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F. A. KOLSTER ET AL

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LOUD SPEAKER

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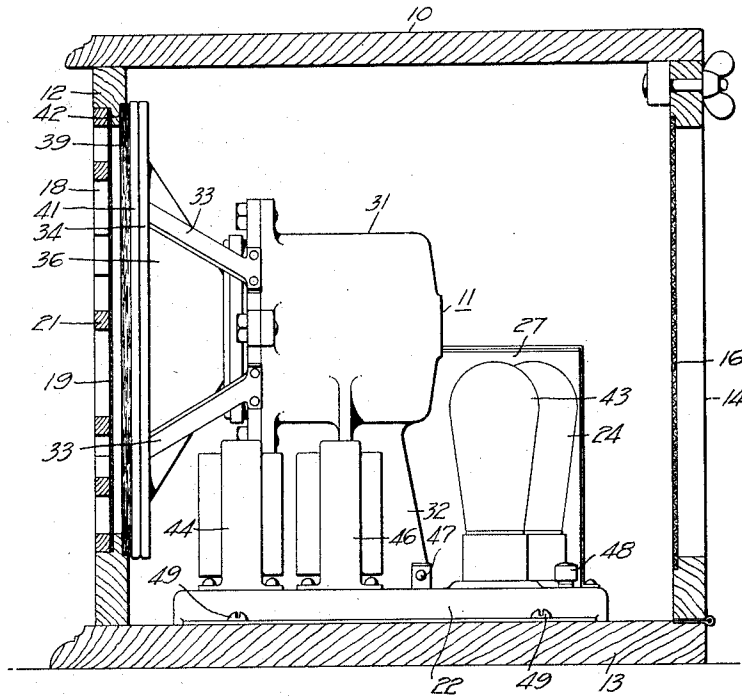
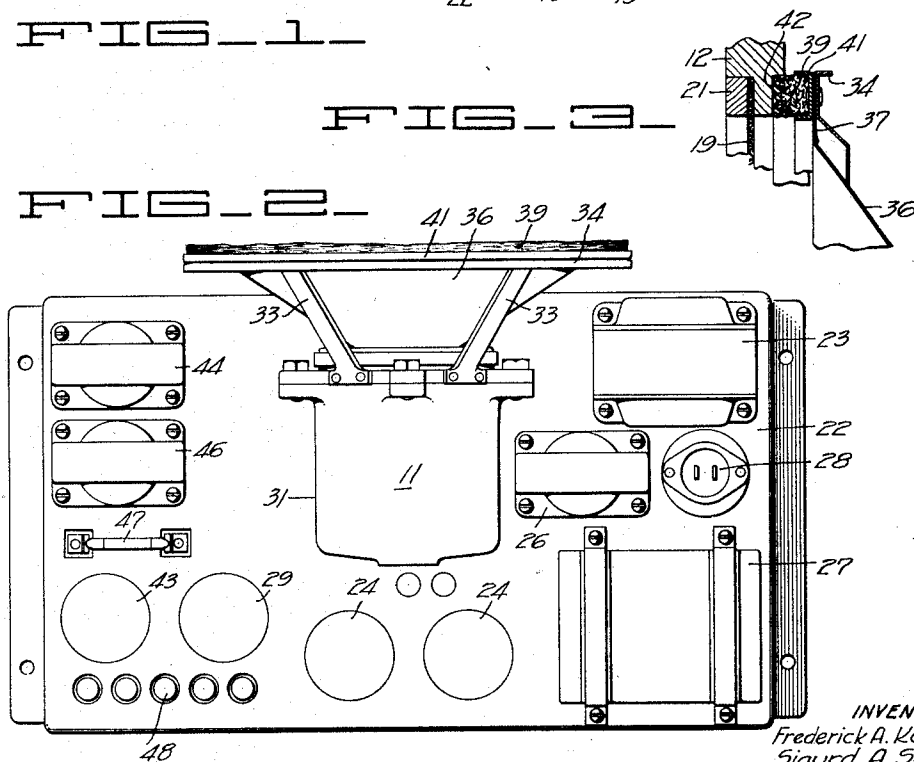
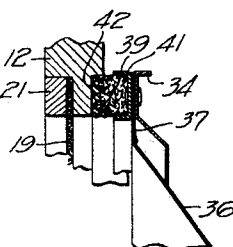


FIG. 1-

FIG. 3-

FIG. 2-



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LOUD-SPEAKER

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This invention relates to sound reproducing apparatus and more especially telephone loud speakers.

