March 2, 1954 I. M. BROWN 2,670,807

ELECTRICALLY ACTUATED OUT-OF-DOOR SPEAKER

Filed Jan. 14, 1952

Fig. 1.

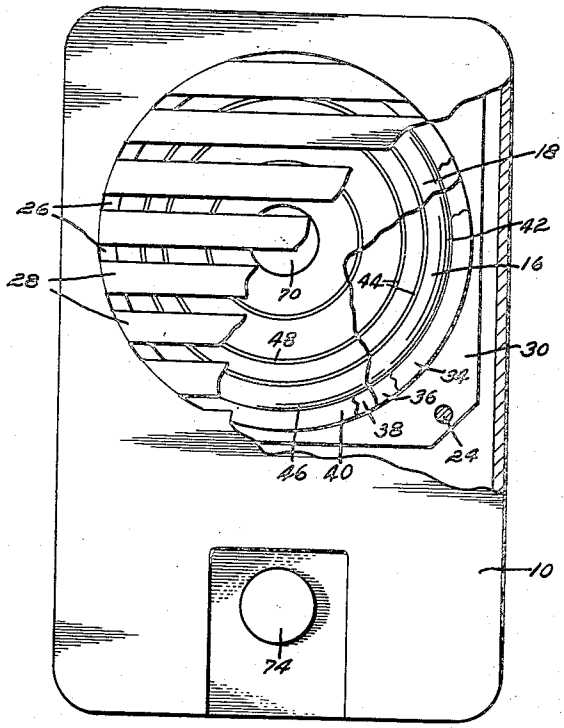
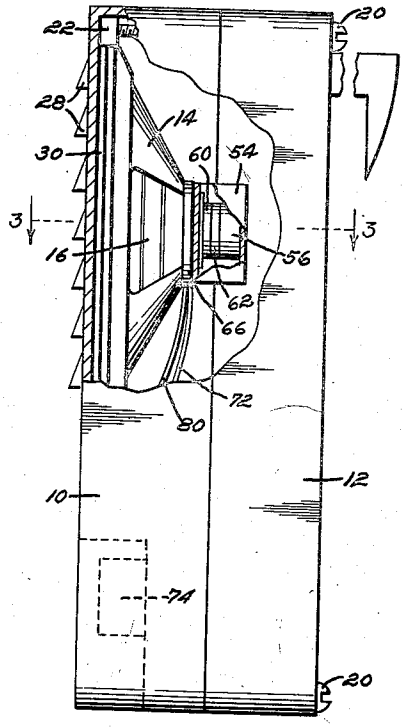


Fig. 2.



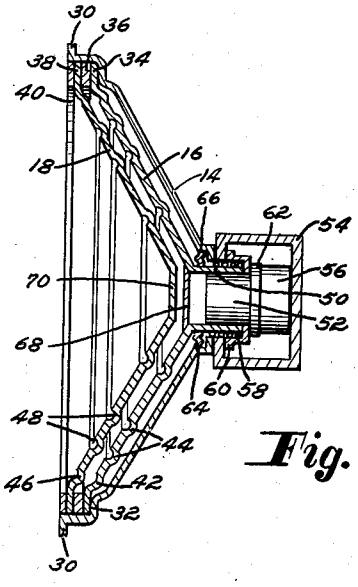


Fig. 3.

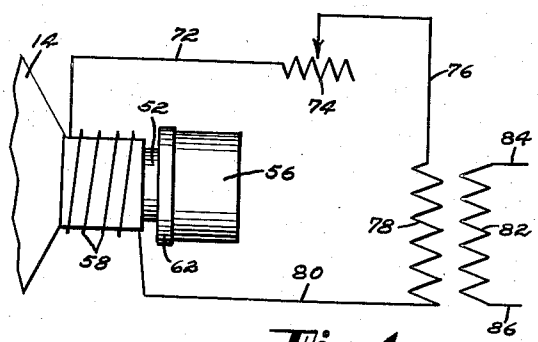


Fig. 4.

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ELECTRICALLY ACTUATED OUT-OF-DOOR SPEAKER

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3 Claims. (Cl. 181—31)

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This invention relates to loud speakers such as used in out-of-door installations and particularly open air moving picture theatres where the speakers are subjected to extreme weather conditions, and in particular this invention provides a protective cone spaced outwardly from and in sealed relation with the conventional cone of the speaker whereby the conventional cone is protected and wherein the outer cone is readily replaceable.

