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ELECTROMAGNETIC COIL MOUNTINGS

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Fig. 1.

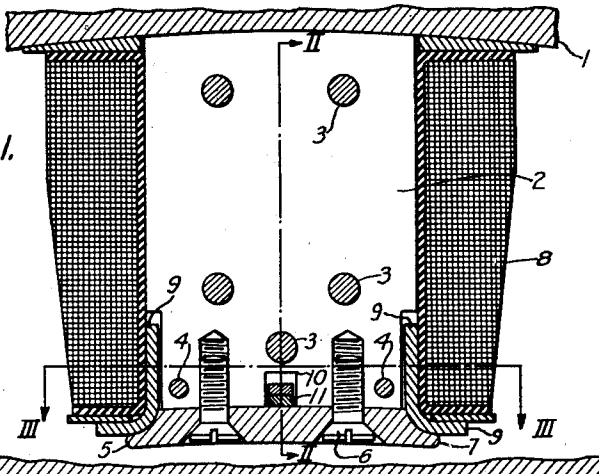
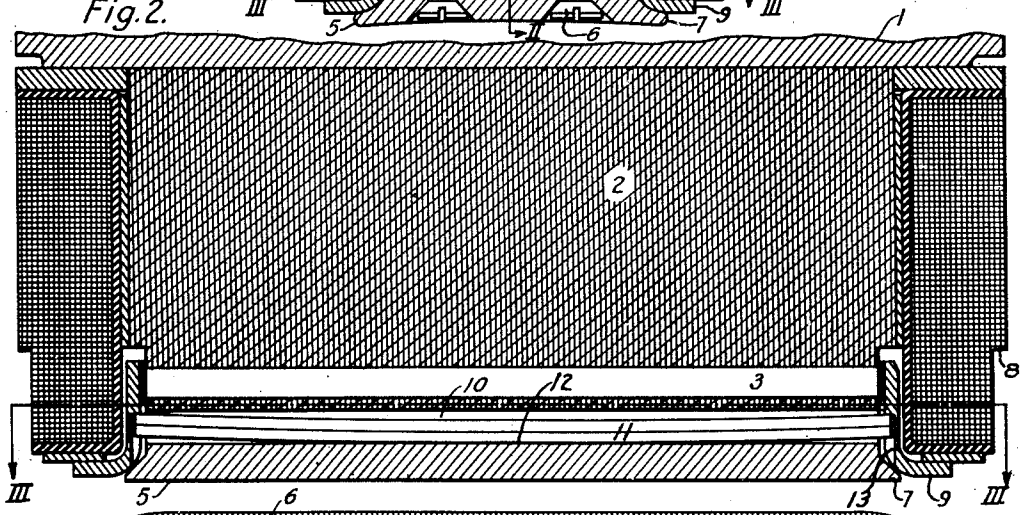


Fig. 2.



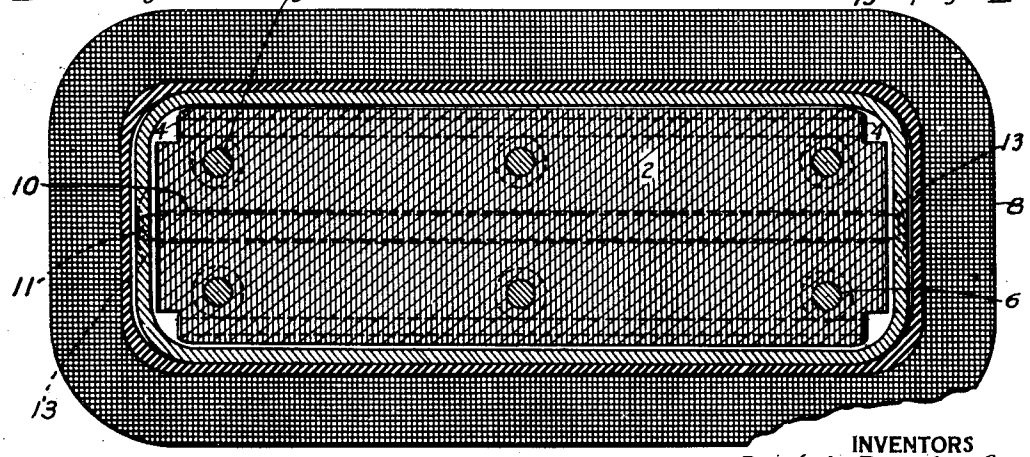


Fig. 3.