To facilitate the production of low frequency notes, it is expedient to so design a loud speaker that the sound waves propagated from one side of the diaphragm are obliged to travel a considerable distance before they can reach the opposite side thereof. This is usually accomplished either by providing a baffle-board of rather large area or by placing the diaphragm in a cabinet. In either event it is quite essential that there be no substantial opening at or near the periphery of the diaphragm such as would provide a path of low impedance to sound waves between the two sides thereof.

On the contrary it is very desirable (particularly when the loud speaker is mounted in a cabinet) to be able quickly and conveniently to withdraw the speaker mechanism and diaphragm from the cabinet for adjustments and repairs.

On the face of things, it appears that these two objectives are inimical one to the other—because a tight joint ordinarily entails clamping or fastening devices which inherently impede removal and replacement.

From what has already been said it is apparent that the primary object of this invention is to facilitate the removal and reimplantation or replacement of a loud speaker (and, if desired, its immediate appurtenances) and at the same time to provide for the effective sealing of the joint between diaphragm and baffle-board or cabinet wall without having to exercise any special precautions or solicitude against possible leaks around the edge of the diaphragm and without having to resort to the use of time consuming, fastening, or clamping devices between the diaphragm and baffle-board or cabinet wall. This at first appearance seems like a rather insignificant consideration, but to the service man who is on many occasions obliged to repeatedly remove and reinsert loudspeakers during the course of making adjustments, such facilitations are of real importance.

In accordance with the present invention the object indicated is accomplished by mount-

ing the loudspeaker unit (preferably together with its immediately associated appurtenances) on a removable base and providing for the speaker diaphragm a resilient sealing ring. By virtue of such an arrangement the loud speaker (together with its appurtenances, if any) can be quickly and easily removed from the cabinet and reimplanted therein with definite assurance that the joint between the diaphragm and cabinet wall is properly sealed.

Referring to the drawing:

Figure 1 is a side elevational view of a loud speaker unit positioned within an enclosing cabinet, the cabinet being shown in cross section.

Fig. 2 is a plan view of the unit employed in the cabinet of Fig. 1.

Fig. 3 is a cross sectional detail illustrating the sound-proof joint between the periphery of the loud speaker tympanum and the cabinet.

There is shown in the drawing a conventional form of cabinet 10 within which is positioned a unit or assemblage 11 comprising several pieces of apparatus, the nature and function of which will be presently set forth. The front wall 12 of the cabinet forms a part of the baffle means as will be explained, and the bottom member 13 forms a support for the several pieces of apparatus designated as a whole by reference numeral 11. The back of the cabinet is preferably closed by a hinged door 14, provided with an open screen 16 to permit ventilation. The front wall 12 is provided with an opening 18 for the emission of sound; and for the sake of appearance this opening may be covered by fabric 19 and grille 21.

The various parts of the assemblage 11 are mounted upon the common base member 22, which is preferably formed of pressed sheet metal with a hollow underside for the accommodation of the wiring. In the example chosen for illustration, the apparatus mounted on the common base member includes a rectifying and filter system comprising a power transformer 23, a filter choke 26, power supply socket 28, filter condensers 27, gas discharge voltage regulator tube 29, a resistor

47, and an audio frequency amplifying system comprising an input transformer 44, an amplifying vacuum tube 43 and an output transformer 46.

5 The loudspeaker which forms the principal element of the assemblage 11 comprises an electrically operated actuating, device 31 which is mounted upon base member 22 by means of a standard 32. This device is preferably of the type having a magnetic field energized from a source of relatively continuous current (as for example rectified direct current supplied by the filter), and a movable armature coil for actuating the diaphragm 10 or tympanum. Mounted upon the device 31 are arms 33 supporting a rigid ring 34. Ring 34 serves as a peripheral support for the tympanum 36, which in this case is in the form of a cone. The center portion or apex 20 of this cone is connected to the movable armature coil of device 31. It is preferred that the major portion of cone 36 be made of comparatively rigid material and that the periphery of the same be connected to supporting ring 34 by means of a comparatively flexible portion 37. This construction permits free vibratory movement of the cone proper.

