Feb. 27, 1934. C. F. REIS 1,948,828

MAGNETO

Filed Aug. 29, 1932

Fig. 1.

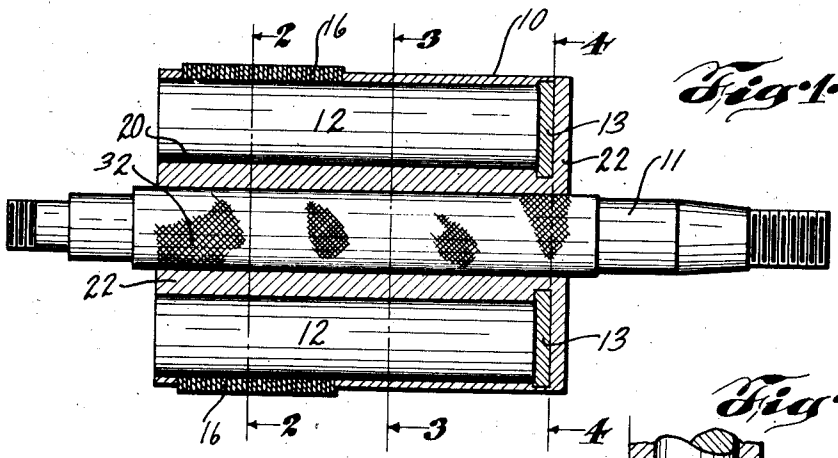


Fig. 5.

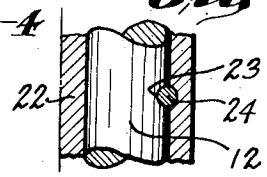


Fig. 2.

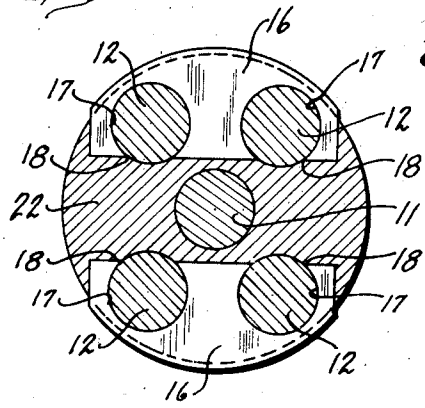


Fig. 3.

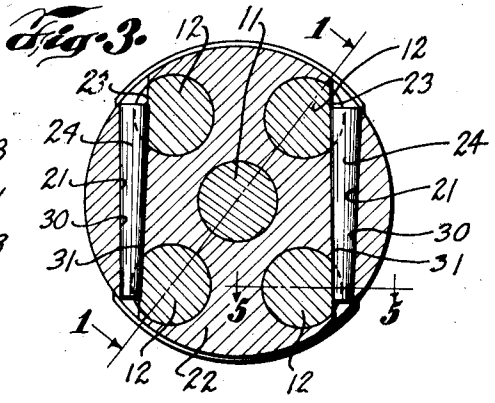


Fig. 4.

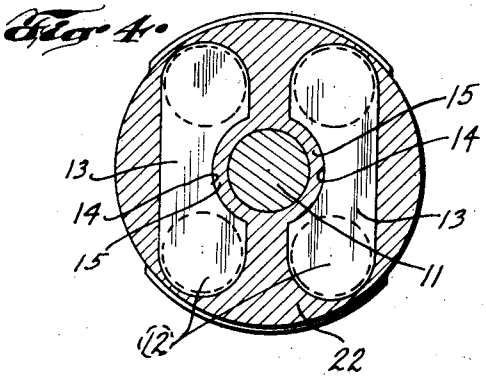


Fig. 6.

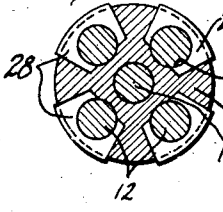
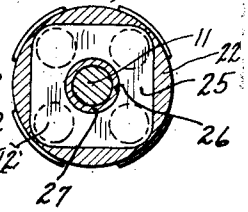


Fig. 7.



