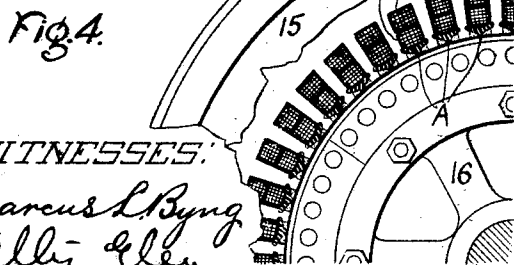
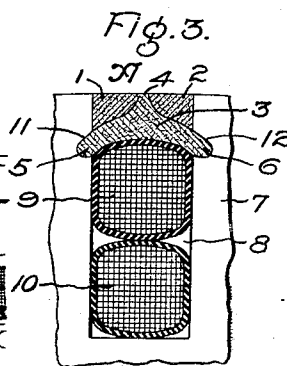
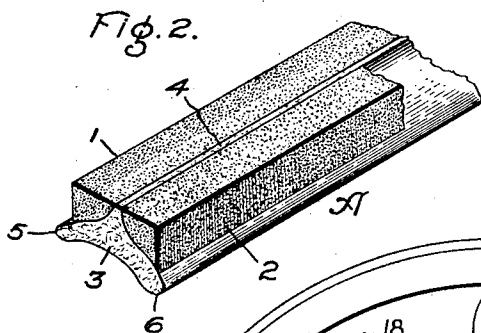
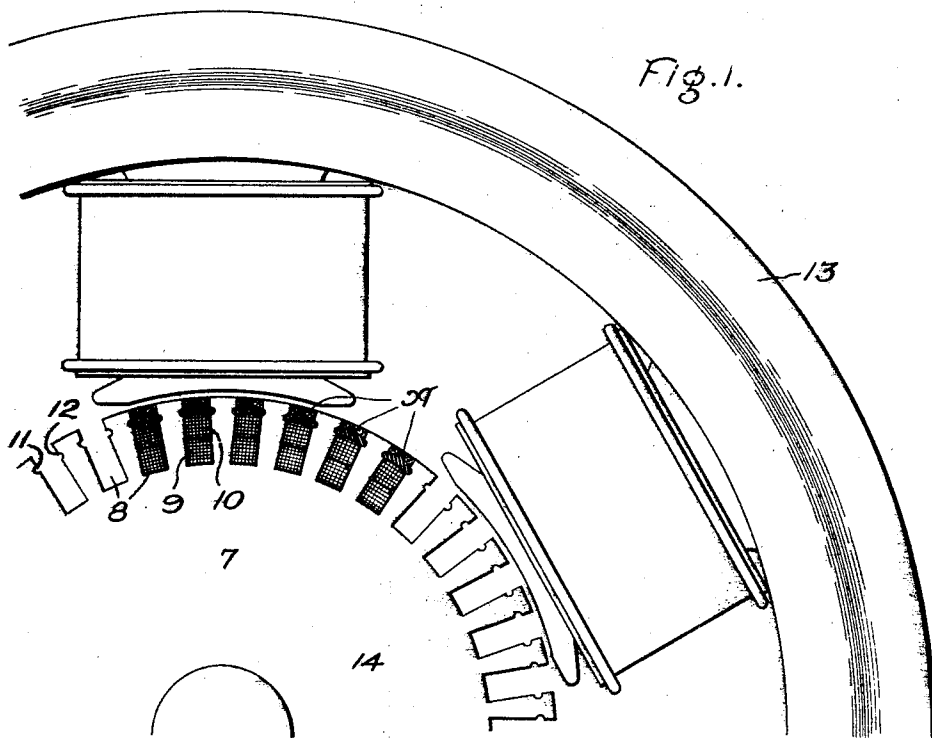


C. ROBINSON.
MAGNETIC WEDGE.
APPLICATION FILED JAN. 8, 1907.

917,138.

Patented Apr. 6, 1909.



WITNESSES:
Marcus L. Byng
J. Ellis Allen.

INVENTOR
CONWAY ROBINSON.
BY *Albert J. Davis*
ATTY.

UNITED STATES PATENT OFFICE.

CONWAY ROBINSON, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MAGNETIC WEDGE.

No. 917,138.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed January 8, 1907. Serial No. 351,358.