30 With the loud speaker arrangement such as described above, any substantial opening between the periphery of cone 36 and the wall 12, would be likely to permit intermingling of the sound waves propagated from the inner and outer sides of the cone, which 35 would be apt to give rise to and cause appreciable interference, the resultant product being distortion or suppression of the lower frequencies, or both. The front wall 12 together with other parts of the cabinet form 40 baffle means preventing distortion due to such interfering waves; and this baffle means is made fully effective by providing an annular ring 39 of suitable material interposed between the supporting ring 34 and front 45 wall 12. It is preferred that this material be compressibly resilient, as for example relatively soft felt, so as to always provide a tight seal irrespective of slight inaccuracies in the positioning of unit 11 within the cabinet. Soft felt is also particularly effective 50 because of its sound absorbing properties. In the preferred construction this felt ring is secured to the rigid supporting ring 34, although it might be secured to the rear side 55 of the front wall 12. For example, as shown in Fig. 3 the rigid supporting ring 34 is provided with an annular groove 41 within which the felt ring 39 is adhesively secured, and the other face of ring 39 is designed to 60 seat in an annular recess 42 provided in wall 12.

65 The amplifier means for supplying amplified current variations to the armature coil of electromotive device 31, has been represented by an amplifier tube 43 having its

input circuit connected to the secondary of an input transformer 44. Output transformer 46 serves as means for coupling the output of amplifier tube 43 to the armature of electromotive device 31. The terminal connectors or binding posts 48 permit connection to a standard broadcast receiver. The output circuit of the amplifier is energized, and also a negative bias for its grid is provided, by the rectifier and filter means.

70 The filaments of the rectifier and amplifier tubes can be supplied with alternating current from transformer 23. Suitable sockets are provided for all of the tubes to permit their removal or replacement.

80 When the unit 11 is inserted in the cabinet 10, the felt ring 39 is fitted into the recess 42, and the base member 22 is fixed to bottom wall 13 as by means of screws 49. Considerable latitude in the position of the unit 11 is permissible as inaccuracies in alignment are taken up by the resilient felt ring 39. At any time desired the entire unit can be removed from the cabinet merely by removing screws or bolts 49, for inspection or for replacement. 90 As long as the felt ring 39 is within recess 42, the cone is properly baffled to minimize distortion.

The present application does not claim broadly the use of a resilient sealing ring 95 (that subject matter being covered by the aforementioned Sollie application) but is limited to the use of a resilient sealing ring or the equivalent thereof in combination with means for automatically positioning the diaphragm structure with respect to the baffle-board or cabinet wall whereby the joint between is closed upon the loudspeaker being inserted in the cabinet—the arrangement being such that it is unnecessary to clamp the diaphragm against the baffle-board or cabinet wall. 105

I claim:

1. A loud speaker comprising a baffle-wall having an opening for sound transmission 110 therethrough, a tympanum co-operatively associated with said opening, a base member adapted to be removably positioned within a cabinet, a sound translating device mounted upon said base for actuating said tympanum, and power supply means also mounted upon said base, the positioning of said base member being effective to maintain the co-operative relation between said tympanum and said baffle-wall, all of said parts 120 carried by said base being solely supported thereby.

2. A loud speaker comprising a base member adapted to be removably positioned within a cabinet, an orificed baffle-wall constituting one face of said cabinet, a sound translating device mounted upon said base, power supply means, and audio frequency amplifying means, both of said means being 125 mounted upon said base together with said

device, said mounting being effective to maintain a suitable co-operative relation between said translating device and said baffle-wall, all of said parts carried by said base being solely supported thereby.

3. A loud speaker unit adapted for use in a cabinet having a baffle wall which is provided with an opening for transmission of sound, a base member adapted to be removably supported within the cabinet, a sound translating device mounted upon said base, a tympanum adapted to be actuated by said device, means for supporting said tympanum upon said base member, and a ring of resilient material adapted to fill the space between the periphery of the tympanum and the baffle wall of said cabinet, said tympanum being positioned with respect to said baffle-wall solely by reason of its fixed relation to said base member, all of said parts carried by said base being solely supported thereby.

4. A loud speaker unit adapted for use in a cabinet having a baffle wall which is provided with an opening for transmission of sound, a base member adapted to be removably supported within the cabinet, a sound translating device mounted upon said base member, a tympanum adapted to be actuated by said device, means for supporting said tympanum upon said base member whereby said base member is effective to maintain a suitable operative position in said cabinet of the tympanum with respect to the opening in the baffle wall of said cabinet, all of said parts carried by said base being solely supported thereby.

