July 25, 1933. O. WULFERT 1,919,540

MACHINE CASING ELEMENT AND METHOD OF MAKING SAME

Filed May 28, 1931

Fig. 1.

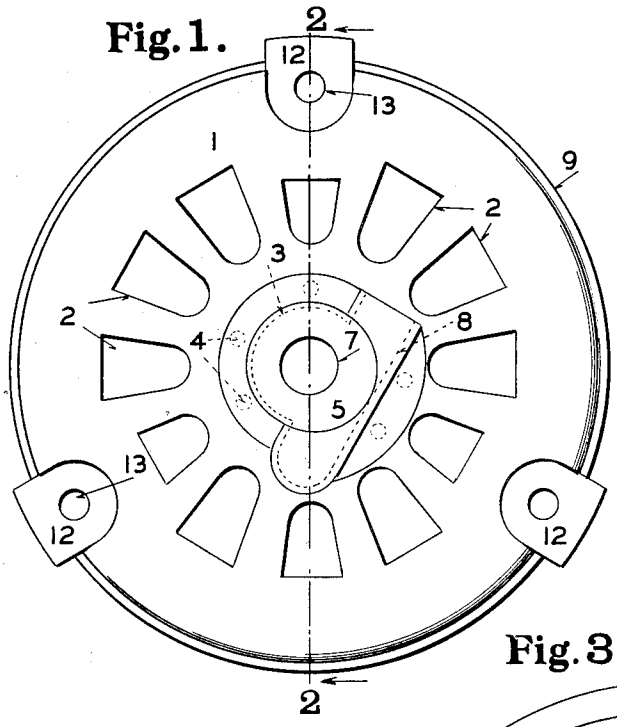


Fig. 2.

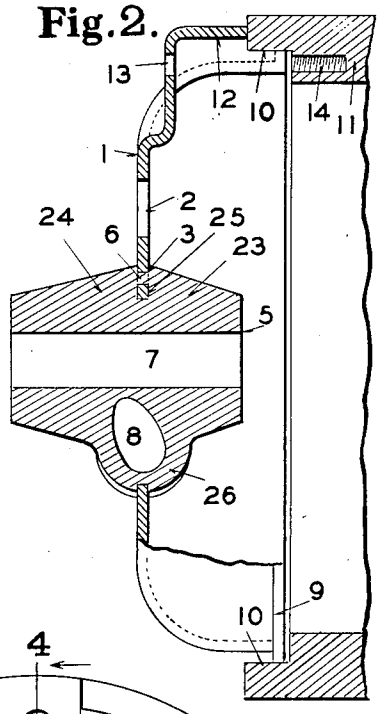


Fig. 3.

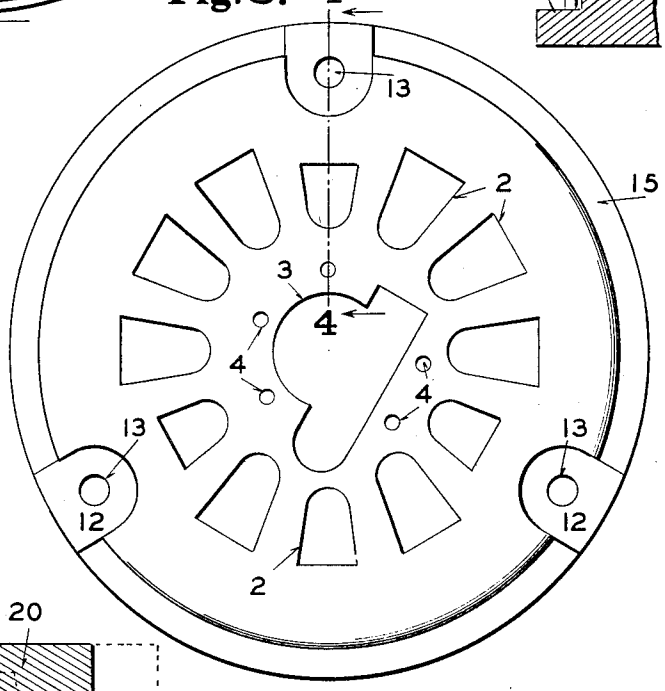


Fig. 4.

