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LOUD SPEAKER

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Fig. 3.

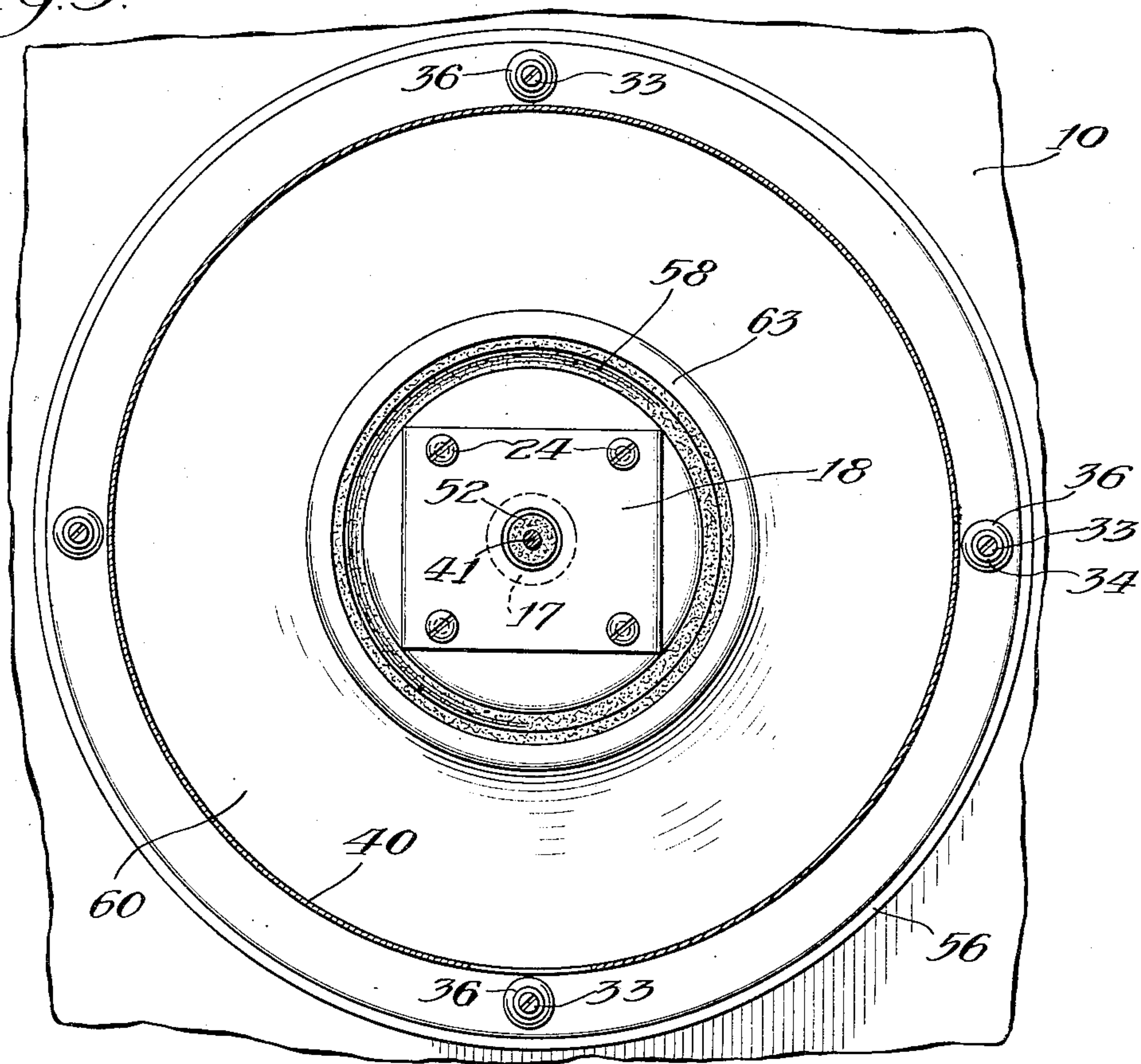
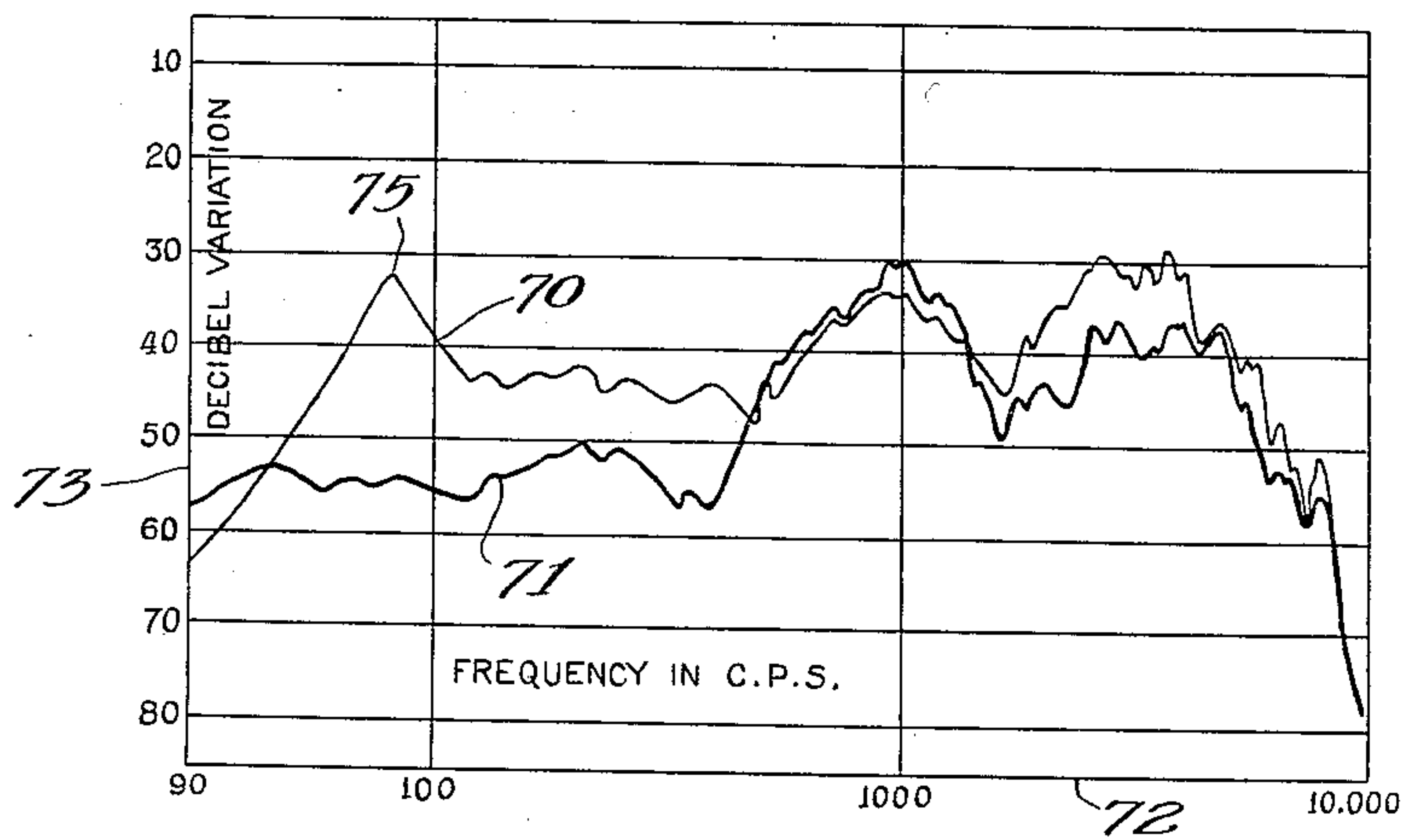


