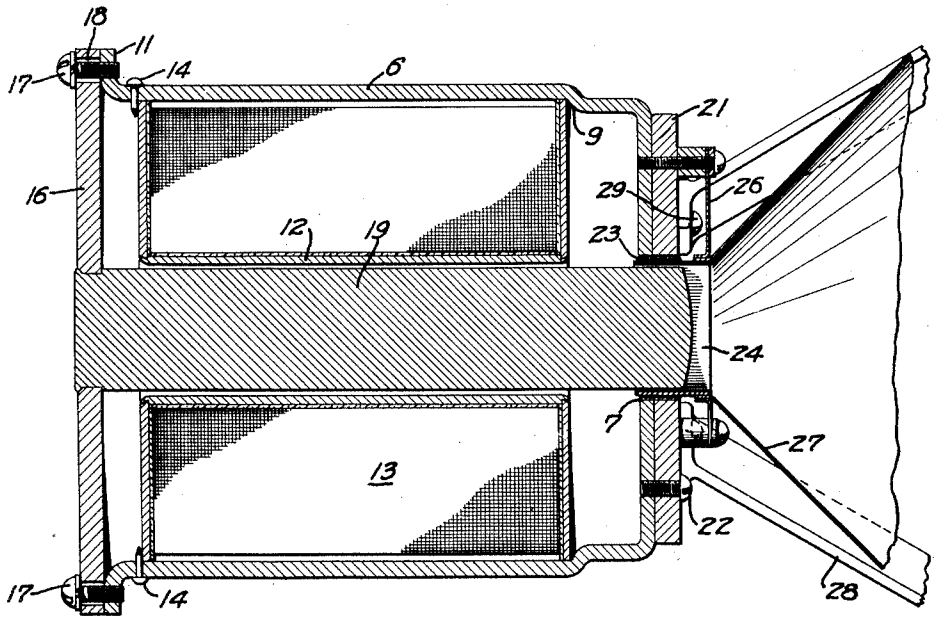
April 5, 1932. P. L. JENSEN 1,852,415

MAGNET

Filed May 31, 1928



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UNITED STATES PATENT OFFICE

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MAGNET

Application filed May 31, 1928. Serial No. 281,691.

My invention relates to electromagnets and particularly to so-called "iron clad" magnets such as are used in sound reproducers of the electrodynamic or moving coil type.

It is an object of my invention to provide a magnet which may be produced cheaply in quantity.

Another object of my invention is to provide a magnet having a minimum number of parts.

Still another object of my invention is to provide a magnet having an annular air gap of accurate size and configuration.

My invention possesses other objects and valuable features, some of which will be set forth in the following description of my invention which is illustrated in the drawings forming part of the specification. It is to be understood that I do not limit myself to the showing made by the said description and drawings, as I may adopt varying forms of my invention within the scope of the claims.

Recent advances in sound reproducers and amplifiers have demonstrated the great technical advantages of the moving coil or electrodynamic reproducer over other types. Commercially, however, such reproducers have suffered from their greater cost of manufacture, which has necessitated their being sold at double or more than double the price of other types. The major item of cost in these reproducers is the magnet, which is necessarily large and heavy, and which must be made with a high degree of accuracy. The present invention provides a magnet for this purpose requiring many fewer parts than necessary in past types, and as these parts may be formed in large part by punch press the labor costs are greatly reduced.

The single figure of the drawing is an axial sectional view of a magnet, embodying my invention, as applied to a sound reproducer.

Broadly stated, the magnet of my invention comprises a cup-shaped casing provided with an opening in the bottom. Within the casing is a winding surrounding a core which extends thru the opening in the bottom of the casing to form an annular air gap. The core is secured to a yoke which seats against the rim of the casing. The latter is preferably formed with a shoulder near the bottom against which the coil rests, and there are also preferably provided a flange on the rim of the casing against which the yoke seats, and an auxiliary plate on the bottom of the casing and having an opening in register with the casing opening. This provides an adequate cross section at all parts of the magnetic circuit and prevents areas of saturation. The reproducer mechanism is secured to the bottom of the casing.

