

[54] METHOD OF PRODUCING A MAGNETO ROTOR

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[51] Int. Cl..... **H02k 15/04**

[58] Field of Search 29/596, 598, 607, 608, 29/523; 310/42, 43, 45, 156, 153, 261, 265; 156/297, 312

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[57] ABSTRACT

A plastoferrite pole ring is affixed to the inner circumferential surface of the casing bell of the rotor by an adhesive layer and pole pieces are similarly affixed to the inner circumferential surface of the pole ring in an assembly having an inner diameter somewhat smaller than the desired final value. A pressure plug is inserted, the outer surface of which has the desired final dimensions, and the assembly is heated, as the result of which the plastoferrite material is permanently deformed, retaining the desired exact dimensions after the removal of the plug. Projections may be provided on the casing bell and on the pole pieces to grasp into the plastoferrite ring.

4 Claims, 2 Drawing Figures

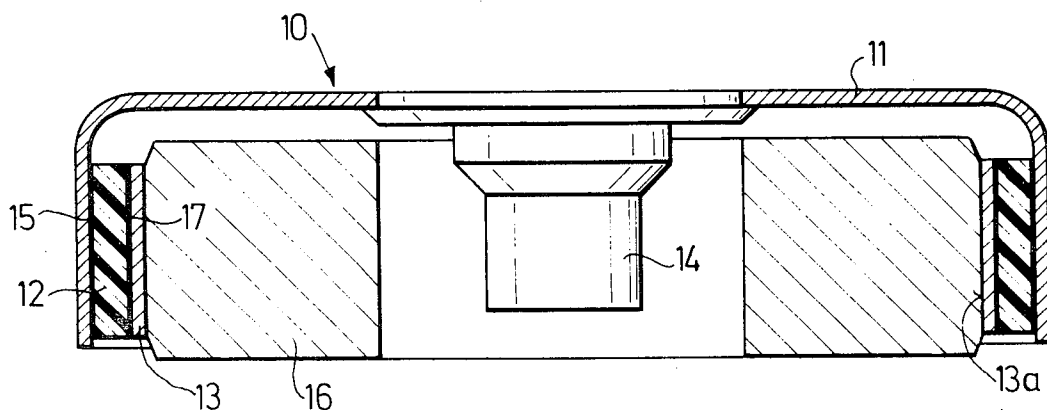


Fig. 1

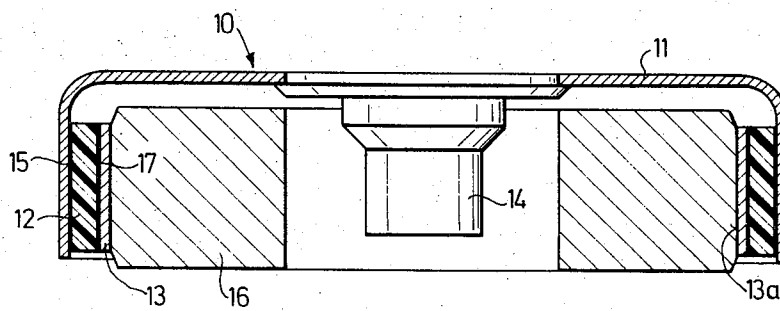
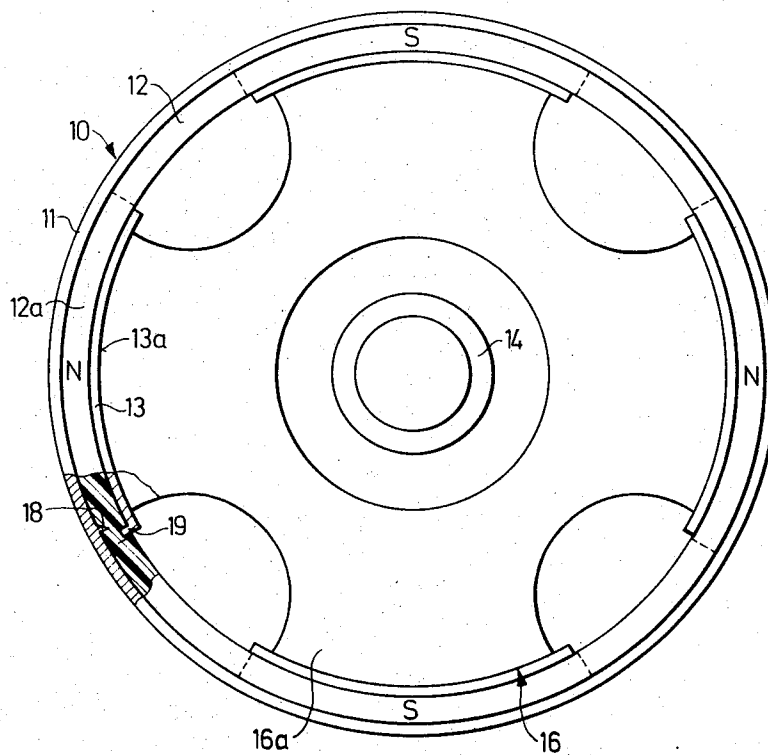


Fig. 2



METHOD OF PRODUCING A MAGNETO ROTOR

This invention relates to a pole wheel for a magneto generator, particularly for a flywheel-mounted ignition system magneto of an internal combustion engine. Such a pole wheel, herein referred to as a magneto rotor, serves to rotate an array of permanent magnets around the outside of a fixed armature structure.

