A. B. FIELD.

DYNAMO ELECTRIC MACHINE.

APPLICATION FILED DEC. 31, 1913.

1,227,414.

Patented May 22, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

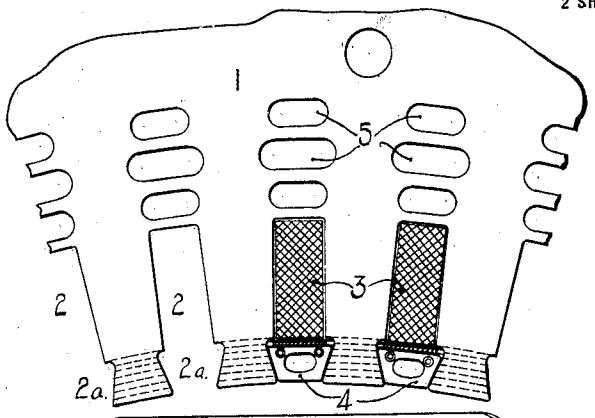


Fig. 2.

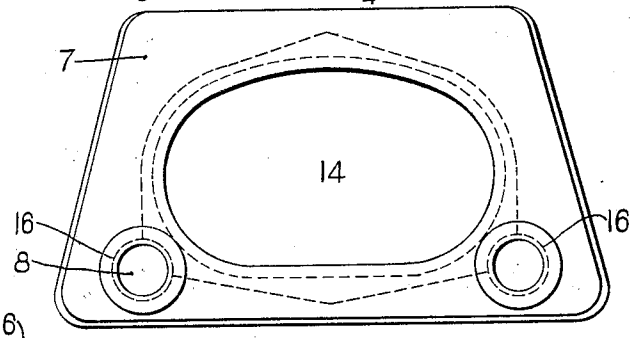


Fig. 3.

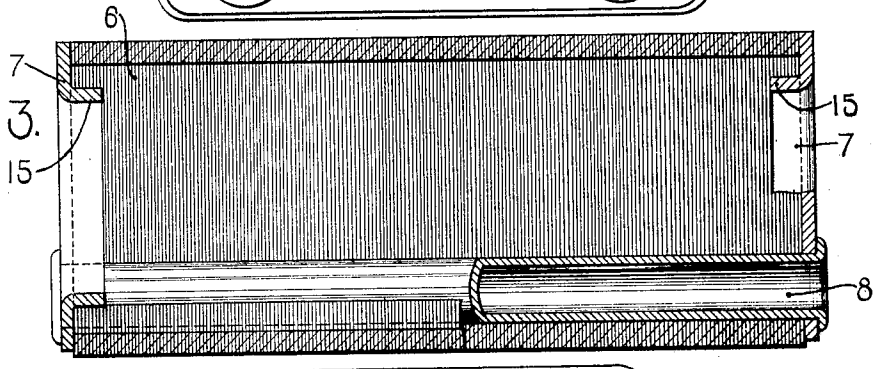
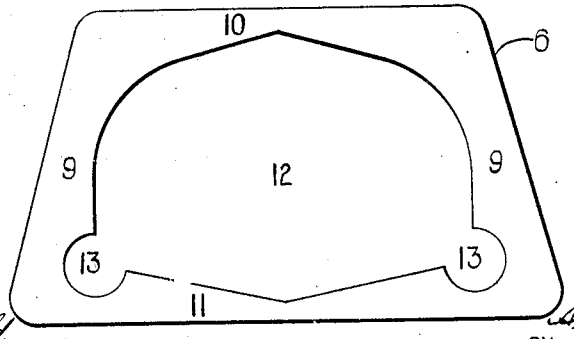


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

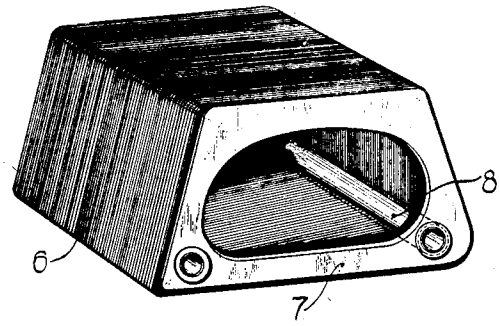


Fig. 6.