5. A loud speaker unit adapted for use in a cabinet having a vertical baffle wall which is provided with an opening for transmission of sound, a horizontal base member adapted to be removably supported within said cabinet, a translating device mounted upon said base member, a tympanum adapted to be vibrated by said device, a rigid annular ring to which the periphery of the tympanum is secured, means for securing said ring to said base member whereby it is disposed in a vertical plane, and in a position to cooperate with said opening when the unit is disposed within the cabinet, and a resilient annular ring interposed between said rigid gasket and said baffle wall, all of said parts carried by said base being solely supported thereby.

6. A loud speaker unit adapted for use in a cabinet having a vertical baffle wall which is provided with an opening for transmission of sound, a horizontal base member adapted to be removably supported within said cabinet, a translating device mounted upon said base member, a tympanum adapted to be vibrated by said device, a rigid annular ring to which the periphery of the tympanum is secured, means for securing said ring to said base member whereby it is disposed in a ver-

tical plane and in a position to cooperate with said opening when the unit is disposed within the cabinet, and an annulus of soft felt interposed between said rigid ring and said baffle wall, all of said parts carried by said base being solely supported thereby.

7. A loud speaker comprising a base and a baffle-board rigidly attached thereto, a diaphragm the periphery of which is detached from and adjacent said baffle-board, a gasket of resilient sound absorbent material sealing the space between said baffle-board and the periphery of said diaphragm, supporting and actuating means for said diaphragm, and a secondary base resting on and removably attached to said first base, said secondary base carrying said diaphragm supporting and actuating means and serving to position said diaphragm adjacent said baffle-board, all of said parts carried by said secondary base being solely supported thereby.

8. In a loudspeaker device, a horizontal base and a baffle-board rigidly attached thereto, a diaphragm the periphery of which is detached from and adjacent said baffle-board, a gasket of resilient sound absorbent material sealing the space between said baffle-board and the periphery of said diaphragm, a rigid supporting structure and an actuating means for said diaphragm, auxiliary devices for energizing said actuating means, and a secondary base, on which said diaphragm supporting and actuating means and said auxiliary devices are secured, removably attached to said first base, all of said parts carried by said secondary base being solely supported thereby.

9. In combination a baffle-board having an opening therein, a base removably mountable in a predetermined space relation with respect to said baffle-board, a loud speaker mounted on said base, said speaker comprising an actuating mechanism and a diaphragm, a relatively rigid structure circumscribing the periphery of said diaphragm, said structure being supported by said base and detached from said baffle-board, and a compressible sealing member interposed between said structure and said baffle-board, said sealing member being operable to complete a soundproof joint between said baffle-board and the periphery of said diaphragm, all of said parts carried by said base being solely supported thereby.

10. In combination a cabinet having a wall with an opening, a base adapted to be removably mounted in said cabinet, a loudspeaker mounted on said base, said speaker comprising an actuating mechanism and a diaphragm adapted to be actuated thereby, and a supporting structure for said diaphragm carried by said base, the arrangement being such that said diaphragm is retained in a predetermined fixed space relation with respect to said base, and further that

when said base is put into place in said cabinet said diaphragm forms a closure for the opening in said cabinet wall without being attached thereto, and a compressible member
5 interposed in the joint between the periphery of said diaphragm and said cabinet wall, said compressible member being operable to seal said joint when said base is in its proper predetermined position in said cabinet, all
10 of said parts carried by said base being solely supported thereby.

11. In a loudspeaker, a cabinet, a translating device comprising a diaphragm with supporting and actuating means therefor, a
15 peripheral frame about said diaphragm, a resilient sound-proof gasket attached to the base of said frame, an opening in the front wall of said cabinet smaller than said peripheral frame, a larger opening in the rear
20 of said cabinet and a base to which said translating device is attached, said base being slidably insertable into said cabinet through the rear opening, whereby said diaphragm is positioned directly behind said front wall
25 without being attached thereto but with said gasket compressed against the wall and surrounding the opening therein, all of said parts carried by said base being solely supported thereby.

30 12. The combination of a conical diaphragm and apparatus for actuating the same, a cabinet one face of which forms a baffle-wall having an opening for transmission of sound, means comprising a base for
35 removably supporting within said cabinet the conical diaphragm and its actuating apparatus as a unit, means effective solely through the base for retaining the position of said diaphragm with respect to said baffle-wall, a relatively rigid ring by which the
40 periphery of said diaphragm is supported and a gasket of relatively soft material interposed between said rigid ring and said baffle-wall, all of said parts carried by said base
45 being solely supported thereby.

In testimony whereof, we have hereunto set our hands.

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