It has been found advantageous to make such a magneto rotor out of a pot-shaped magnetically conducting casing bell provided with a hub for mounting on an engine crankshaft or other drive shaft, carrying on its inner circumferential surface an annular strip of synthetic material containing embedded magnetizable particles and known as a pole ring. The pole ring has magnetized zones which form pole faces at the inner surface of the pole ring, a pole piece of soft magnetic material commonly being applied on the inner surface of the pole ring to form the pole face surface. This type of pole ring is commonly referred to as a plastoferrite magnet or magnet structure.

It is known to manufacture a magneto rotor of the type above described by riveting the pole pieces, pole ring and casing bell together, compressing the plastoferrite material between the pole pieces and the casing of the pole wheel by the rivets and the like which pass through the plastoferrite material.

This form of construction has the disadvantage that the assembly of the magneto rotor requires several distinct operations that cannot easily be combined, because the mounting holes for the rivets must be provided, the rivets inserted and clinched and, finally, the pole face surfaces of the pole pieces must be machined to the design dimension of the inner diameter of the rotor.

It is an object of this invention to provide an improved method of manufacturing a magneto rotor and to provide a form of rotor that can be more easily manufactured. It is a further object to provide a form of assembly of a magneto rotor comprising plastoferrite magnets that is substantially simpler and more efficient and, in particular, to make it possible to obtain the required inner dimensions of the pole faces without post-assembly machining while still allowing the dimensions of the individual components to be subject to relatively wide tolerances.

Subject matter of the present invention: Briefly, an adhesive is applied to the outer circumferential surface of the pole ring and/or to the inner circumferential surface of the pot-shaped casing bell, the pole ring is placed in position in the casing bell, at this time having an inner diameter somewhat less than the finally desired dimension, and then a pressure plug is introduced inside the pole ring while the assembly is warmed to apply radial outward pressure against the inner surface of the pole faces, pressing the pole ring outwardly against the inner surface of the casing bell and producing a permanent deformation of the pole ring and pole surfaces to their desired final inner dimensions, after which the pressure plug is withdrawn.

In the case of magneto rotors in which the pole faces are provided by pole pieces, the manufacturing process of the present invention has the further feature that an adhesive is applied to the inner circumferential surface of the strip-like pole ring and/or the outer or the seating surface of the pole pieces and that the pole pieces are pressed by the pressure plug against the inner circum-

ferential surfaces of the magnetized zones of the pole ring.

According to a further refinement of the invention projections are provided on the inner surface of the casing bell that stick into the pole ring and the pole pieces have hook elements, such as bent edges that extend radially into the pole ring material for a short distance, so that all components of the structure are secured against circumferential relative displacement.

The invention will be described by way of example with reference to the accompanying drawing, in which:

FIG. 1 is a cross-section of a magneto rotor of the present invention with the pressure plug used in its manufacture inserted therein, and

FIG. 2 is a front view of the same rotor with the pressure plug inserted.

FIGS. 1 and 2 show the pole wheel rotor 10 of a flywheel-driven ignition magneto generator. This rotor comprises a pot-shaped casing bell 11 made from a disc of sheet steel by a deep drawing process. On the inner circumferential surface of this casing bell 11 is a pole ring 12 in the form of a strip of rectangular cross-section, made of a synthetic material containing embedded magnetizable particles, a so-called plastoferrite material. The north and south poles of the pole ring are formed by magnetized zones 12a, the boundaries of which are shown by dashed lines in FIG. 2. On the inner circumferential surface of each of these magnetized zones a pole piece 13 is provided, the inner circumferential surface of each of which provides a pole face 13a. The casing bell 11 is also provided with a hub 14 for affixing it to a crankshaft of an internal combustion engine (not shown). To assemble the magneto rotor 10, a layer of adhesive 15 is applied to the outer surface of the pole ring 12 and/or to the inner circumferential surface of the pot-shaped casing bell 11. Likewise, an adhesive layer 17 is provided on the inner circumferential surface of the pole ring 12 in the region of the magnetized zones 12a and/or on the outer or seating surfaces of the pole pieces 13. The pole ring 12 is then placed in position in the casing bell 11 and the pole pieces 13 are applied to the inner circumferential surfaces of the magnetized zones 12a. At this stage the minimum inner diameter of the pole structure is somewhat less than the desired final dimension.

