April 25, 1939. F. L. CREAGER 2,155,474

LOUDSPEAKER

Filed Nov. 30, 1934

Fig. 1.

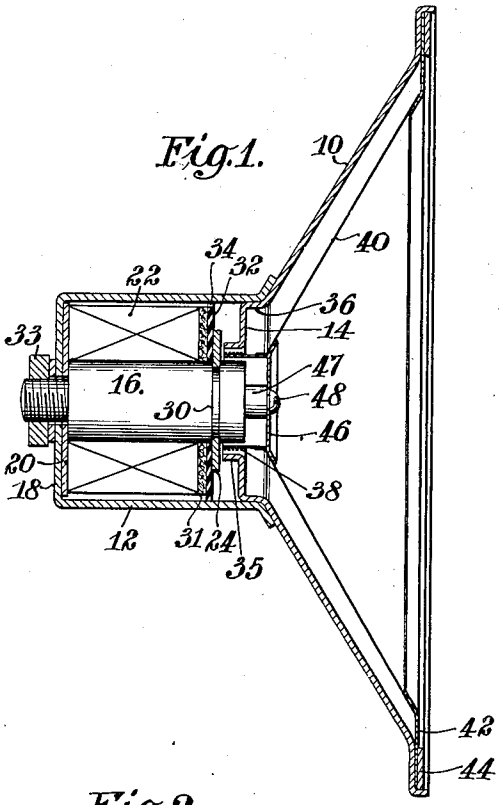


Fig. 4.

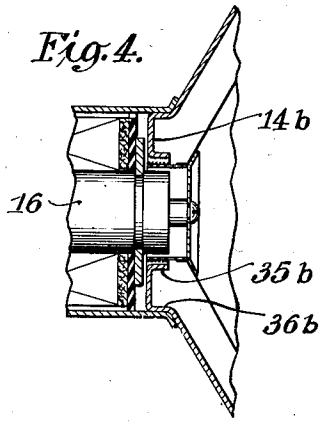


Fig. 5.

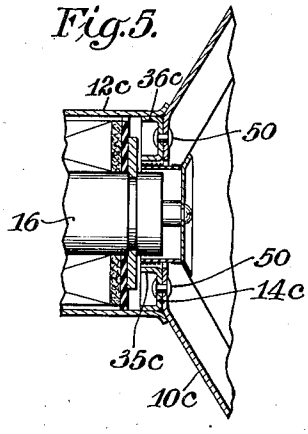


Fig. 2.

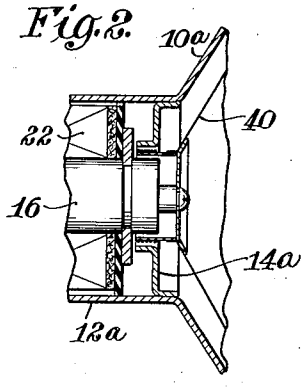


Fig. 7.

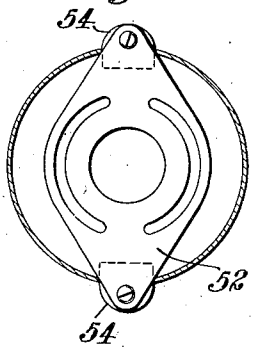


Fig. 6.

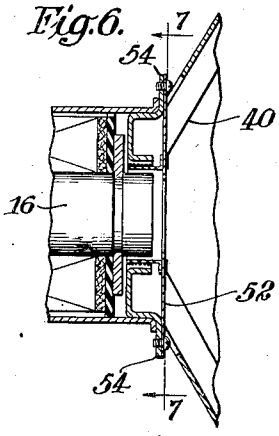
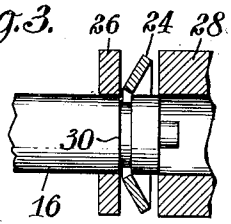


Fig. 3.



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UNITED STATES PATENT OFFICE

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LOUDSPEAKER

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Application November 30, 1934, Serial No. 755,408

3 Claims. (Cl. 179—115.5)

My invention relates to improvements in loudspeakers.

One of the objects of my invention is to provide an improved construction for loudspeakers which have a relatively small field coil and cone, and which are adaptable, particularly, for use in the so-called midget radio receivers.

Another object of my invention is to provide an improved construction for loudspeakers whereby it is feasible to make the cone housing, the yoke and the yoke plate from sheet metal and assemble these parts together at a relatively small cost.

Another object of my invention is to provide an improved construction for loudspeakers which has advantages over those proposed heretofore in the way of simplicity and cheapness of construction, and whose operating characteristics satisfy present-day requirements for reception.

Other objects and advantages will hereinafter appear.

In accordance with my invention, the cone housing, the yoke, and the yoke plate, constituting three parts of the loudspeaker, are formed from sheet metal. Two of these parts are formed integrally from a single sheet of ferrous material. The yoke plate has a press fit within the yoke, and is disposed at the juncture of the latter with the cone housing. The yoke plate is provided with a central opening into which the end of the core extends to provide an annular air gap, and is provided with an annular flange which extends around this end of the core to increase the magnetic path so that it embraces fully the range of movement of the voice coil.

My invention resides in the improved construction of the character hereinafter described and claimed.

For the purpose of illustrating my invention, an embodiment thereof is shown in the drawing, wherein

Figure 1 is a sectional view, taken in a plane through the longitudinal axis of a loudspeaker constructed in accordance with my invention;

Fig. 2 is a fragmentary sectional view similar to Fig. 1, showing a modification;

Fig. 3 is a fragmentary sectional view, showing one of the details of construction;

Figs. 4 and 5 are views similar to Fig. 2, showing other modifications;

Fig. 6 is a fragmentary view similar to Fig. 4, showing another modification; and

Fig. 7 is a sectional view, the section being taken on the line 7—7 in Fig. 6

In Fig. 1, the reference numerals 10, 12 and 14 designate three parts of the loudspeaker, these being, respectively, the cone housing, the yoke, and the yoke plate.