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1,948,828

MAGNETO

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Application August 29, 1932. Serial No. 630,875

4 Claims. (Cl. 171—252)

This invention relates to improvements in magnetos, and more particularly to improvements in rotors of magnetos of the type employing rotating permanent magnets.

In certain prior types of magnet rotors, it is usual to employ a mass of cast non-magnetic metal, such as brass, for the rotor shaft, and for intimately uniting the laminated pole shoes. Such structures are objectionable, in that a cast shaft is comparatively low in tensile strength, and is rather expensive for shafting material. In magnetos of this type, it is desirable to employ permanent magnets formed of cobalt steel or other materials having high magnetic retentivity. Such materials have not been widely used in magnetos because of the difficulty experienced in machining, and in securing the pole pieces to the rotor. In prior types of rotor constructions it is usual to employ screws or other like fastening means for securing the permanent magnets and the various other parts to the rotor shaft. Such constructions are objectionable in that the screws become loose and ineffective.

An object of the present invention is to provide an improved rotor for magnetos of the type above noted, which includes a rotor shaft formed of steel or other similar material, and a mass of die-cast aluminum or zinc alloy for intimately uniting the laminated pole shoes to the shaft. By this provision, a shaft of substantial strength and rigidity is employed in the rotor assembly.

A further object is to provide an improved construction of rotors of magnetos of the rotating field type which includes a mass of die-cast non-magnetic metal for securing the laminated pole shoes and magnetic bridging member to the rotor shaft, and means for removably securing the pole pieces into intimate contact with the pole shoes and bridging member.

A still further object is to provide an improved rotor for magnetos of the rotating field type in which the laminated pole shoes and the magnetic pole bridging member are intimately united to the rotor shaft by means of a mass of die-cast non-magnetic metal, and in which the pole pieces are removably assembled and more firmly secured to the die cast mass, than is possible through the use of screws, bolts, nuts or the like.

An additional object is to provide an improved rotor for magnetos of the rotating field type, which is rigid and durable in construction, and is composed of but a few simple and easily assembled parts, and which results in a substantial reduction of production costs, through minimization of machining operations on the permanent magnets.

Further objects and advantages will appear from the following detailed description of parts, and the accompanying drawing of a single preferred embodiment, and in which:

Fig. 1 is a longitudinal section of a preferred form of rotor for magnetos of the rotating field type, the section being taken along line 1—1 of Fig. 3; Fig. 2 is a section taken along line 2—2 in Fig. 1; Fig. 3 is a section taken along line 3—3 in Fig. 1; Fig. 4 is a section taken along line 4—4 in Fig. 1; Fig. 5 is a fragmentary section taken along line 5—5 in Fig. 3; Fig. 6 is a reduced section taken along line 2—2 in Fig. 1, and showing a modified pole shoe construction; and Fig. 7 is a section, substantially reduced in size, taken along line 4—4 in Fig. 1 and showing a modified form of magnet bridging member to be employed in connection with the pole shoe construction shown in Fig. 6.

Referring by numerals to the drawing, the numeral 10 designates, generally, a preferred form of rotor for magnetos of the rotating field type, and which includes a rotor shaft 11 formed, by preference, of mild steel or other similar shafting material of substantial strength and rigidity. A plurality of pole pieces or permanent magnets 12, are, by preference, arranged in spaced relation and substantially parallel to each other, and to the longitudinal axis of the shaft. These pole pieces are, by preference, formed of cobalt steel or other material possessing high magnetic retentivity, and are formed, by preference, circular in cross section to facilitate machining operations. In the preferred example shown, the rotor 10 includes four such pole pieces, although it will be understood that the number may be varied, depending upon the type and number of poles of the magneto to be constructed.