A pressure plug 16 is then inserted into the pole wheel structure 10. As shown in FIG. 2, this pressure plug engages the pole structure along the pole faces with radially extending regions 16a, the outer boundaries of which have the design contour of the inner surface of the pole faces 13a, hence supplying a circumference of somewhat larger diameter than the inner diameter of the pole face circumference prior to the introduction of the pressure plug 16. That means that when the pressure plug 16 is inserted, the pole pieces 13 and with them also the pole ring 12 of plastoferrite material are compressed outwardly against the inner circumferential surface of the casing bell 11, so that the pole ring 12 and the pole pieces 13 are under pressure. The pole wheel rotor 10 along with the pressure plug 16 inside it are now heated. The adhesive layers 15 and 17 then become fluid, so that unevennesses are smoothed out and the opposed surfaces of the casing bell 11, the strip-like pole ring 12 and the pole pieces 13 are stuck firmly together. At the same time the pole ring 12 is deformed, thereby relieving the pressure applied by the pressure plug 16. This is a permanent deformation, so

that after the cooling of the rotor 10 that follows and the removal of the pressure plug 16, the rotor 10 has the proper intended value of inner diameter at its pole faces without the necessity of a further machining step. The dimensional tolerances for the components such as the pole pieces 13 and the pole ring 12 may be relatively large, because dimensional variations to which these components may be subject are fully compensated by the deformation of the plastoferrite material of the pole ring 12 produced under the influence of heat.

Supplementary fastening means as well as further manufacturing operations for fastening the pole pieces 13 and the pole ring 12 are not necessary, because in a pole wheel rotor produced in accordance with the present invention the pole pieces 13 adhere firmly to the inner surface of the pole ring strip 12 and the pole ring 12 likewise firmly adheres to the inner surface of the casing bell 11. The casing bell 11 and/or the pole pieces 13, however, can be anchored in the plastoferrite material of the pole ring 12 without any supplementary assembly operations if in the manufacture of the casing bell 11 a number of projections 18, for example in the form of small claws, are provided on its inner circumferential surface and/or if in the manufacture of the pole pieces 13 radially outwardly extending, bent or peeled hooks 19 are provided which will press into the plastoferrite material of the pole ring 12 when the pressure plug 16 is inserted into the structure and will become firmly embedded therein.

Although the invention has been described with respect to a particular embodiment, it is not limited to that embodiment and modifications and variations may be made within the inventive concept. For example, pole wheel rotors can be made that have no pole pieces. In this case the pole ring itself has the pole faces 13a on its inner circumferential surface in the region of the magnetized zones 12a. The pressure plug 16 must in that case be so shaped that the entire inner circumferential surface of the pole ring 12 is compressed to the designed inner diameter dimension, instead of the pressure being applied only to the pole piece surfaces as shown in FIG. 2. As another example, the warming up of the rotor structure 10 can take place before the insertion of the pressure plug 16 or simultaneously therewith. The adhesive layers 15 and 17 can, for example, be made of an adhesive cement or by the application of a sheet of adhesive film.

Since a magneto rotor manufactured in this way can also have coarse tolerances for its outer diameter, the individual components of the rotor can be manufactured and assembled largely without machining. For protection of the surface of the casing bell 11 and of the pole pieces 13, they can be made of zinc plated sheet steel. If bare sheet steel is used, the completely assembled rotor 10 can be coated in a bonderizing

bath.

I claim:

1. A method of making a magneto rotor comprising a pot-shaped magnetically conducting casing bell (11) with a hub (14) for mounting on a drive shaft and a pole ring (12) of synthetic material containing embedded magnetic particles on the inner circumference of said casing bell, which method comprises the steps of:

applying an adhesive to at least one of the matched circumferential surfaces respectively of said casing bell and of a pole ring of the aforesaid type having magnetized regions and having an inner diameter slightly smaller than the desired final dimension thereof;

placing said pole ring in position in said casing bell on the inner circumferential surface thereof;

introducing inside said pole ring a pressure plug (16) shaped to the desired final inner dimensions of at least the magnetized regions of said pole ring and thereby exerting an outward radial force while, warming the assembly and permanently deforming said pole ring to its desired final inner dimension; allowing the assembly to cool and said adhesive to harden and thereby to bind said matched surfaces, and

thereafter withdrawing said pressure plug.

2. A method as defined in claim 1 which also includes the step of affixing pole pieces (13) to the inner circumferential surface of said pole ring (12), said pole pieces having surfaces matched to the shape of the inner surfaces of the magnetized regions of the said pole ring for mounting thereon, by applying an adhesive to at least one of said matched surfaces respectively of said pole ring (12) and of said pole pieces (13), and in which said pressure plug (16) is shaped to the desired final spacing of inward facing pole face surfaces (13a) of said pole pieces as finally disposed with respect to each other, so that the introduction of said pressure plug (16) inside said pole ring takes place also inside said pole pieces and serves to exert outward radial force against said pole pieces as well as indirectly against said pole ring, pressing said pole pieces (13) against the inner surface of the magnetized zones of said pole ring (12), after which said adhesive is allowed to harden to secure said pole pieces to said pole ring before said pressure plug is removed.

3. A method as defined in claim 1 in which the adhesive (15) is warmed and becomes fluid when warmed and thereby binds the matched surfaces of said casing bell (11) and said pole ring (12).

4. A method as defined in claim 2 in which an adhesive (15, 17) is used which becomes fluid upon warming and is warmed and thereby binds the matched surfaces of said casing bell (11) and said pole ring (12) and of said pole pieces (13).

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