No. 697,783. Patented Apr. 15, 1902.

E. J. BERG.

DYNAMO ELECTRIC MACHINE.

(Application filed Aug. 25, 1899.)

(No Model.)

Fig. 2.

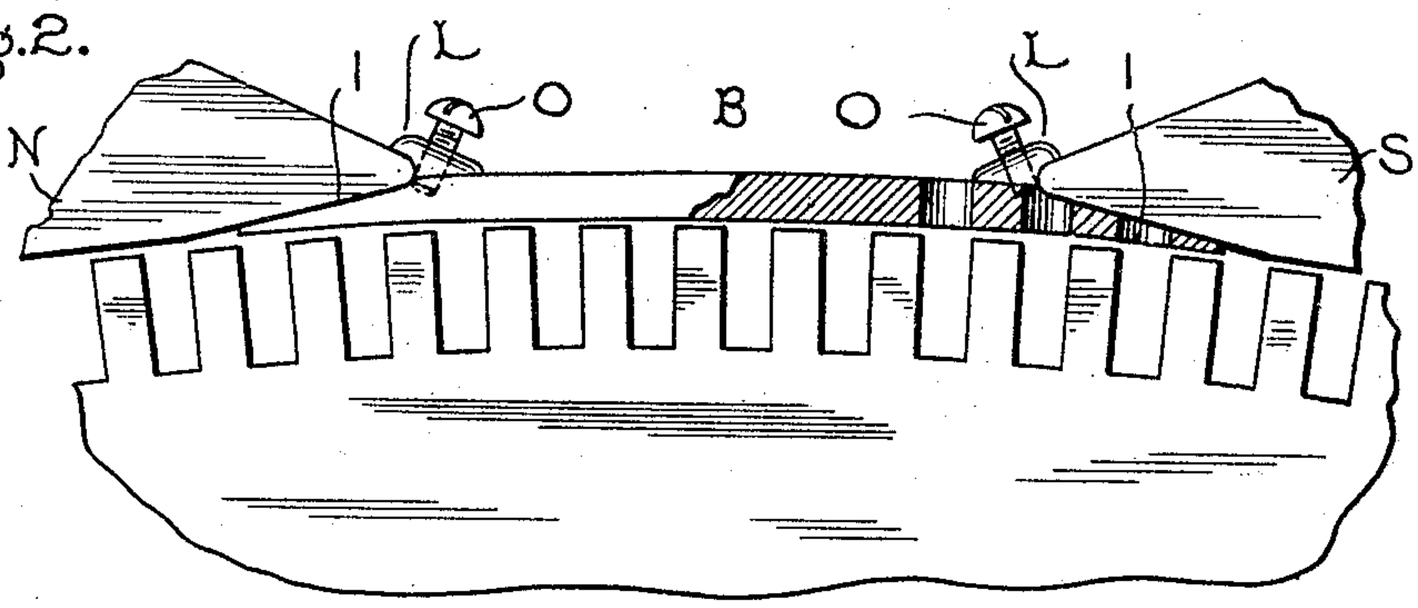
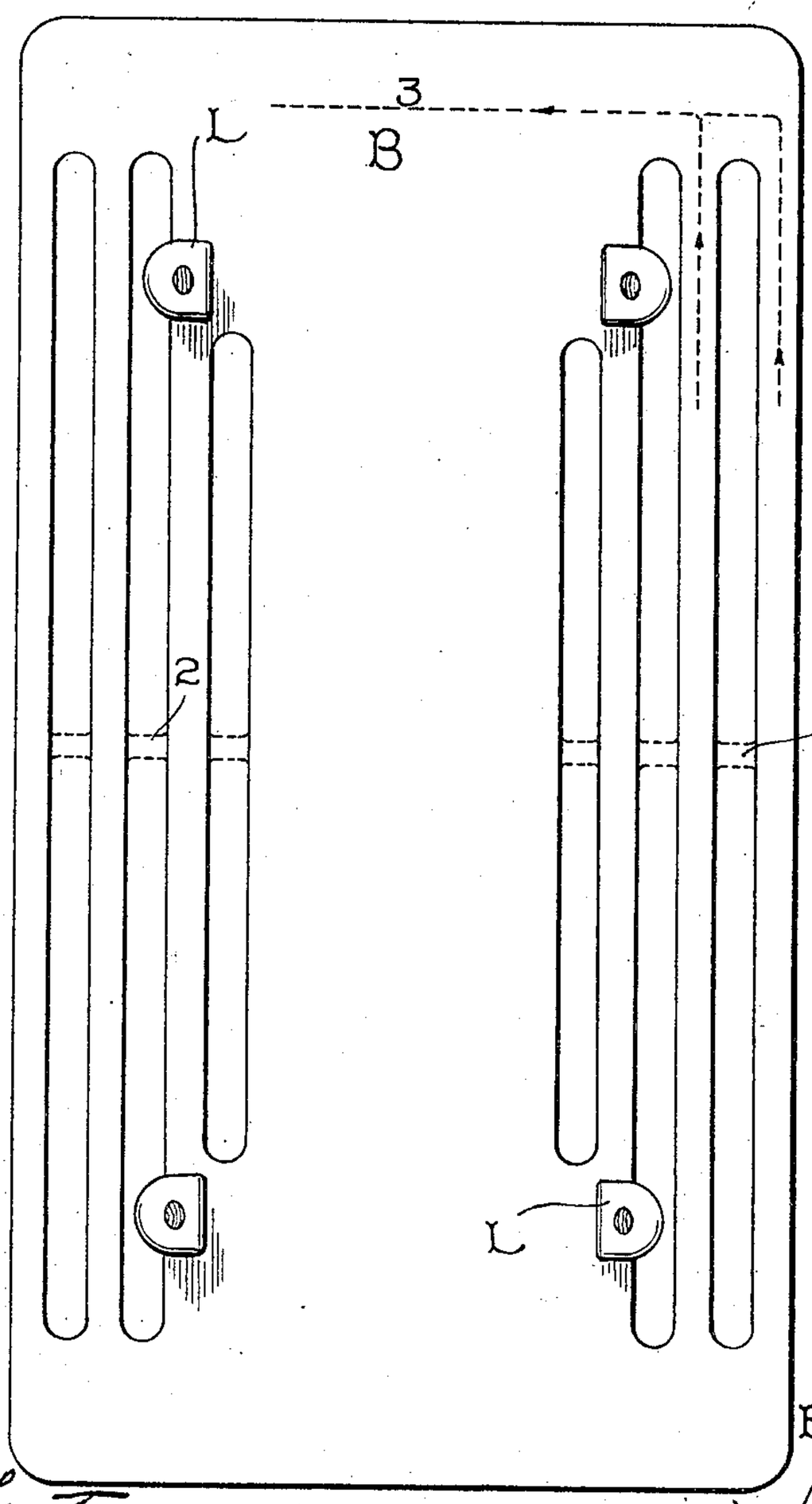