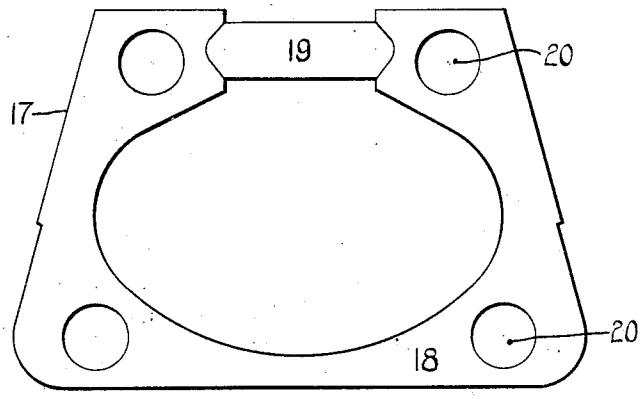
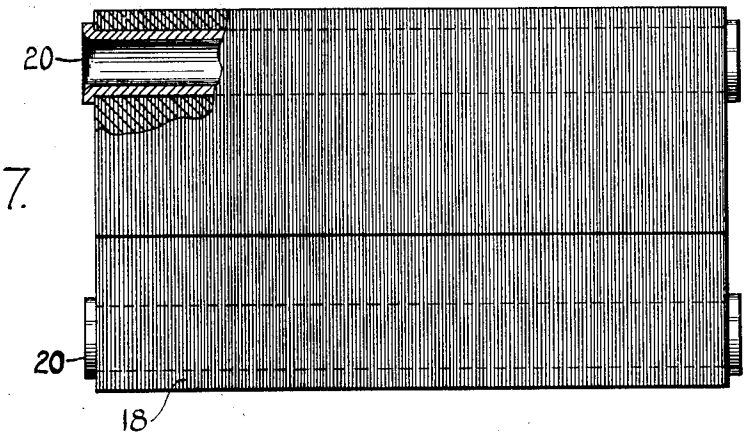


Fig. 7.



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UNITED STATES PATENT OFFICE.

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DYNAMO-ELECTRIC MACHINE.

1,227,414. Specification of Letters Patent. Patented May 22, 1917.

Application filed December 31, 1913. Serial No. 809,596.

To all whom it may concern:

Be it known that I, ALLAN B. FIELD, a subject of the King of England, and a resident of London, England, have invented a new and useful Improvement in Dynamo-Electric Machines, of which the following is a specification.

My invention relates to dynamo-electric machines and it has special reference to coil-retaining wedges adapted for use in such machines.

One object of my invention is to provide a magnetizable core for dynamo-electric machines which shall permit of ready and rapid winding of the coils therein and shall embody means for easily and securely maintaining the coils in position.

Another object of my invention is to provide a machine of such construction that its internal reactance is appreciably increased, a characteristic which is of great value upon the occurrence of a sudden short-circuit of the machine.

A further object of my invention is to secure, during operation, an approximately continuous area of magnetizable material adjacent to the machine air gap. The advantages of this "closed slot" construction, in the line of improving the operating characteristics of a machine, are well-known to those skilled in the art and need not be explained here.

Another object of my invention is to remove the working conductors from the active field that is always present in the top of the core slots.

A further object of my invention is to provide a coil-retaining wedge which shall be economically and readily manufactured, conveniently assembled and insulated in the machine, and which shall have a tendency to increase its wedging action when subjected to the inevitable magnetic pull of the field polar projections during operation.

A still further object of my invention is to provide a wedge of the above-indicated character which shall embrace means for allowing a full and suitable ventilation and cooling of the wedge itself and of the adjacent portions of the core and coils.

Accordingly, I have devised a machine core and a magnetizable coil-retaining wedge which mutually coact to fulfil the ends in view. In addition to the customarily provided coil-containing slots in the core, I provide contiguous and relatively deep openings substantially trapezoidal or wedge-shaped in form and disposed radially without the slots. The well-known advantages of open slots for winding are thus provided.

The associated wedge is laminated, is substantially trapezoidal in form, having large flat surfaces, and has a longitudinal aperture therethrough for purposes of ventilation, as hereinbefore mentioned. It will be noted that the coils are thus disposed at an appreciable distance from the machine air gap proper, thereby considerably increasing the effective air gap and internal reactance of the machine and excluding the working conductors from the cross-flux in the tops of the slots. Also, a practically unbroken area of magnetizable material confronts the air gap, thus securing for the machine the "closed slot" effect and advantages.

Moreover, wedges constructed as indicated above may be readily driven into the receiving openings, and the problem of insulation from the core is a simple one to solve, since fish paper or other similar material may be conveniently positioned by reason of the large flat surfaces of the wedge. Again, the form and disposition of the wedge is such as to increase its wedging action when magnetically attracted during operation toward the air gap, as will be readily apparent. Furthermore, a considerable saving may be accomplished in the process of manufacture of a core constructed in accordance with my invention, inasmuch as both the core laminations and the wedge laminations may be punched out in one operation, thereby effecting an appreciable economy in both time and material.