In detail, a preferred form of my invention comprises a casing 6 which is preferably drawn from mild steel plate. The casing is cup-shaped, and is provided with an end wall formed integrally therewith and having a circular opening 7 formed centrally in said end wall. Near the end wall the casing is reduced in diameter to form a shoulder 9, and around the rim a flange 11 is provided.

Within the casing a bobbin or spool 12 rests against the shoulder, the spool carrying the magnet winding 13. Pins 14 pass thru the casing and engage the bobbin to hold it firmly against the shoulder.

A circular plate or yoke 16 rests against the rim of the casing and is secured to the flange by the screws 17 which are threaded into the flange, passing thru holes 18 in the yoke. These holes are sufficiently large to permit an adjustment of the position of the yoke on the flange. A core 19 is secured to the yoke, and, passing thru the winding, extends into the opening 7 to form an annular air gap.

An auxiliary plate 21 is secured to the integral end of the cup by the screws 22. This plate is also of magnetic material, such as mild steel. It increases the cross section where the cup has been thinned by the drawing process, and gives a deeper air gap and provides the necessary permeance for the lines of force converging from the circumference toward the gap. The plate is a relatively small and easily handled part, and it is, therefore, advantageous to secure the reproducer mechanism to it, the necessary machining operations being performed before it is attached to the casing. It is obvious that if desired the plate may be placed inside instead of outside of the casing, in which case the

reproducer mechanism would attach directly to the casing itself.

The moving element of the reproducer is the coil 23, mounted on the form 24 and positioned in the gap by the spider 26 so as to drive the conical diaphragm 27. The diaphragm is supported by a frame 28 which is secured to the plate 21 by the screws 29. The reproducer mechanism is in all essentials that described in my co-pending application, Serial No. 229,575, filed October 29, 1927, and need not be described here in further detail.

I claim:

1. An electromagnet comprising a cup-shaped casing provided with an end formed integrally therewith and having an opening in said integrally formed end, a yoke adjustably secured to the rim of said casing, a core fixed to said yoke and extending thru said opening to form an annular air gap, and a winding within said casing and surrounding said core.

2. An electromagnet comprising a cup-shaped casing of substantially uniform thickness having a portion of reduced diameter forming a shoulder therein, and a winding within said casing supported by said shoulder.

3. An electromagnet comprising a cup-shaped casing having an opening in the bottom thereof, a flange on the rim of said casing, a yoke adjustable on said flange, a core fixed to said yoke and extending thru said opening to form an annular air gap, and a winding within said casing and surrounding said core.

4. A sound reproducer comprising a cup-shaped casing provided with an end formed integrally therewith and having an opening therein, a winding in the casing, a core within the winding and extending thru the opening to form an annular air gap, a coil movably mounted in said air gap, a diaphragm driven by said coil, an auxiliary plate secured to the end of the casing and having an opening registering with the opening in said end, and means mounted on said plate for supporting the coil and diaphragm.

5. An electromagnet comprising a cup-shaped casing of substantially uniform thickness having a portion of reduced diameter forming a shoulder therein and provided with an end formed integrally therewith and having an opening therein, a yoke secured to the rim of the casing, a core fixed to said yoke and extending through said opening to form an annular air gap, and a winding within said casing around the core and seating upon said shoulder.

6. An electromagnet comprising a cup-shaped casing of substantially uniform thickness having a portion of reduced diameter forming a shoulder therein and provided with an end formed integrally therewith and having an opening therein, a yoke secured to the rim of the casing, a core fixed to said yoke and extending through said opening to form an annular air gap, a winding within said casing around the core and seating upon said shoulder, and an auxiliary plate secured to the end of the casing and having an opening registering with the opening in said end.

7. An electromagnet comprising a cup-shaped casing of substantially uniform thickness having a portion of reduced diameter forming a shoulder therein and provided with an end formed integrally therewith and having an opening therein, a yoke secured to the rim of the casing, a core fixed to said yoke and extending through said opening to form an annular air gap, a winding within said casing around the core and seating upon said shoulder, an auxiliary plate secured to the end of the casing and having an opening registering with the opening in said end, and means upon said plate for mounting a coil and diaphragm.

In testimony whereof, I have hereunto set my hand.

PETER L. JENSEN.