Fig. 1.



Witnesses.
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UNITED STATES PATENT OFFICE.

ERNST J. BERG, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 697,783, dated April 15, 1902.

Application filed August 25, 1899. Serial No. 728,406. (No model.)

To all whom it may concern:

Be it known that I, ERNST J. BERG, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Dynamo-Electric Machines, (Case No. 993,) of which the following is a specification.

In cases where bridges of conducting material are placed between the pole-pieces of alternating-current dynamo-electric machines for the purpose of securing uniformity of rotation a wasteful production of eddy-currents in the material forming the bridges results when the armature-core is provided with teeth, as is usually the case. These eddy-currents are constantly set up by the sweeping action of the tufts of lines of force emanating from the armature-teeth and are to be distinguished from the occasional or periodic currents which are set up in the bridges only when the machine hunts or when there is some other cause producing changes of armature reaction. The eddy-currents referred to have no useful effect and in some cases appreciably reduce the efficiency of the machine, and it is the object of my invention to prevent this waste of energy so far as possible.

The details of my invention and its mode of application will best be understood by reference to the following description, taken in connection with the accompanying drawings, while its scope will be particularly pointed out in the claims appended hereto.

In carrying out my invention in practice the bridge or other body of conducting material in which eddy-currents tend to be set up by reason of the sweeping action of lines of force due to the toothed structure of the armature is provided with slots parallel to the slots of the armature-core and of a width and pitch equal to the width and pitch of the slots in the armature. By this construction the teeth in the armature as they pass across the face of a bridge are so related as to produce in each of the bars of the bridge electromotive forces of practically equal intensity and of the same direction. Owing, however, to the absence of conducting material between the bars, no short paths are provided for resulting currents, which if the bridge were solid would take the form of small eddies or whirls. Any tendency of current to flow along the ends of the bridge would be met by a relatively larger resistance of the circuit. The slotting of the bridge therefore has the effect of reducing the eddy-current loss, though not necessarily eliminating it wholly.