The yoke is provided with a core 16 extending outwardly from the base 18 of the yoke. In assembling the parts, it is proposed to interpose a flux plate, in the for mof a washer 20 of permeable material, between the base portion of the yoke and the coil 22, if it is desired that the thickness of material in this region be greater than that of the yoke.

Prior to assembly on the yoke, the core 16 is provided with a shading coil in the form of a copper washer 24. This washer is originally conical, as shown in Fig. 3, and is flattened out between two members 26 and 28 which are moved together for this purpose, whereby the inner edge of the washer is caused to fit within an annular groove 30 in the core, as shown in Fig. 1.

A felt washer 31 and a fiber washer 32, each having a snug fit on the core 16, are disposed on the latter with the coil 22, as shown. The threaded end of the core extends through the base portion 18 of the yoke and receives a nut 33 which holds the various parts together. The felt washer 31 is compressed slightly between the fiber washer 32 and the coil, and operates to prevent movement of the latter on the core 16. The fiber washer has a snug or press fit within the yoke 12, and serves to center the core 16 in the latter. This washer may be provided with a notch 34 in its edge for the admission of sealing material into the yoke to completely encase and protect the coil. The terminals of the coil may be led out through the wall of the yoke, as will be well understood.

The yoke plate 14 is shown provided at its inner and outer edges with annular flanges 35 and 36, respectively, these extending in opposite directions. The yoke plate has a press fit within the yoke 12 adjacent the juncture of the yoke and the cone housing 10.

The end of the core 16 extends into the central opening with which the yoke plate is provided, to form an annular air gap in which the voice coil 38 moves. The voice coil is fixed on the smaller end of a cone 40 which is supported at its base by a flexible piece 42 clamped between a ring 44 and the outer edge of the cone housing 10. The cone is supported at its smaller end by a yieldable piece 46 fixed to the core extension 47 by a screw 48.

The inner annular flange 35 with which the yoke plate is provided serves the important purpose of extending the magnetic path in the region of motion of the voice coil.

In Fig. 1, the cone housing and the yoke plate are shown formed from a single sheet of ferrous material. The yoke **12** is of heavier gauge than the cone housing and the yoke plate, and is in the form of a cup, drawn from a sheet of ferrous material.

If it is convenient or desirable to make the yoke of the same gauge material as the cone housing, it is proposed to form these two parts integrally, from a single sheet of ferrous material. This construction is shown in Fig. 2, where the reference characters **10***a*, **12***a* and **14***a* designate, respectively, the cone housing, the yoke, and the yoke plate. The yoke plate, as before, has a press fit within the yoke, being disposed at the juncture of the latter with the cone housing. The construction in Fig. 2, otherwise, is the same as that of Fig. 1.

In Fig. 4, the yoke plate **14***b* is provided with the flanges **35***b* and **36***b* corresponding, respectively, to the flanges **35** and **36** in Fig. 1. These flanges, in Fig. 4, extend in the same direction, the flange **35***b* operating to increase the magnetic path in which the voice coil moves. The construction, otherwise, is the same as in Fig. 1.

In Fig. 5, the yoke plate **14***c* is U-shape in cross section, to provide the inner flange **35***c* and the outer flange **36***c* extending in the same direction, toward the base portion of the yoke **12***c*. The yoke plate and the cone housing **10***c* in this construction are made separately from sheets of ferrous material, and are secured together by rivets **50**. The inner flange **35***c* of the yoke plate serves to extend the magnetic path for the voice coil, in the same manner as the corresponding flanges in Figs. 1, 2 and 4. The construction, otherwise, is the same as in Fig. 1.

In the modification shown in Figs. 6 and 7, the yieldable piece **46** and the core extension **47** in Fig. 1 are omitted, and, in lieu thereof, the cone **40** is supported at its smaller end by a yieldable piece **52** extending across the cone housing and having its ends fixed to portions **54** stuck out from the latter. This modified construction may also be embodied in the modifications shown in Figs. 2, 4 and 5.

It will be understood that various modifications, other than those shown, are possible without departing from the spirit of my invention or the scope of the claims.

I clam as my invention:

1. A loudspeaker comprising a yoke part formed from a single sheet of ferrous material, a cone-housing part and a yoke-plate part formed integrally from a single sheet of ferrous material, said yoke-plate part frictionally fitting within said yoke part adjacent the juncture thereof with said cone-housing part, said friction fit constituting the sole means of uniting said yoke-plate part with said yoke part.

2. A loudspeaker comprising a cone housing, a yoke provided with a core, and a yoke plate formed from a single sheet of ferrous material and associated with said cone housing and said yoke, said yoke plate being provided with flanges at its inner and outer edges and directed respectively in opposite directions, the flange at the outer edge of said yoke plate fitting within said yoke adjacent the juncture of the latter with said cone housing, and the flange at the inner edge of said yoke plate extending around said core at the end of the latter.

3. A loudspeaker comprising a cone-housing part, a yoke part provided with a core, and a yoke-plate part associated with said cone-housing part and said yoke part, two of said three parts being formed integrally from a single sheet of ferrous material, the third one of said three parts being formed from a single sheet of ferrous material, said yoke-plate part being provided with flanges at its inner and outer edges, the flange at the outer edge of said yoke-plate part fitting within said yoke part adjacent the juncture of the latter with said cone-housing part, and the flange at the inner edge of said yoke-plate part extending around said core at the end of the latter.

FREDERICK L. CREAGER.