Jan. 9, 1940. L. B. CORNWELL 2,186,576

REPRODUCER

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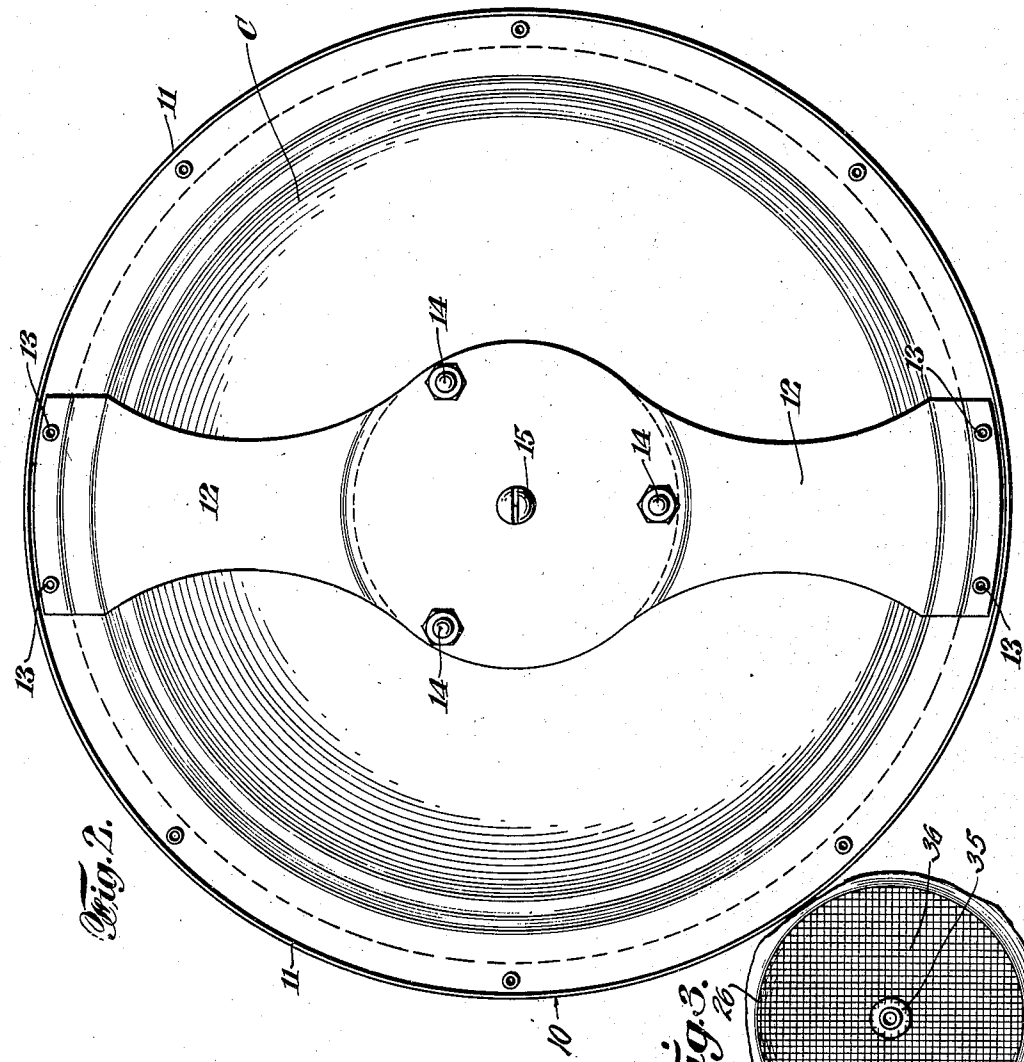


Fig. 2.

Fig. 3.

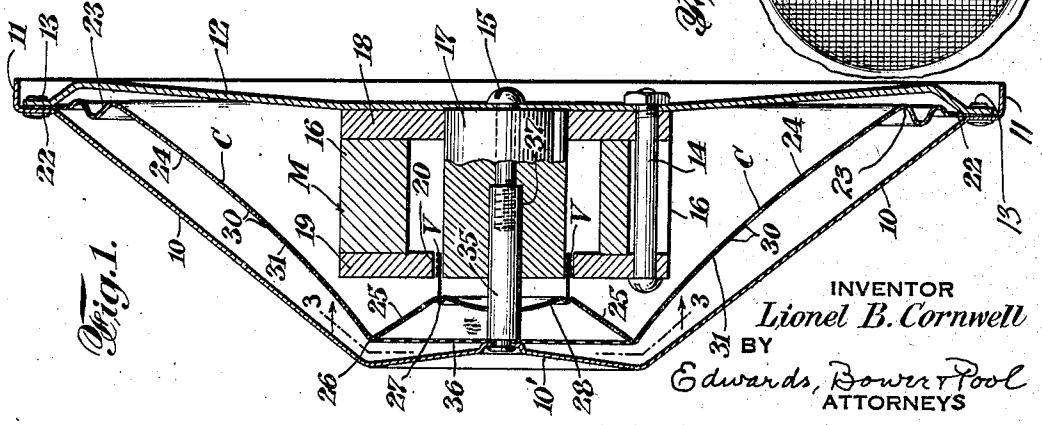


Fig. 1.