Fig. 4.



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LOUD SPEAKER

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5 Claims. (Cl. 181—31)

The invention relates to loud speakers and has among its other objects the provision of a loud speaker which has improved means whereby it may be adjusted with fidelity or to emphasize the desired range of tones.

Another object of the invention is to provide a loud speaker having improved means whereby it may be adjusted in relation to the acoustics of a room so that it reproduces sound in a desired manner.

Still another object of the invention is to provide improved means whereby a loud speaker may be quickly and easily adjusted to reproduce sound in a desired manner.

Other objects and advantages will become apparent as the following detailed description progresses, reference being had to the accompanying drawings, wherein—

Fig. 1 is a longitudinal section taken through a loud speaker which embodies the invention.

Fig. 2 is an enlarged fragmentary section taken on the same line as Fig. 1.

Fig. 3 is a section taken on line 3—3 of Fig. 1, and

Fig. 4 is a diagram illustrating the manner in which the improved loud speaker operates when it is adjusted to operate in two different ways.

Referring for the present to Figs. 1 to 3, inclusive, wherein a preferred embodiment of the invention is illustrated, the reference character 10 designates the front wall of a cabinet of the type commonly employed to house radio receivers. It will be readily understood that the wall 10 functions as a baffle. A loud speaker designated generally by the reference character 11 is in registry with an opening 12 provided in the wall 10. The loud speaker 11 comprises a diaphragm or cone 13 formed of any suitable substance such as paper or fabric. Secured to the cone 13 at the smaller end thereof is a sleeve 15 which carries the voice coil 16. The sleeve 15 and the voice coil 16 reciprocate longitudinally of the loud speaker and longitudinally with respect to a central pole piece 17 which is secured at its rear end to a U-shaped member 18 forming part of an electro-magnet. The winding of the electromagnet is not shown. Secured to the U-shaped member 18 is an outer pole piece or plate 20 which co-operates with the central pole piece 17 to form the annular magnetic gap in which the voice coil 16 reciprocates. The member 18 and the outer pole piece 20 are secured to each other and to a metallic basket 22 by a plurality of bolts 24, the basket 22 being provided with the usual apertures 25 so as to reduce the

amount it will damp the action of the cone 13.

The basket 22 terminates at its periphery in an annular flange 26, the construction being such that an annular shoulder 27 is formed against which the periphery of the cone 13 abuts. Interposed between the periphery or marginal portion of the cone 13 and the inner surface of the wall 10 are a plurality of cardboard rings 28, or the equivalent, which are glued to each other and to the periphery of the cone. The cone 13, the basket 22 and the cardboard rings 28 are secured to the wall 10 by means comprising a plurality of screws 30 and a plurality of posts 32 which are screw-threaded upon shanks of the screws 30 (Fig. 2). It will be noted that the screws 30 co-operate with the posts 32 to clamp the cardboard rings 28 and the marginal portions of the cone 13 and the basket 22 between the posts and the wall 10. The inner ends of the posts 32 have screws 33 screw-threaded therein. The screws 33 secure washers 34 to the inner ends of the posts 32.

Slidably journaled upon the posts 32 are grommets 36 which are preferably formed from rubber and are provided with annular grooves 37 whereby they are secured to a housing member or shell 40. It will be noted that when the shell 40 is in the position wherein it is shown in full lines in Fig. 1, it provides a relatively large chamber in back of the basket 22 and it will also be noted that the back end of the shell 40 is spaced a relatively large distance from the magnet structure which comprises the central and outer poles 17 and 20, respectively, and the member 18. Secured to the back wall of the shell 40 is a rod or plunger 41, the plunger 41 being provided with a knob 42 in back of the shell 40 and being provided with a knob 43 within the cone 13 so that it is accessible through the hole 12 provided in the wall 10. The back wall of the shell 40 is clamped between the knob 42 and a washer 44, a nut 45 screw-threaded upon the plunger being provided to secure these parts together. The knob 43 is screw-threaded upon the plunger.

The plunger 41 projects through a bore 50 extending longitudinally and centrally through the central or inner core 17, the bore being lined with felt 52 so that the metallic plunger 41 will not contact the metal of the inner core 17 and thereby affect the reproducing characteristics of the loud speaker.

It will be readily understood that one may grasp the knob 42 and draw the shell 40 and the plunger 41 into positions wherein they are shown in dotted lines in Fig. 1. Such displacement of

the shell 40 and the plunger 41 is permitted by the grommets 36 which slide upon the posts 32.

The marginal portions at the forward end of the shell 40 preferably comprise a cylindrical internal flange 55 and an outwardly extending annular flange 56. When the shell 40 is in the position wherein it is shown in dotted lines in Fig. 1, the cylindrical flange 55 encircles the flange 26 of the basket member 22.

Glued or otherwise secured to the smaller end of the basket 22, is a felt ring 58. A damping member 60 which is preferably formed from cardboard and is preferably in the shape of a truncated cone, has its base portion secured to the forward end of the shell 40 by glue or other suitable means. The inner or smaller end of the damping member 60 terminates in a bead 63 so that the inner edge of the damping member 60 may engage the felt ring 58 yieldingly.

