other suitable material for absorbing moisture, as hereinafter explained. The remainder of the interior of the cylinder is occupied by an Archimedean screw attached to the shaft of the armature. This shaft is made hollow throughout its entire length, and perforated with small holes for the purpose of conducting water to the sponge lining of the cylinder. If preferred, channels may be made in the cylinder of the armature and the water conducted to the sponge lining through connections with the hollow shaft.

My invention involves certain other new and novel modes of operation and peculiarities of construction, all of which will be hereinafter first fully described, and then pointed out in the claims.

In the drawings, Figure 1 is an end elevation of my improved dynamo-machine. Fig. 2 is a vertical longitudinal section of the same, showing the arrangement of the various parts. Fig. 3 is a vertical sectional view of one of the bobbins of my improved armature. Fig. 4 is a vertical section of one of the bearings of the hollow armature-shaft, showing the method employed for conducting the water to the interior thereof.

Like letters of reference, wherever they occur, indicate corresponding parts in all the figures.

A A are the iron cores of the bobbins of the armature, said cores being formed of bundles of iron wire.

B B is the insulated wire of which said bobbins are composed. I prefer to wind the same in sections, each section being composed of two or more wires connected in the multiple arc. The bobbins are held firmly in place upon their cores by bending the wires thereof over the outside of the bobbin, as plainly indicated in Fig. 3. By winding the bobbins of the armature in this manner each one is separate and complete. The advantage of this will readily be seen, as in case of accident or damage to any single one it may be easily and quickly replaced without the necessity of rewinding the whole armature or interfering with or displacing the other bobbins.

C is the iron cylinder around which the bobbins of the armature are arranged.

D is an Archimedean screw attached to the hollow shaft E of the armature, said shaft be-

ing made hollow for the purpose of conducting water, and perforated at intervals with minute holes *a* for the expulsion of the same.

F F is a lining of sponge or other absorbing material placed upon the interior of the cylinder C.

H is a commutator, constructed in the usual manner, and connected with the bobbins of the armature. *h h'* are the brushes for taking the electricity from the commutator.

I I are the field-magnets, composed of iron wires, extending around the armature and wound with bobbins K K. These magnets are held firmly in position upon uprights L L upon the base M. The bearings O O' for the shaft of the armature are also supported upon base M. Fig. 4 shows a sectional view of the bearing O', illustrating the method employed for conducting water therethrough into the hollow shaft E.

P is a water-pipe, extending up into the bearing O'.

o is a small hole in shaft E, directly in the line of the outlet of pipe P. At each revolution of the shaft a small quantity of water will be admitted into the shaft, the desired quantity being regulated by the valve N.

p p' are packing-boxes, constructed in the usual manner, and placed around the shaft upon each side of the bearing O'. Both ends of the shaft are closed, the only outlet for the water being through the perforations in the shaft upon the interior of the cylinder.

S is a pulley attached to the shaft of the armature, for the purpose of communicating motion thereto in the usual manner.

By using bundles of iron wire for the cores of bobbins of the armature and constructing the field-magnets also of bundles of iron wire, instead of solid bars of iron, a much greater surface is exposed, the heat generated will radiate rapidly therefrom, and the magnets are rendered much more sensitive to magnetic variations.

When the armature is rotated the water in the hollow shaft will be ejected through the perforations therein, and will be immediately taken up by the sponge lining of the cylinder, the amount of water admitted therein being only sufficient to supply evaporation, keeping the sponge at all times moist. The current of air drawn through the cylinder by the screw upon the shaft thereof will accelerate evaporation of the water, thereby counteracting the effect of the heat produced by the electrical and mechanical resistance, as will readily be seen. The higher the rate of the speed of the armature the greater will be the quantity of air drawn through the cylinder and the greater the evaporation.

The use of the hollow shaft for conducting water and the sponge lining of the cylinder may be dispensed with, if desired. The air alone drawn through the cylinder by the screw upon the shaft will cool the adjacent parts. If preferred, the temperature of the air conducted to the interior of the cylinder may be considerably lowered by chemical or other means, and after escaping therefrom it may be directed upon the field-magnets.

The electricity generated by the rotation of the armature passes through the field-magnets and re-enforces the same, the machine being connected up and the current generated utilized for illuminating purposes, &c., after the manner well known to electricians.

It will therefore be seen that my improved dynamo-machine admirably answers the various uses and purposes for which it is intended.

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

1. In a dynamo-electric machine, a hollow cylindrical armature-carrier, in combination with armature-cores formed of U-shaped bundles of wires passing through slots in said carrier.

2. In a dynamo-electric machine, armature-cores formed of bundles of wires attached to a revolving carrier, in combination with bobbins held in place by bending the wires over upon the ends of the bobbins.

3. In a dynamo-electric machine, armature-cores formed of U-shaped bundles of wires passing through slots in their carrier and bent over at their ends upon the armature-bobbins.

4. An electro-magnet whose core is formed of bundles of wires bent over at their ends to hold the bobbins in place, and constituting an enlarged pole for said magnet.

5. In a dynamo-machine of the character herein shown, the cores of the bobbins forming the armature, said cores being composed of iron wire, and wound with wire running longitudinally with respect to the hollow cylinder of the armature and separate from each other, substantially as shown and described.

6. In a dynamo-machine of the character herein shown, the hollow armature lined with absorbing material, substantially as shown and described.

7. In a dynamo-machine, an armature provided with a continuous hollow shaft, said shaft being perforated at numerous points between the ends of the armature and adapted and arranged to convey water to the interior of the cylinder of the armature, substantially as and for the uses and purposes explained.

8. In combination with the hollow cylindrical armature-carrier of a magneto-electric machine, the Archimedean screw placed within said carrier and embracing the shaft of the machine.

9. In a dynamo-machine of the character herein shown, the combination, with the perforated hollow shaft, of the Archimedean screw attached thereto and the absorbing material lining the cylinder of the armature, substantially as and for the uses and purposes described.

10. In a dynamo-machine, the iron wire field-

magnets I I, armature-bobbin cores A A, iron cylinder C, absorbing-lining F, screw D, hollow shaft E, commutator H, brushes *h h'*, bobbins K K, bearings O O', water-pipe P, valve N, packing-boxes *p p'*, and pulley S, the whole combined and arranged to operate substantially as and for the uses and purposes shown and described.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of two witnesses.

WILLIAM L. VOELKER.

Witnesses:
ARTHUR M. PIERCE,
WORTH OSGOOD.