INVENTORS
René A. Baudry &
Marion R. Lory
BY
Paul E. Friedemann
ATTORNEY

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ELECTROMAGNETIC COIL MOUNTING

René A. Baudry, Pittsburgh, and Marion R. Lory, Irwin, Pa., assignors to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

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9 Claims. (Cl. 171—252)

Our invention relates to mountings for electromagnetic devices, and more particularly to the mounting structure for the windings for the pole pieces of dynamo-electric machines.

An object of our invention is the provision of the firm positioning of coil windings on pole pieces regardless of whether the poles are in motion or at rest.

A further, somewhat more specific object of our invention is to prevent any shifting, or movement, of the coil windings of a dynamo-electric machine when the pole pieces stop rotating.

Another object of our invention is an improvement in the mounting of the coil windings for the pole pieces of a dynamo-electric machine to increase the efficiency of the machine.

The objects hereinbefore stated are merely illustrative and, no doubt, many other objects and advantages will become readily apparent from a study of the following specification when made in conjunction with the accompanying drawing, in which:

Figure 1 is a sectional view of a pole piece, including our invention, taken in a plane normal to the axis of the rotor with which the poles are to cooperate;

Fig. 2 is a sectional view of the subject matter shown in Fig. 1 taken substantially on the section line II—II shown in Fig. 1; and

Fig. 3 is a sectional view of the subject matter shown in Figs. 1 and 2 on the section line III—III of Figs. 1 and 2.

In all dynamo-electric machines, generally, and large electromagnetic couplings particularly, the air gap may be non-uniform either because of bearing war, or inaccurate bearing alignment, or any one of a number of other reasons. The magnetic pull on the pole pieces is thus asymmetric and tends to aggravate the effects of the variable air gap. By positioning a heavy copper collar, or damper winding, about the pole ends near the air gap, the asymmetric magnetic pull is substantially eliminated.

Another problem, particularly in large dynamo-electric machines, is to hold the coils, or pole windings, firmly on the pole pieces. During normal operation, the centrifugal forces are sufficient to hold the coils in place but as the machine slows down during stopping, the coils, when above the shaft, slide on the pole pieces toward the shaft and when below the shaft, slide on the pole pieces away from the shaft.

To eliminate the slipping of the coils on the pole pieces and yet to get the benefit of the effect of the respective copper collars at the pole piece ends, springs were formerly positioned between the coils and the copper collars.

We have found that such a construction is rather inefficient and is wasteful of very valuable space. With our novel construction, the coils are firmly held on the pole pieces and, for a given frame size, larger coils, that is, coils as high as ten percent larger, may be used. This also means that a smaller machine, as a magnetic coupling, may be used for given torque, or load, requirements.

The novel construction will become more apparent from a detailed discussion of the figures on the drawing.

In Figures 1 and 2, 1 represents the outer rotating frame, or members, of a large electromagnetic coupling to which frame the laminated pole pieces 2 are rigidly bolted by bolts not shown.

The laminations are firmly held together by rivets, or bolts, 3 and 4, and an iron pole face plate 5 is rigidly held on the laminations by stud bolts 6. Disposed between the outer rim 7 of the plate 5 and the coil 8 is a copper, silver, aluminum, or other metal collar 9. This collar acts as a damper winding and substantially eliminates the asymmetric magnetic pull hereinbefore mentioned.

To hold the coil firmly on the pole piece, we provide a groove 10 longitudinally of the face of the laminated portion of the pole piece and position a spring 11 in this groove, which spring acts on the plate 5 and collar 9 to firmly bias the coil toward the frame 1.

The spring 11 is a leaf spring including one, two, or more leaves. At the mid-portion of the spring, the spring pressure is against the plate 5, whereas at the ends the spring ends fit into grooves 13 in the damper winding. The collar 9, and in consequence, coil 8, is thus firmly held on the pole piece 2 and the short shuttling action of the coils as the rotor 1 slows down to a stop is entirely eliminated. Valuable coil space is not taken up by the springs when the springs are positioned between the collar rim and the coil, the spring construction is simplified, and the size of the coil, for a given pole size, is increased.

The structure we have thus invented is cheaper, greater flux densities can be obtained, and the efficiency of a dynamo-electric machine is increased.

We realize that others, particularly after having had the benefit of our teaching, may devise other similar structures. We, therefore, do not wish to be limited to the exact showing made but

wish to be limited only by the scope of the claims hereto appended.