Figure 1 illustrates a bridge made in accordance with my invention, and Fig. 2 shows its application to a dynamo-electric machine.

As seen from the drawings, the bridge consists of a curved plate, preferably of copper, arranged to span the pole-pieces N and S of the dynamo-electric machine, the curvature of the bridge and its adjustment to the pole-pieces being such as to bring its concave surface into close proximity to the armature, the distance between the bridge and the armature being practically the same as that between the pole-pieces and the armature. This construction is clearly shown in Fig. 2. The two opposing sides of the bridge are arranged to undercut the pole-tips a short distance, and for this purpose the pole-tips are slightly chamfered or cut away, as shown at 1. The bridge B is secured in position in such a manner as to cause a portion of its surface to lie under the pole-tip and in contact with the chamfered surface of the pole-tip, as shown in Fig. 2. In order to secure the bridge in this position, any suitable means may be employed. For this purpose, however, I find it convenient to provide the bridge with integral lugs L, so arranged as to lap over the extreme corners of the pole-pieces S and N. In adjusting the bridge in position the same is passed between the opposing poles in a plane parallel to a plane through the two opposing edges of the pole-pieces. When the bridge has been moved into a suitable position over the armature and between the pole-pieces, it is fixed in position and prevented from longitudinal motion with respect to the armature by suitable set-screws, (indicated at O.)

Fig. 1 is a plan view of the bridge itself. It will be seen that only those portions of the bridge are provided with slots which in normal operation are placed under or in close

proximity to the pole-tips. This is due to the fact that few lines of force pass from the armature through other portions of the bridge, practically all of the lines of force passing directly across between the armature and pole-pieces, at the same time forming a slightly-outlying fringe about the same.

Such slots as are formed in the bridges are, as described, of a width and pitch corresponding to the width and pitch of the armature-slots. It is preferable that these slots extend from one side of the bridge to the other, so that each slot is continuous; but for mechanical reasons, in order to secure rigidity of the bridge, I sometimes find it desirable to form a web or webs of small cross-sections across the slots in order to connect the intervening bars of the bridge together and so prevent them from springing or being otherwise drawn out of place. I have indicated connecting-webs of this character in dotted lines at 2.

The general directions of the paths which would be taken by eddy-currents are indicated by dotted vertical lines and arrows in Fig. 1. By cutting away the material of the bridge and forming slots, as shown, it will be seen that the return-circuit for these eddy-currents is removed, thus largely preventing the currents which would otherwise result. On the other hand, the currents set up by variations of armature reaction are provided with paths along the bars on the edge of the bridge and then along the cross-connections at the ends of the bridge, as indicated in dotted lines at 3. The useful effect of secondary currents due to variations of armature reaction is thus secured without involving at the same time the wasteful effect of eddy-currents due to the lack of uniformity in the distribution of flux at the armature-surface.

Wherever I herein make use of the term "plate" I refer to any more or less extended body of material and do not intend to limit its significance to any particular thickness or contour.

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

1. A dynamo-electric machine provided with slotted copper bridges between the poles.

2. A dynamo-electric machine provided with pole-pieces and slotted copper plates under the pole-corners.

3. A dynamo-electric machine provided with pole-pieces and slotted plates or bodies of conducting material under the pole-corners.

4. A dynamo-electric machine provided with pole-pieces, a plate or body of conducting material extending between pole-pieces, and a plurality of openings or holes in said plate or body.

5. A dynamo-electric machine having field-magnets, and slotted bridges of conducting material undercutting the pole-tips and extending between the poles.

6. A dynamo-electric machine having field-magnets and slotted bridges of non-magnetic conducting material extending between the poles of the field-magnets.

7. A dynamo-electric machine having two relatively rotatable members, one of which is provided with teeth and the other with opposing slots closed at the ends and of the same pitch and width as the slots between the teeth of the first member.

8. A dynamo-electric machine provided with pole-pieces carrying slotted bodies of conducting material undercutting the pole-tips.

9. A dynamo-electric machine provided with pole-pieces and bodies of slotted conducting material arranged to intercept the lines of force flowing through the pole-tips.

In witness whereof I have hereunto set my hand this 22d day of August, 1899.

ERNST J. BERG.

Witnesses:

BENJAMIN B. HULL,

MABEL E. JACOBSON.