To all whom it may concern:

Be it known that I, CONWAY ROBINSON, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Magnetic Wedges, of which the following is a specification.

My invention relates to dynamo-electric machines and particularly to wedge devices for retaining conductors in slots formed in the core structures, and it has for its object to improve such devices.

In the stators of induction motors, particularly, it is of advantage to have the surface of the core present as nearly as possible an unbroken area of magnetic material to effect a uniform distribution of the flux and decrease the reluctance of the air gap. It is also desirable in this and other types of dynamo-electric machines to bring the conductors as near the surface as possible in order to reduce the length of the magnetic circuits to a minimum. The retaining wedge should therefore be preferably formed in part, at least, of magnetic material, and should be mechanically strong in order that it may be made as thin as possible and thereby permit the conductor-receiving slot to be made only slightly deeper than the depth of the conductors. It is also, of course, necessary to divide the magnetic material of the wedge or retaining device in such a way that no eddy currents are set up therein.

My invention therefore consists in a novel construction and arrangement of parts constituting a wedge having the above and other desirable characteristics.

The various features of novelty will be pointed out with particularity in the appended claims; but for a full understanding of the invention and of its various objects and advantages reference may be had to the following detailed description taken in connection with the accompanying drawing which shows a preferred embodiment.

In said drawing, Figure 1 shows a portion of a dynamo-electric machine having the improved retaining device applied to the armature or rotor thereof; Fig. 2 is a perspective view of a section of a retaining device; Fig. 3 is an enlarged view showing in cross-section a set of conductors arranged in a slot with the retaining device in position; and Fig. 4 shows a portion of an in-

duction motor having the retaining devices applied to the stator.

Reference being had to the drawing, A indicates the improved wedge as a whole. It is made in such form that when in position it partially bridges the slot with magnetic material so as to form a pole tip or tips adjacent the slot. It may conveniently be made in the form of a pair of magnetic strips 1 and 2, secured or cemented to a backing 3, which is preferably made of fiber or some other tough material, adding to the strength of the wedge and at the same time providing a certain elasticity whereby the wedge may readily adjust itself to the slot into which it is driven. The members 1 and 2 are preferably of subdivided magnetic material so as to avoid eddy losses. For this purpose iron-wool, or iron filings, held together by some suitable electrically non-conducting binder, may conveniently be employed. Where iron-wool is used, some of the magnetic fibers extend wholly or partially across the width of each member and add greatly to the permeability thereof in the transverse direction. The member 3 may conveniently be made of wood pulp, asbestos or some other fiber also held together by a suitable binder. I have found that sodium silicate may be used to advantage as the binder for the magnetic material, and gelatin chromate as a binder for the fiber. These particular compositions need not necessarily be used, however.

The member 3 preferably takes the shape of a slightly curved slab having a thin, and preferably tapered, central rib 4 projecting from one side thereof. When made of some fibrous material held together by a suitable binder, it is preferably formed by placing the plastic material in suitable dies upon which sufficient pressure is exerted to squeeze the whole into a tough mass. This is then dried and placed in another die or mold having the shape of the completed wedge. The material of the magnetic portions is then introduced into this latter die or mold and pressure is again exerted until the magnetic portions together with the slab of fibrous material are pressed and cemented into a hard compact form. The whole is then dried, and, if desired, provided with a coating of varnish. The resulting wedge is exceedingly stiff and strong.

The rib on the member 3 is preferably of

such length that its outer edge is substantially flush with the upper surface of the magnetic portions 1 and 2 and the combined widths of this rib and the magnetic portions (which is equal to the width of the slot into which the wedge is to be driven), is somewhat less than the width of the body portion of the member 3, whereby beads 5 and 6 are formed at the sides of the wedge by the projecting portions of the fiber backing.

The manner of using the wedge is shown in Fig. 3, wherein 7 indicates a fragment of core having a coil-receiving slot 8. 9 and 10 are two coils arranged one above the other in the slot. The slot may conveniently be made rectangular in form with a pair of under-cut grooves 11 and 12 on opposite sides thereof at points adjacent the top of the uppermost coil. These grooves are adapted to receive the beads 5 and 6 of the wedge. The parts are so proportioned that the outer surface of the wedge is flush with the outer surface of the core member. It will be seen that the magnetic portions 1 and 2 form, as it were, pole tips for the core portions bounding the sides of the coil-receiving slots and therefore a good magnetic path is provided at all points along the surface of the core except throughout the narrow areas constituting the upper portions of the ribs 4. The function of the rib is therefore not only a mechanical one but also an electrical one in that it prevents the shunting of the flux from one pole tip to another, that is, from one magnetic member of the wedge to the other, and causes the flux to pass in the proper direction from each pole-tip down into the core body. By making the bottom of the wedge curved, as shown, whereby it fits the upper surface of the conductor 9, an added depth is given to the wedge without necessitating an increase in the depth of the slot as a whole.