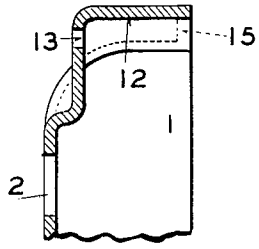
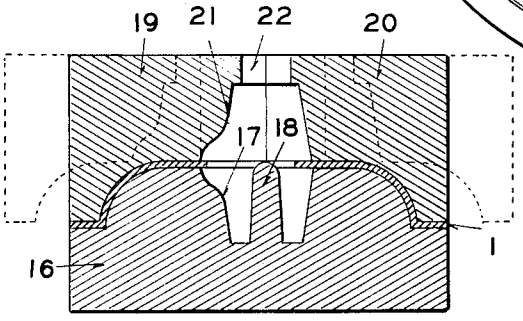


Fig. 5.



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UNITED STATES PATENT OFFICE

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MACHINE CASING ELEMENT AND METHOD OF MAKING SAME

Application filed May 28, 1931. Serial No. 540,623.

My invention relates to a machine casing element and the method of making same and more particularly to end plates for dynamo electric machines made from sheet steel and provided with an alloy bearing cast therein for supporting the shaft of the machine.

In one common type of end plate for dynamo electric machines the entire end plate and shaft bearing are cast as a unit. This type, however, has the disadvantage that it requires excessive machining and is not as strong as desired. It is also well known to make end plates from sheet metal and attach thereon cast bearings, but even in this type considerable machining is necessary to secure a neat and tight fitting connection, and the cast bearing is frequently broken during riveting it to the sheet metal.

Among the objects of my invention is to produce an end plate for a dynamo electric machine that is light in weight, strong and durable, and cheap and easy to manufacture. Another object is to devise a method of making an end plate that requires no machining to obtain a neat and smooth finish. Still another object is to provide a method of casting a bearing member into a sheet metal plate which results in a very strong and tight fitting joint that prevents any relative movement between the bearing and the sheet metal. A further and more specific object of my invention is to produce a drawn or roller sheet steel end plate having an alloy bearing cast therein and requiring a minimum amount of machining to complete and fit it to a dynamo electric machine.

Other objects will become apparent from the description of my invention taken in connection with the accompanying drawing in which Figure 1 is an end view of my completed end plate; Figure 2 is a view on the line 2—2 of Figure 1, showing the end plate attached to the central casing member of a dynamo-electric machine; Figure 3 is an end view of the end plate prior to casting the bearing therein; Figure 4 is a cross sectional view on the line 4—4 of Figure 3; and Figure 5 is a cross sectional view showing the end plate in the casting mold.

Referring to the drawing in detail, and especially to Figures 1 and 2, the reference numeral 1 indicates the main body of my sheet metal end plate which is cup-shaped in form and has a plurality of ventilating openings 2 in the bottom thereof. Approximately in the center of the end plate is a relatively large, irregular opening 3, as shown, which is surrounded by a plurality of smaller openings 4. An alloy bearing 5 is cast into the irregular opening 3 and around the portion of the plate adjacent the opening. The cast material also extends along each side of the sheet metal a sufficient distance to completely surround and fill the small openings 4, as indicated at 6 in Figure 2. A hole 7 is bored through the bearing 5 at its center to receive the bushing and the shaft of the motor (not shown). Also bored in the enlarged part of the cast bearing filling the irregular opening 3, is an oil reservoir 8 for lubricating the bushing. This oil reservoir is bored at an angle to a plane perpendicular to the axis of the hole 7 and is adapted to intersect the hole 7, with the opening of the reservoir on the outside and the bottom of the reservoir on the inside of the end plate 1.

The rim of the cup-shaped end plate is flanged outwardly, as indicated at 9, and is adapted to fit into a circumferential recess 10 in the end of the dynamo electric machine casing 11. Retaining ears 12 are pressed out of the side of the end plate and bent in such manner as to abut against the end of the casing 11. Holes 13 are provided in the ears 12 to receive screws for attaching the end plate to the casing 11, the screws entering threaded openings 14 in the casing.