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2 Claims. (Cl. 179—115.5)

This invention relates to sound reproducers, and particularly those of the loud speaker type.

The object of the invention is to provide a speaker which is simple in structure and durable in use, and which will maintain close adjustment and accurate alinement of the relatively movable parts.

Further objects of the invention, particularly in the relative supporting structure and guidance of the parts will appear from the following description taken in connection with the accompanying drawing in which

Fig. 1 is a vertical sectional view of a loud speaker embodying the invention,

Fig. 2 is a face view of the speaker shown in Fig. 1, and

Fig. 3 is a plan view of the centering net structure of the diaphragm shown in Fig. 1.

Referring to Figs. 1 and 2, a rear spider or chassis 10 carries at its periphery the annular flange ring 11 supporting the front bridge piece 12 by rivets 13. A magnet structure M is fastened to the bridge 12 by bolts 14 and screw 15, the permanent magnet structure comprising magnet 16, core 17 and pole pieces 18, 19 with a narrow annular air gap 20 for the voice coil V of the reproducing diaphragm or cone C.

The diaphragm C is preferably formed of a continuous sheet of fibrous material of double conical formation and at its periphery is shaped to provide the radial flange 22 cemented to the flange ring 11 and with the corrugations 23 just within this peripheral portion. The outer cone 24 and the inner cone 25 of the diaphragm are oppositely directed and meet in the ridge 26, and the inner edge of the inner cone is formed with an annular V groove 27 and then carried inward in a dome formation 28 with a center opening providing clearance around post 35. The voice coil cylinder 29, preferably of mica, is seated and cemented in the groove 27 and at its other end carries the voice coil V.

The channeled formation provided by the joining of the opposite cones 24, 25 greatly contributes to the rigidity of the central portion of the diaphragm and the resulting crest 26 also serves as a connecting ring for the centering supporting means precisely alining the voice coil V in the air gap. This centering means stretches across from a center post or pin 35 to the ridge 26 and may be a stamped out unit of sheet material or composed of radial strands, or preferably is of open net formation 36 (Fig. 3) in circular formation having its periphery cemented to the ridge 26 and its center fastened securely to the post 35. The net 36 will have its strands interlocked at the intersections and will preferably be impregnated with a hardening compound imparting rigidity while maintaining lightness. The post 35 is in form of a dowel riveted to the chassis 10 at the center thereof and snugly fitting in the bore 37 of core 17. Care is taken to have this bore concentric with the air gap G and to have the voice coil V concentric with the dowel 35, the combination insuring accurate alinement of the voice coil in the air gap. As shown in Fig. 1 the screw 15 of the magnet assembly threads into the end of the dowel 35 and draws it tightly against the shoulder at the inner end of bore 37. The front bridge and housing are thus joined tightly at the periphery and at the center, giving double support of each and cooperating to maintain precise relative spacing. The diaphragm C is also supported both at its periphery and by the centering net 36, and is free for axial vibration while held securely against radial shifting.

The chassis 10 (Fig. 1) is of the spider type with open spaces between the periphery and center and the sound from diaphragm C is projected both frontward (toward the right Fig. 1) and rearward (toward the left Fig. 1). The structural combination of Figs. 1 and 2 gives a very compact loud speaker. The re-entrant diaphragm C accommodates location of the voice coil V and its magnet M inside of the conical formation, making the overall depth very slight as compared to conventional speakers. The conical housing 10 of drawn metal, preferably steel, constitutes a protecting rigidifying cover for the diaphragm and serves as a rigid attachment around the periphery as well as an anchorage for the bridge strap 12. At the concave center disk 10' the construction provides a stiff hold for the riveted connection and the brass dowel pin 35 riveted to the housing 10 holds the centering net 36 firmly in place. This centering net is a flat disk of flexible material full of holes allowing the high frequency vibrations to pass through it, and at the same time permitting ample axial travel for the production of low notes while maintaining the voice coil V in perfect alinement in the air gap between the magnet poles.

Another advantage of the structure shown in Fig. 1 is the separation between the magnet M and the steel housing 10. This is important because the lines of flux of the magnet will tend to leak into any paths of magnetic material too close or in contact with it with a consequent tendency to reduce the flux density in the air gap. The dowel 35 and bridge piece 12 are of

brass or other nonmagnetic material and with the spacing of the steel housing 10 as shown the flux density of the air gap is preserved.

I claim:

1. In a loud speaker construction the combination with a frame member having an annular periphery, of a cooperating bridge member extending across from one side to the other of said periphery, axial means connecting said bridge to said frame at the center, a magnet unit supported by said bridge and a diaphragm connected to the frame periphery and carrying a voice coil cooperating with said magnet unit, said diaphragm being apertured to fit said axial means.

2. In a loud speaker construction the combination with a frame member having an annular periphery, of a cooperating bridge member extending across from one side to the other of said periphery, axial means connecting said bridge to said frame at the center, a magnet unit supported by said bridge, a diaphragm connected to the frame periphery and carrying a voice coil cooperating with said magnet unit, said diaphragm being apertured to fit said axial means, and a centering net carried by said central axial connection and having its periphery attached to said diaphragm.

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