Referring to Fig. 1, 13 indicates the field magnet, or stator, of a dynamo-electric machine, and 14 the armature, or rotor, which has a core 7 provided with slots 8 for the conductors 9 and 10. Each set of conductors, it will be seen, is held in place by one of the wedge devices.

In Fig. 4 I have shown an induction motor comprising stator and rotor members 15 and 16, respectively; the retaining devices A being used to hold the coils 17 and 18 in place.

In direct current machines, it is not necessary that the wedges be magnetic and instead of iron or steel wool, copper wool may be employed to advantage.

While I have described in detail a preferred form of my invention, I do not desire to be limited to the particular arrangement of parts shown since in its broader aspects my invention contemplates other

constructions embodying the essential features as defined in the appended claims.

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

1. As an article of manufacture, a slot-closing device consisting of a bar composed of magnetic material whose continuity is interrupted by portions of electrically non-conducting material and a central layer of non-magnetic material dividing said bar into two portions, said bar and said central layer being cemented together.

2. As an article of manufacture, a slot-closing device consisting of a bar composed of finely divided portions of magnetic material held together by a binder of electrically non-conducting material, said bar having a central portion of non-magnetic material, said bar and said central portion being cemented together.

3. As an article of manufacture, a slot-closing device consisting of strips composed of finely divided magnetic material held together by electrically non-conducting binding material, together with an interposed strip of non-magnetic material, said strips being cemented together.

4. As an article of manufacture, a slot-closing device consisting of a fiber backing having a projecting rib on one side and strips composed of finely divided portions of magnetic material held together by a binder of electrically non-conducting material, arranged on opposite sides of said rib, said backing and said strips being cemented together.

5. As an article of manufacture, a slot-closing device consisting of a fiber backing having a central rib on one side and a filling of finely-divided magnetic material and electrically non-conducting binding material on opposite sides of the rib, said fiber backing and said filling being cemented together.

6. As an article of manufacture, a slot-closing device consisting of a bar of magnetic material divided into two halves by a strip of non-magnetic material and backed by a layer of non-magnetic material which projects beyond the sides of the bar to form beads.

7. The combination with a dynamo-electric machine having coil-retaining slots, of slot-closing devices each in the form of a pair of pole tips composed of finely divided magnetic material held together by a binder of electrically non-conducting material, said tips being separated by and cemented to a strip of non-magnetic material.

8. The combination with a dynamo-electric machine having coil-retaining slots with grooves in the sides thereof and coils in said slots, of slot-closing devices consisting each of a strip of non-magnetic material

concaved on its under side to fit the top of the coils and having projecting beads at the edges adjacent the concaved side fitting said grooves and portions of metal wool cemented to said strip.

9. As an article of manufacture, a slot-closing device consisting of a bar composed of metal wool held together by an electrically non-conducting binder.

10. As an article of manufacture, a slot-closing device consisting of a bar composed of steel wool having a central layer of non-magnetic material.

11. In an induction motor, a stator having coil-retaining slots, and slot-closing devices each in the form of a pair of pole tips composed of magnetic wool, said tips being separated by and cemented to a strip of non-magnetic material.

12. The combination with a dynamo-electric machine having coil retaining slots, of

slot closing devices each consisting of a bar of metal wool cemented to a strip of non-magnetic material.

13. The combination with a dynamo-electric machine having coil retaining slots, of slot closing devices each consisting of a fiber backing having a projecting rib on one side and strips of magnetic wool cemented to opposite sides of said rib.

14. As an article of manufacture, a slot closing device consisting of a pair of pole tips composed of magnetic wool separated by and cemented to a strip of non-magnetic material.

In witness whereof, I have hereunto set my hand this 7th day of January, 1907.

CONWAY ROBINSON.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.