Referring more particularly to Figs. 2 and 4, wherein the parts of the rotor are arranged for a two pole machine, a pair of bridging members 13 of stamped soft iron or steel, are disposed near one end of the rotor and each in contact with the end portions of a pair of the pole pieces 12 of opposed polarity. Each bridging member provides a flux path between the paired pole pieces of opposite polarity, to provide a structure which is, in effect, a U shaped permanent magnet. By this arrangement there are provided two distinct magnetic circuits within the rotor, where a two pole machine is desired. Each bridging member 13 is provided with an intermediate semi-circular recessed portion 14. By reason of this construc-

tion, there results an annular space 15, which separates the shaft 11 from the opposed recessed inner margins of the members 13. Pole shoes 16 are provided, and consist of stacks of soft iron laminations, each of partly sector shape, which are arranged, respectively, on the free ends of the pole pieces 12, each pole shoe connecting the pole pieces of like polarity. Each lamination is, by preference, provided with a pair of apertures 17 which are slotted as indicated at 18, the pole pieces extending through these apertures. It will be readily seen that the pole shoes 16 only partially encircle the paired pole pieces, because of the slotted portion 18 of the laminations.

In assembling the rotor, the laminated pole shoes, bridging members 13, together with the rotor shaft, are suitably positioned in a die-casting mold. The mold, prior to casting, is provided with cores corresponding in size and shape with, and so as to result in, openings 20. In similar manner, paired tapered slots 21 are provided by suitable cores in the die-casting mold. A mass of non-magnetic metal 22, such as a suitable aluminum or zinc alloy, is then poured into the mold for intimately uniting to the shaft, the assembled laminations for the pole shoes, and the bridging members. After the die-casting process, the resulting rigid, integral structure is removed from the mold, the cores corresponding to openings 20 and slots 21, removed from the casting, and the pole pieces 12 are inserted through the pole shoe apertures 17 and the cored openings 20. Each pole piece is provided with a slotted or notched portion 23, which is arranged to be aligned with the slots 21 previously cored in the mass of metal 22. These notched portions are so disposed on each pole piece as to be aligned with the adjacent or corresponding slot 21 when the pole piece is in contact with the bridging piece 13. A tapered wedge or pin 24 is then driven or pressed into each slot to secure the pole pieces to the mass of cast metal, and to prevent any appreciable endwise or rotary movement of the pole pieces, relative to the cast portions of the structure. These wedge pins may also be so constructed that, upon insertion, they serve to urge the ends of the pole pieces into intimate contact with the soft iron bridging members 13, to insure good magnetic contact between the bridging members and pole pieces. The wedge pins may be formed of a suitable non-magnetic material, and as illustrated, each pin serves to hold a pair of the pole pieces of opposed polarity, in place in the assembly. The rotor is now completely assembled, and ready for use in a magneto, and it will be apparent that by the above arrangement all screws or threaded fastening means for assembling the rotor, are eliminated, a much easier and more secure assembly expedient being provided by the wedge pins.

In Figs. 6 and 7 certain of the rotor parts are shown as arranged for a four pole machine. In this modification, a plate 25 of stamped soft iron or steel is disposed near one end of the pole pieces 12, in place of the bridging members 13 employed in the above described two pole machine. The plate 25 provides a flux path common to all the pole pieces. A central circular aperture 26 is punched in the plate 25, which, when the plate is assembled in the rotor, causes the plate to be separated from the shaft 11 by an annular web 27 of the casting metal. Pole shoes 28 consisting of stacks of soft iron laminations, are arranged on the free ends of each pole piece, to form four separate and distinct poles. Each lamination is provided with a slotted aperture 29 similar to that shown in Fig. 2. It will be readily seen that the various parts are assembled in the same manner as described for the two pole machine.