When the shell 40 is displaced from the position wherein it is shown in Fig. 1 to the position wherein it is shown in dotted lines in the same figure, or to any intermediate position, the damping member 60 is adjusted into a corresponding position as indicated by dotted lines in Fig. 1. Of course, such adjustment may be made by pulling or pushing, as the case may be, on the knob 42 or the knob 43.

When the damping member 60 is in the position wherein it is shown in full lines in Fig. 1, it exercises the maximum of damping effect upon the cone 13 and when the damping member is in the position wherein it is shown in dotted lines in Fig. 1, it exercises the minimum of damping effect upon the cone 13. Obviously, the damping member may be moved to an intermediate position, if desired, to obtain a desired damping effect upon the cone 13.

In Fig. 4 a diagram is shown comprising two graphs 70 and 71. Frequencies in cycles per second are plotted along the base line 72 of the diagram. The decibel variation in intensity of vibration or sound is plotted along the vertical line 73. The graph 70 indicates the action of the loud speaker 11 when the shell 40 and the damping member 60 are displaced into the positions wherein they are shown in dotted lines in Fig. 1, it being understood that when the damping member 60 is in the position wherein it is shown in dotted lines in Fig. 1, it has a minimum of damping effect upon the cone 13. The graph 71 represents the action of the loud speaker or cone when the shell 40 and the damping member 60 are in the positions wherein they are shown in full lines in Fig. 1.

It will be noted that when the damping member is displaced toward the cone 13, the intensity of the vibrations of the cone 13 at low frequencies is diminished while the intensity of the vibrations of the cone 13 is increased in the higher frequencies. Of course, when the damping member 60 is displaced into positions intermediate the full and dotted line positions of Fig. 1, the action of the cone 13 may be represented by graphs which will lie mainly between the graphs 70 and 71. In other words, the closer the damping member 60 is brought to the cone 13, the more the low frequencies will be damped and the more the intensity of the high frequencies will be increased.

It will be noted that in graph 70 there is a peak 75 in the lower frequencies. This peak corresponds to the natural mechanical period of the moving system of the loud speaker. When

the damping member 60 is displaced toward the cone 13 the peak 75 is diminished more and more. It will be noted that the peak 75 has disappeared entirely in the graph 71.

It may be mentioned that the energy which is taken from the lower frequencies is returned substantially entirely to the higher frequencies. It may be said that the energy represented between the graphs 71 and 75 at the lower frequencies is substantially equal to the energy represented between these graphs at the higher frequencies.

While certain embodiments of the invention have been shown and described, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims in which it is the intention to claim all novelty inherent in the invention as broadly as possible in view of the prior art.

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

1. A loud speaker comprising an apertured baffle, a diaphragm mounted on said baffle in registry with the aperture therein, means for actuating said diaphragm, a housing member providing a chamber in back of said diaphragm, means mounted on said baffle for adjustably mounting said housing member thereon and means disposed in said housing member and movable therewith for damping the diaphragm.

2. A loud speaker comprising an apertured baffle, a diaphragm mounted on said baffle in registry with the aperture therein, means for actuating said diaphragm, a housing member providing a chamber in back of said diaphragm, means mounted on said baffle for adjustably mounting said housing member thereon, and an apertured member disposed in said housing member and movable therewith for damping the diaphragm.

3. A loud speaker comprising an apertured baffle, a diaphragm mounted on said baffle in registry with the aperture therein, means for actuating said diaphragm, a housing member providing a chamber in back of said diaphragm, means mounted on said baffle for adjustably mounting said housing member thereon, and a damping member extending transversely of said housing and having a central aperture in registry with the central portion of said diaphragm, said damping member being movable with said housing to control the sound reproduction of said diaphragm.

4. Means for damping a substantially conical diaphragm, said means comprising a housing member disposed in back of said diaphragm, means adjustably mounting said housing member, and a frustro-conical member disposed in said housing and movable therewith for controlling the sound reproduction of the diaphragm.

5. Means for damping a substantially conical diaphragm, said means comprising a housing disposed in back of said diaphragm, means adjustably mounting said housing, and a frustro-conical member disposed in said housing and movable therewith for controlling the sound reproduction of the diaphragm, the axes of said conical diaphragm and said frustro-conical member being coincident and said frustro-conical member having a central opening.

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