Referring to Figures 3, 4 and 5, the method of making the completed end plate will now be described. The proper size of sheet steel is selected and pressed to a cup-shaped form and flanged outwardly at its rim, as indicated at 15. It is to be noted that this flanged rim is wider than the finished flange 9, the purpose of which will appear later. The ventilating openings 2, irregular bearing receiving opening 3, and small holes 4 are now punched in the bottom of the drawn

cup-shaped member as shown. The retaining ears 12 and the holes 13 therein are next formed from the sides and the flanged rim of the cup-shaped member. The end plate as shown in Figures 3 and 4 is now ready to be placed in the casting mold for the purpose of casting the bearing 5 therein. The mold consists of a base member 16 formed to receive thereon the drawn end plate. This base member has a recess 17 therein adjacent the center of the end plate and of sufficient size to surround the irregular opening 3 and the small holes 4. The sides of the recess 17 taper toward the bottom which has an extension 18 for the purpose of forming part of the finished bushing receiving hole 7 of the completed bearing. The upper part of the mold is formed of two parts 19 and 20 which are adapted to be placed adjacent the face of the end plate opposite the base member 16. The adjacent edges of the molds 19 and 20 are shaped to form a tapered recess 21 adjacent and surrounding the irregular opening 3 and small holes 4 of the end plate. An opening 22 is also formed by the adjacent edges of the molds 19 and 20 for the reception of the molten casting material. The assembly as shown in Figure 5 is now tightly clamped together.

Molten aluminum alloy is forced into the recesses 17 and 21 through the opening 22 which results in the irregular opening 3 and small holes 4 in the end plate 1 being completely filled and surrounded by the cast material. The molten aluminum alloy is next allowed to cool and the end plate and cast bearing removed by first separating the two molds 19 and 20, as indicated by dotted lines in Figure 5.

An aluminum alloy is used as a casting material because of its relatively large shrinkage upon solidification. The advantage of this is that as the main part of the casting material passing through the opening 3 of the end plate contracts, pressure is created by the parts 23 and 24 upon the portion 25 of the end plate that lies between them, thereby securely clamping the end plate to the bearing body. The casting material which completely fills the small holes 4 also increases the clamping action of the parts 23 and 24 and in addition assists the walls of the irregular opening surrounding the cast material in preventing relative turning movement between the bearing body and the end plate. It is also to be noted that the parts 23 and 24 of the cast material tightly embrace the sides of the portion of the end plate adjacent the opening 3 for a considerable distance from the edge of the opening which prevents any angular or wobbling movement between the plate and the bearing body.

The only necessary machining operations to complete the finished end plate is the boring of the hole 7 in the center of the cast body for the reception of the bushing, the boring of the lubricating reservoir 8 in the protuberance 26 formed in the irregular opening and the turning of the flange 15 concentric with the bushing receiving opening 7 and to a circumference 9 to fit the circumferential recess 10 in the end of the machine casing.

The extension 18 of the mold may be of such length as to produce a hole completely through the cast body if desired. It is also possible to cast the bushing directly into the body which would do away with the necessity of boring the hole 7 after the casting operation.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A method of making an end plate for a dynamo-electric machine which comprises forming a sheet metal member with an opening therethrough and casting a body of material into the opening and over both surfaces of the portion of the sheet metal member adjacent the opening, forming a shaft receiving opening through said cast material, and machining the circumference of the sheet metal member concentric with said last mentioned opening.

2. A method of making an end plate for a dynamo-electric machine which comprises forming a cup-shaped sheet metal member with a non-circular opening therethrough in its bottom and an outwardly extending flange on its rim, forming a plurality of spaced apart retaining elements from the sides of the cup-shaped member, casting a body of material in said opening, forming a shaft receiving opening through said cast material, and machining the circumference of the flange concentric with the last mentioned opening.

3. An end plate for a machine casing comprising a sheet metal member having a central non-circular opening therethrough, and a bearing body cast in said central opening and embracing the surfaces of the sheet metal member adjacent said opening.

4. An end plate for a machine casing comprising a sheet metal member having a central opening and a plurality of adjacent small openings therethrough, a bearing body cast in said central opening and embracing the surfaces of the sheet metal member adjacent said central and small openings, the cast material embracing the surfaces of the sheet metal member adjacent the small openings being integrally connected by cast material extending through the small openings, a shaft receiving opening extending through said bearing body and the central opening of the sheet metal member, and an oil reservoir formed in said bearing body and com-

municating with said shaft receiving opening.

5. The combination with a machine casing having a circumferential recess at one end, of an end plate therefor comprising a cup-shaped member having an outwardly extending circumferential flange adapted to fit into said recess, and a plurality of retaining elements integral with said cup-shaped member and adapted to abut the end of the machine casing adjacent said recess.

6. An end plate for a machine casing comprising a sheet metal member having an opening therethrough, a bearing body cast in said opening and embracing the surfaces of the sheet metal member adjacent said opening, said bearing body having a shaft receiving opening extending therethrough, and an oil reservoir formed in said bearing body and communicating with said shaft receiving opening.

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