Dec. 19, 1933. R. J. ROCKWELL 1,939,922

CENTERING DEVICE FOR LOUD SPEAKER CONES

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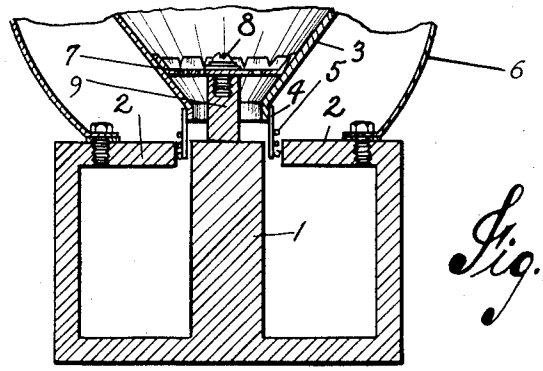


Fig. 1.

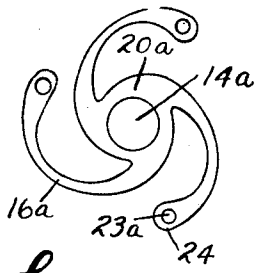


Fig. 5.

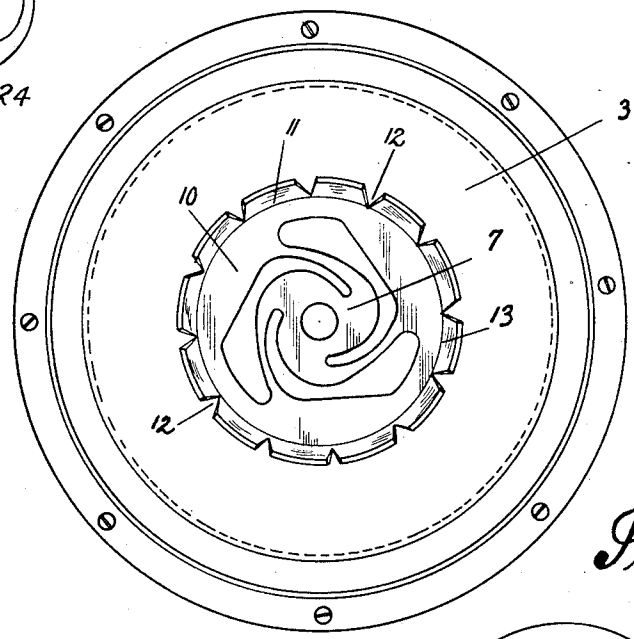


Fig. 2.

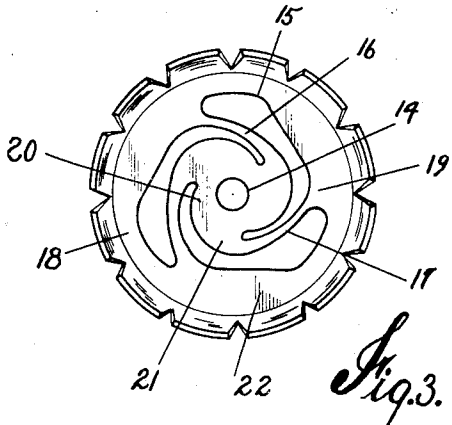


Fig. 3.

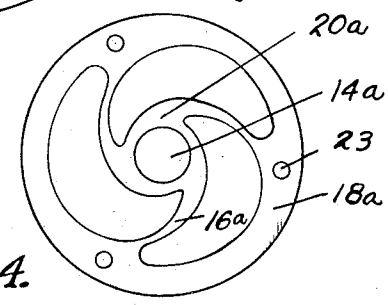


Fig. 4.

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CENTERING DEVICE FOR LOUD SPEAKER CONES

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2 Claims. (Cl. 179—115.5)

My invention relates to means for centering and mounting the vibratile member, such as a cone, in a loud speaker. Such devices are used primarily in the moving coil type of speaker. Here, where the apex of the cone is not held by a centered drive rod or the like, and where it is necessary accurately to center the cone so as to position the coil in the air gap between the pole pieces of the field assembly, it has been the practice to provide a mounting device in the shape of a disc with a peripheral flange of conical form. The flange is attached to the cone of a speaker so as to position the disc tranversely to the axis of the cone and interspaced from the actual or effective apex thereof. The center of the disc is then fastened to some suitable support. In other types of mounting the disc may be external of the cone and the cone fastened within or to the center of the disc. The edge of the disc will then be mounted upon a suitable support. The cone can then vibrate with reference to this support, but only upon the flexing of the disc. The disc has hitherto been made of a suitable resilient material, of which there are many, thin fiber or ticket board being effective. It has likewise been the practice to increase the ability of the disc to flex by cutting out portions of it so that relatively narrow portions actually act as the support. Thus slots of circular shape have been cut in the disc without being complete peripherally, thus leaving radially disposed portions of the disc as supporting members. Where more than one series of circular slots have been employed, the radial supporting portions have usually been staggered. Such constructions, while serviceable, have yet left something to be desired, because they are able to flex only in relatively short portions, which become tensioned as they flex.

The primary object of my invention is to provide a supporting means for cones which, while being no more expensive than the means hitherto employed, has a much greater effective flexibility before failure.

These and other objects of my invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading this specification, I accomplish by that certain construction and arrangement of parts of which I shall now describe a preferred embodiment, reference being had to the drawing which forms a part of this specification, in which

Figure 1 is a sectional view of part of a loud speaker motor showing the use of my supporting device.