We claim as our invention:

1. In a dynamo-electric machine, in combination, a pole piece, a face plate larger than the face of the pole piece on the face of the pole piece, a coil on the pole piece, an annular collar disposed about the pole end and disposed between the face plate and the coil, means disposed transverse of the mid-portion of the face of the pole piece and engaging the collar for biasing the collar away from the face plate and against the coil.

2. In a dynamo-electric machine, in combination, a machine, a pole having a coil thereon rigidly connected to the machine, and leaf spring means held in position in the face of the pole piece and acting on the coil to firmly bias the coil away from one end of the pole piece.

3. In a dynamo-electric machine, in combination, a machine having a rotor frame, a pole piece rigidly mounted on the frame, a coil surrounding the pole piece, a flat spring disposed transverse of the end of the pole piece remote from the frame, means for holding said spring in fixed relation to the pole piece near the mid-portion of the spring, said spring being so flexed as to engage the coil to bias the coil firmly against the frame.

4. In a dynamo-electric machine, in combination, a rotor frame, a pole piece firmly secured at one of its ends to the frame, a coil encircling the pole piece, said pole piece having a transverse recess in its end remote from the frame, resilient means disposed in said recess and extending beyond the ends of the recess to engage the coil at two points to firmly bias the coil against the frame.

5. In a dynamo-electric machine, in combination, a rotor frame, a pole piece firmly secured at one of its ends to the frame, a coil encircling the pole piece, a collar encircling the pole piece at the end remote from the frame, said pole piece having a transverse recess in its end remote from the frame, resilient means disposed in said recess and extending beyond the ends of the recess to engage the collar at two points to thus firmly bias the collar and coil against the frame.

6. In a dynamo-electric machine, in combination, a rotor frame, a pole piece firmly secured at one of its ends to the rotor frame, said pole piece having parallel rabbets cut along two edges at the ends remote from the frame, an annular collar having an L-shaped section, said collar having one leg of the L-shape disposed loosely in the rabbet and the other leg of the L-shape projecting outwardly beyond the peripheral surface of the pole piece, a pole winding encircling the pole piece and disposed between the frame and the projecting L-shape portion of the annular collar, said pole piece having a groove in the face of the pole piece remote from the frame, a leaf spring so mounted in the groove that its ends engage the collar to bias the collar and thus the pole winding firmly against the frame.

7. In a dynamo-electric machine, in combination, a rotor frame, a pole piece firmly secured at one of its ends to the rotor frame, said pole piece having parallel rabbets cut along two edges at the ends remote from the frame, an annular collar having an L-shaped section, said collar having one leg of the L-shape disposed loosely in the rabbet and the other leg of the L-shape projecting outwardly beyond the peripheral surface of the pole piece, a pole winding encircling the pole piece and disposed between the frame and the projecting portion of the L-shaped annular collar, said pole piece having a groove in the face of the pole piece remote from the frame, a leaf spring loosely fitting in the groove and having its ends extend beyond the face of the pole piece to engage the collar at two points, and a face plate for the pole piece secured to the pole piece and covering the groove, whereby the spring biases the collar and thus the coil firmly against the frame.

8. In a dynamo-electric machine, in combination, a rotor, a pole piece secured at one of its ends to the rotor, a torque equalizing winding loosely surrounding a reduced portion of the end of the pole piece remote from the frame, a single unit flat-leaf spring means secured to the mid-portion of the pole piece and with its ends engaging a notch in the torque equalizing winding to thus bias the torque equalizing winding toward the rotor frame, and a pole winding disposed on the pole piece and between the rotor and the torque equalizing winding.

9. In a dynamo-electric machine, in combination, a rotor frame, a pole piece firmly secured at one of its ends to the rotor frame, said pole piece having parallel rabbets cut along two edges at the ends remote from the frame, an annular collar having an L-shaped section, said collar having one leg of the L-shape disposed loosely in the rabbet and the other leg of the L-shape projecting outwardly beyond the peripheral surface of the pole piece, a pole winding encircling the pole piece and disposed between the frame and the projecting portion of the L-shaped collar, said pole piece having a groove in the face of the pole piece remote from the frame, and a leaf spring so mounted in the groove that its ends engage the collar to thus bias the collar and thereby the pole winding firmly against the frame.

RENÉ A. BAUDRY.
MARION R. LORY.