The purpose of this invention is to extend the life of cones of loud speakers of outside installations where the conventional paper cones are subjected to atmospheric conditions.

In open air theatres where patrons are distributed over a comparatively wide area it is customary to provide individual speakers on posts and although these speakers are substantially enclosed in a housing with a grille and louvers over the cone the cone is subjected to moisture and temperature changes whereby efficient operation of the speaker is limited to a comparatively short period of time.

Various attempts have been made to protect the paper cones in speakers for this use, such as stretching membranes across the base of the speaker, however, such expedients cause distortions in the sound produced, a loss of fidelity, and general lowering of efficiency. With this thought in mind this invention contemplates a speaker of the type having a paper cone therein, enclosed in a housing and having a protecting cone substantially of the same shape as the paper cone and spaced therefrom, positioned in front of the conventional cone, whereby with the area between the cones sealed and with the protecting cone having grooves and a hinge corresponding with similar elements of the conventional cone the protecting cone vibrates with the conventional cone and substantially the same sound waves are emitted therefrom.

The object of this invention is, therefore, to provide means for protecting the cone of a loud speaker unit from atmospheric conditions and the elements without impairing the speaker.

Another object of the invention is to provide a protecting shield for cones of loud speaker units in which the shield may readily be removed and replaced.

A further object of the invention is to provide a protecting cone for conventional cones of

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loud speaker units to protect the conventional cone from changes in atmospheric conditions that may be installed in loud speaker units without materially changing the units.

A still further object of the invention is to provide a loud speaker unit for outside installation in which the cone thereof is protected from the weather with an outer shielding cone in which the unit is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies a loud speaker cone in combination with a voice coil, a frame in which the parts are mounted, a disc positioned over an opening in the center of the cone, and a protecting cone of the same configuration as the former cone mounted in the frame and spaced from the former cone.

Other features and advantages of the invention will appear from the following description taken in connection with the drawing, wherein:

Figure 1 is a front elevational view of a loud speaker unit adapted for outside installations with parts broken away showing the conventional cone behind the protecting cone.

Figure 2 is an end elevational view also with parts broken away and with parts shown in section.

Figure 3 is a sectional plan taken on line 3—3 of Figure 2 showing the speaker cone, protecting cone, frame, and mounting elements.

Figure 4 shows a typical wiring diagram of the speaker.

Referring now to the drawing wherein like reference characters denote corresponding parts the protected loud speaker unit of this invention includes a housing having a front section 10, a base section 12, and a frame 14 with which a conventional speaker cone 16 having a protecting cone 18 spaced from the outer surface is mounted in the housing. The sections of the housing are secured together with screws or bolts 20 which are threaded into lugs 22, and the frame 14 is secured in the housing with bolts 24.

The front of the housing is provided with horizontally disposed slots 26 which are positioned between louvers 28 which are inclined outwardly to prevent rain, snow and the like entering the interior of the cone opening.

The frame 14 is provided with a flange 30 through which the bolts 24 extend and inside

of the flange is an annular recess 32 in which a rim 34 of the cone 16 is positioned. A spacing washer 36 is provided between the rim 34 and a similar rim 38 of the cone 18, and the parts are secured in the recess with a ring 40 that is positioned flush with the outer surface of the flange 30, as shown in Figure 3.

The cone 16 is provided with an annular ridge 42 which forms a hinge and expansion grooves 44 are formed in the intermediate part. A similar hinge ridge 46 is provided in the cone 18 and spaced expansion grooves 48 in the intermediate part are positioned to correspond with the grooves 44 of the cone 16 whereby a sympathetic series of vibrations are provided in the cone 18 which are responsive to vibrations of the cone 16.

A sleeve 50, extended from the center of the cone 16, is positioned over an iron core 52 of the speaker mechanism which is mounted in a frame 54 that is C-shape in cross section, and that is carried by the frame 14. The core 52 extends from a permanent magnet 56, and a wire coil 58, which forms the voice coil, is positioned over the sleeve 50 to which it is secured by shellac or the like. The core 52 and magnet 56 are secured in the frame 54 with a collar 60 which is Z-shaped in cross section and the body portion of this collar extends over the inner end of the voice coil 58, as shown. The collar 60 is of non-magnetic material and one end abuts an annular rim 62 of the magnet 56 with the opposite end against the inner end wall of the frame 54.