Figure 2 is a plan view of the cone of a speaker, showing my supporting device in position thereon.

Figure 3 is a plan view of my supporting device itself.

Figure 4 is a plan view of the supporting disc of larger dimensions intended to be used externally of the cone.

Figure 5 is another type of external supporting member having however, no external rim.

Essentially, in my invention I gain the results described by employing a modified cantilever form of supporting arms in my disc in which the arms taper from the ends toward the middle, which is the narrowest part of said arms. I form these arms by providing cut outs of the proper size and shape, as will hereinafter be described, and in my novel supporting structure the shape and character of my cut outs enable me to produce a structure which is not only more flexible with respect to vibrations, but is lighter than has been possible heretofore.

In my construction, the supporting arms essentially taper from either end toward the center, which is the narrowest part. For reasons which are noted in these specifications, I employ such a shape generally in my device, because I have found that the best results are obtained thereby.

I have shown in Figure 1, the field structure of a loud speaker, which structure has a central pole piece 1. Adjacent field core pole pieces 2 are interspaced from the piece 1 so as to form an air gap in which the moving coil is located, as will be readily understood. I have indicated at 3, a cone for sound reproduction, the smaller end of which is fitted with a cylindrical member 4, upon which is a winding 5 forming a voice coil. The outer end of the cone may be supported by members attached to a cup-shaped structure 6 in any commercial fashion. The supporting of the outer edge of the cone forms no part of my present invention. I have shown, however, a supporting structure 7 attached to the cone by a suitable flange, and also attached, as by a bolt 8, to an extension 9 of the pole piece 1, whereby the smaller or apex end of the cone is supported for vibratile movement, and the voice coil is accurately positioned within the air gap between the pole pieces of the field core. As shown in Figure 2, a supporting structure 7 may have a flat or disc-shaped portion, which I have indicated generally at 10, and a flange 11 which

is turned up about the periphery thereof so as to assume an angular shape such as will facilitate its attachment to the cone 3. Notches 12 are made at intervals about the flanged portion to permit its being struck up into conical shape, and the line of demarcation between the disc portion 10 and the flange portion 11 is quite sharp and is indicated by the circular line 13. The supporting structure is formed by first cutting a piece of suitable material, as will hereinafter be described, and then placing it in a die, whereby the flange portion is shaped.

A perforation 14 is provided centrally of my supporting structure for the passage of the bolt 8, and about this perforation I form a series of non-radial slots or cut out portions 15. These cut out portions are so arranged and proportioned as to leave supporting arms 16 of the material, which also are disposed non-radially, and which therefore can be made considerably longer than radial arms. I have shown three arms, but it will be understood that my invention is not limited to the precise number of arms shown or employed. The number may be increased or decreased with entire satisfaction. I have found, however, that three arms is a number which works out with entire satisfaction in the supporting structure shown. The arms have a central portion 17 which is relatively narrow. The cut outs are so placed that a rim 18 of the disc is left. The arms join this rim in widened portions 19. About the perforation 14 there is a portion 20 of the disc which may be referred to as a hub. The arms join this disc also in a widened portion 21. The outer rim 18 may be made wider in the portions between the arm attachment portions, as is shown at 22. The purpose of this is to stiffen the rim portions at these places.

In Figure 4, the central hub portion 20*a* has a perforation 14*a* therein of sufficient size to receive and be secured to the outer portion of the cone, usually near the apex thereof. The arms 16*a* are again of a shape in which the arms taper from the ends toward the middle which is the narrowest part of said arms but there is an external rim 18*a* provided with perforations 23, for the reception of bolts or screws in mounting my supporting structure.

The structure of Figure 5 is essentially the same as that of Figure 4, excepting that the external or outer rim 18*a* has been omitted. The arms terminate in somewhat enlarged portions 24 having perforations 23*a* for mounting purposes. By the shape of the arms, as I have described it, I achieve an increase in the available movement for a given length of arm of given thickness before the point of failure of the material is reached. The reason for this lies in the fact that an arm or spring of this design will bend more uniformly throughout its length. My design has an additional advantage in that it provides space for the insertion of shims for positioning the armature coil in the air gap.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A centering device for loud speaking cones comprising a relatively thin sheet-like structure forming a central apertured hub and outer cone-attaching means, and arms directed spirally from said hub to said means, integral with said hub and said means, said arms gradually decreasing in width outwardly from the hub along substantially half their spiral extent, and then gradually increasing in width toward the cone-attaching means for the remainder of their spiral extent, the spiral direction of the arms affording a maximum of leverage thereon by the relative movement of the hub and cone-attaching means, and the gradual narrowing toward their midlengths from each end of each arm affording a maximum of flexibility consistent with a required factor of safety in the strength of their material, for the purposes set forth.

2. A centering device for loud speaker cones comprising a relatively thin sheet-like structure forming a central apertured hub and outer cone-attaching means in the form of a rim, and arms directed spirally from said hub to said rim, integral with said hub and rim, said arms gradually decreasing in width outwardly from the hub along substantially half their spiral extent, and then gradually increasing in width toward the rim for the remainder of their spiral extent, the spiral direction of the arms affording a maximum of leverage thereon by the relative movement of the hub and rim, and the gradual narrowing toward their midlengths from each end of each arm affording a maximum of flexibility consistent with a required factor of safety in the strength of their material for the purposes set forth.

RONALD J. ROCKWELL.