My invention may better be understood in connection with the accompanying drawing, in which Figure 1 is a fragmentary view, partially in section, of the core of a dynamo-electric machine embodying my invention; Fig. 2 is a view, in end elevation, and Fig. 3 is a view, in longitudinal section, with parts broken away, of a wedge constructed in accordance with my invention; Fig. 4 is a view, in elevation, of the type of lamination employed in the wedge shown in Figs. 2 and 3; Fig. 5 is a view, in perspective, of a complete wedge; and Figs. 6 and 7 are views, in end elevation and in side elevation with a portion broken away,

respectively, of a modification of my invention.

Referring to the drawings, the portion of a dynamo-electric machine here shown comprises a preferably laminated core 1 having a plurality of slots 2 within which coils 3 are disposed and a plurality of contiguous, relatively deep openings 2^a that are substantially trapezoidal in form and are disposed radially without the slots 2, and a plurality of wedges 4 severally disposed in the openings 2^a. A plurality of longitudinally disposed ventilating openings 5 and of radially disposed communicating openings (not shown) are preferably employed.

The wedges 4 severally comprise a plurality of apertured and substantially trapezoidal laminations 6, a pair of apertured end-plates 7 and a plurality of rivets 8 for clamping the laminations intermediate the end plates.

The laminations 6, best shown in Fig. 4, are preferably of magnetizable material and severally comprise two non-parallel side walls 9 and substantially parallel, relatively narrow, upper and lower integral bridging members 10 and 11, respectively. A relatively large internal aperture 12 is thus formed, and two contiguous arcuate slots 13 are disposed adjacent to the ends of the longer parallel side of the lamination, for a purpose hereinafter described, the complete internal opening thus being substantially of acorn-shape and leaving a margin of material on all sides sufficiently only for adequate mechanical stiffness and for conveyance of the intended flux.

The end-plates 7 are preferably of non-magnetizable material and have a substantially oval aperture 14 having an internally disposed flange 15, and a pair of openings 16 that register with the slots 13, for a purpose hereinafter explained.

The rivets 8 are preferably tubular and of high-resistance non-magnetizable material to minimize the eddy current losses therein. Moreover, the rivets are severally disposed in the arcuate slots 13, which, it will be noted are located a considerable distance from the path of the active cross-flux in the slot tops. Consequently, it has been found unnecessary to insulate the rivets from the laminations. The ends of the rivets extend through the openings 16 and are suitably turned over upon the outer surfaces of the end-plates 7, thereby tightly clamping the laminations intermediate the end plates. The completed wedge 4 is thus rugged, compact and entirely self-contained, and its relatively large, flat surfaces may be readily and economically insulated from the core. Further mechanical and electrical advantages accruing from the use of the wedge in combination with the core construction hereinbefore described, have already been pointed out.

Reference may now be had to Figs. 6 and 7, in which a modification of my invention is shown. Such a construction may be employed to advantage in core slots wherein a very tight fit is desirable. In addition, the majority of the advantageous features heretofore enumerated in connection with the preferred form of my invention are also incorporated in the wedge 17 of Figs. 6 and 7.

The laminations 18 embodied in the wedge 17 severally have three sides surrounding an internal aperture, and the fourth or upper side is partially open and is adapted to receive an auxiliary wedging member 19 that may be driven into place after the wedge proper has been suitably positioned in the core, thereby causing the main wedge to tightly engage the core teeth. A plurality of hollow rivets 20 preferably insulated from the laminations to reduce eddy current losses, serve to suitably clamp the laminations together.

I do not wish to be restricted to the specific structural details herein set forth, but desire that only such limitations shall be imposed as are indicated in the accompanying claims.

I claim as my invention:

1. A coil-retaining wedge for dynamo-electric machines comprising a plurality of similar substantially trapezoidal laminations having registering apertures and a plurality of arcuate slots located in the base portions of said laminations and a plurality of tubular rivets disposed in said slots for securing said laminations together.

2. A coil-retaining wedge for dynamo-electric machines comprising a plurality of similar substantially trapezoidal laminations of magnetizable material having registering apertures and a plurality of arcuate slots located in the base portions of said laminations, a pair of apertured end-plates of non-magnetizable material and a plurality of tubular rivets of non-magnetizable material disposed in said slots for clamping said laminations and said end-plates together.

In testimony whereof, I have hereunto subscribed my name this tenth day of December 1913.

ALLAN BERTRAM FIELD.

Witnesses:
A. S. CACHEWAILLE,
W. J. SEERTEN.