In either construction above described, it will be seen that the mass of non-magnetic metal secures the various parts of the rotor to the shaft, and that a web of non-magnetic metal, magnetically insulates the bridging members 13 or the plate 25 from the shaft. The tapered slots 21 are, by preference, formed with a tapered wall portion 30 and an opposite, straight wall portion 31. By this provision, the slots in the pole pieces may be ground without taper, to facilitate machining and assembling. It will be readily seen that the pole pieces 12 may be removed for remagnetizing purposes, simply by withdrawing the wedge pins 24. After remagnetization, the poles may be reinserted and again secured in place by the pins 24. The use of these wedge pins eliminates expensive and difficult machining operations on the hard steel magnets. The only machining operation, viz., that of grinding the straight slots 21, is simple and inexpensive, as compared to the machining necessary with prior types of rotors. It will also be readily seen that all the parts of the rotor, with the execption of the tapered pins 24 and pole pieces 12, are metallically united into a rigid unitary structure in the diecasting process.

The rotor shaft 11 is, by reference, provided with a knurled portion 32 to insure good interengaging coherence between the mass of cast metal 22 and the shaft. This knurled portion prevents any relative movement, due to an improved bond between the cast metal 22 and the shaft. It will be apparent that the present improved rotor is neat and compact in construction, and forms practically a rigid, solid, rotating mass. It will, of course, be understood that my preference is not to die-cast the pole pieces in place, since the heat developed during the die-casting process would anneal the pole pieces resulting in a loss in magnetic retentivity. It is therefore desirable to assemble the rotor as above described, and to hold the pole pieces in place by the wedging means heretofore referred to.

It will, of course, be understood that the present detailed description of parts and the accompanying drawing relate to only a single preferred executional embodiment of the invention and that substantial changes may be made in the described arrangement and construction of parts without departing from the spirit and full intended scope of the invention.

I claim:

1. A rotary magnet structure for magnetos of the rotating-field type, including a shaft of ferrous metal, a plurality of pole pieces disposed parallel to, and spaced about the shaft, an element bridging an end portion of a plurality of said pole pieces, pole shoes, a body of non-ferrous metal cast about the shaft between its ends and embracing the bridging element and said pole shoes, and a locking member engaging the opposite end portions of certain of the pole pieces, at points within the body of cast metal.

2. A rotary magnet structure for magnetos of the rotating field type including a steel shaft, a plurality of pole pieces each having a preformed notched portion, said pole pieces being disposed parallel to, and spaced about the shaft, an element contacting, in bridging relation, end faces of certain of the pole pieces, laminated pole shoes each having preformed pole-piece receiving open-

ings, a body of non-magnetic metal cast onto an intermediate portion of the shaft, and embracing the bridging element and said pole shoes, and a locking element engaging the opposite end portions of certain of the pole pieces, within the body of cast metal, and coacting therewith to maintain the pole pieces and bridging elements in contact with each other and to maintain the pole pieces in removable assembled relation in the structure.

3. A rotor structure for magnetos of the rotating field type including a shaft, a plurality of pole pieces having preformed notched portions, disposed in spaced relation about the shaft, and lengthwise thereof, a bridging element engaging a plurality of said pole pieces, pole shoes, a body of metal cast about an intermediate portion of the shaft, and embracing the bridging element and pole shoes, preformed sockets in said cast body for receiving said pole pieces in assembly, a plurality of wedge elements engaging the notched portions of certain of said pole pieces, within the body of cast metal, and preformed channeled seats for the wedge elements in said cast body.

4. A rotor structure for magnetos of the rotating field type including a shaft of ferrous metal, pole pieces disposed parallel to and spaced about the shaft, pole-bridging elements each contacting with the end portions of a plurality of said pole pieces, pole shoes each consisting of a plurality of adjacent laminations disposed over certain of said pole pieces, a body of non-magnetic metal die-cast about an intermediate portion of the shaft, and embracing the bridging elements, and pole shoes, tapered channels preformed within the body of cast metal, said pole pieces having grooved portions, said body of cast metal and said pole shoes having preformed pole-piece-receiving openings extending longitudinally of said shaft, locking pins of wedge section disposed in said channels and each engaging grooved portions of a plurality of the pole pieces, within the cast metal body, when said pole pieces are in magnetic contact with said bridging elements, the shaft being provided with a preformed roughened gripping surface on that portion of the shaft within and engaged by the body of cast metal, and the shaft projecting through such body, and beyond each opposite end thereof.

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