The sleeve 50, which extends from the cone 16, is retained in spaced relation to the frames 14 and 54 with a paper pulp washer 64 having a corrugated contour and cross section to permit sliding movement of the sleeve in relation to the frame, and the washer is secured in an annular recess in a hub 66 in the frame 14, as shown. The inner edge of the washer is secured, preferably by cementing, to the sleeve, and the outer edge is secured in a similar manner in the hub 66 of the frame 14. The washer 64 is conventional, being used in speakers of this type where a single cone is used.

The opening at the center of the cone 16 is closed by a disc 68 that may be integral with the cone or secured to the cone by suitable means, and this disc is spaced from and parallel to a flat surface 70 at the center of the cone 18. The area between the cones is sealed providing a dead air space, however, with the cone 18 held only by the ring 40, this cone may readily be removed and replaced.

As illustrated in Figure 4, the voice coil 58 is connected by a wire 72 to a rheostat switch 74, the opposite terminal of which is connected by a wire 76 to the secondary winding 78 of a transformer, and the opposite end of the winding 78 is connected to the coil 58 with a wire 80. The primary winding 82 of the transformer is connected by wires 84 and 86 to a suitable source of modulated electrical energy as desired and in a conventional manner.

In operation, the conventional speaker cone 16 is vibrated by signals or impulses from the voice coil and magnet and these vibrations are transferred or transmitted to the protecting cone 18 through the dead air space causing sound to be emitted in the usual manner. The cone 16 being formed of wood pulp or compressed paper pulp is susceptible to absorbing moisture and continuous moistening and drying out results in distortion which causes the voice coil to be moved out of axial alignment with respect to the axis of the core 52 with the result that imperfect sound waves are produced thereby. With the cone 16 protected by the cone 18, it is not subjected to atmospheric changes and substantially perfect alignment of the voice coil with the core is maintained. Distortion of the outer cone, which is not connected to the core is not so important, however, as the outer cone is not directly connected to the voice coil and magnet, it may readily be removed and replaced without taking the entire speaker unit apart.

From the foregoing description it is thought to be obvious that an electrically actuated speaker constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof, and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice, except as claimed.

What is claimed is:

1. In a receiver speaker cone unit, the combination which comprises a magnetic cylindrical core, a voice coil sleeve concentric therewith, an inner speaker cone integral with and extended from one end of said sleeve, a disc providing a closure for the center of said speaker cone, said speaker cone having an annular flange extended from the periphery and said flange being positioned in a plane perpendicular to the axis of the cone and sleeve, a substantially conical-shaped frame having spaced openings therein spaced from and extended over said speaker cone, the wall of said frame being parallel to the corresponding wall of the speaker cone, said frame having a hub positioned on the sleeve of the speaker cone and having a peripheral rim with an annular recess therein in which the flange of the speaker cone is positioned, a protecting cone closed at the center and having an annular flange in said annular recess of the rim of the frame, an annular spacing washer positioned between the flanges of the protecting cone and speaker cone, and an annular ring positioned in the recess of the rim of the frame and against the flange of the protecting cone retaining the cones in the recess and in sealed relation, said protecting and speaker cones having spaced annular concentric grooves therein and annular ridges also concentric to the grooves and axis of the speaker unit, said ridges being positioned between the walls of the cones and flanges thereof providing hinges and said concentric grooves providing compensating means for expansion in the cones.

2. A speaker for outdoor use comprising an inner vibratory speaker diaphragm carrying a voice coil sleeve; a magnetic core; said sleeve being concentric around said core; an outer vibratory protective speaker diaphragm in axial alignment with said inner diaphragm, a sealed dead air space intermediate said diaphragms, said outer diaphragm being exposed to atmosphere and shielding the forward face of said inner diaphragm therefrom, said outer diaphragm being vibratory with said inner diaphragm by virtue of vibrations therefrom transmitted by said sealed dead air space, housing means sealingly surrounding said diaphragms except for the forward face of said outer diaphragm, whereby said inner

diaphragm is sealed and protected from atmospheric moisture to prevent warping thereof, so that said voice coil sleeve is maintained in concentricity with said core.

3. A speaker as set forth in claim 2, wherein said diaphragms are conically shaped and have respective corrugations juxtaposed opposite each other in pairs, wherein each pair comprises a corrugation on each diaphragm.

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