

May 10, 1949.

J. D. PHYFE

2,469,986

SOUND DISTRIBUTING SYSTEM FOR DRIVE-IN THEATERS

Filed March 31, 1945

2 Sheets-Sheet 1

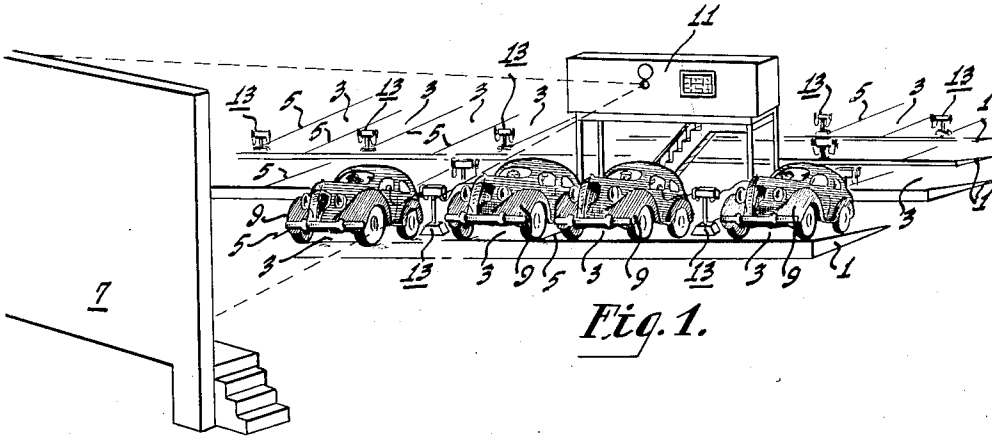


Fig. 1.

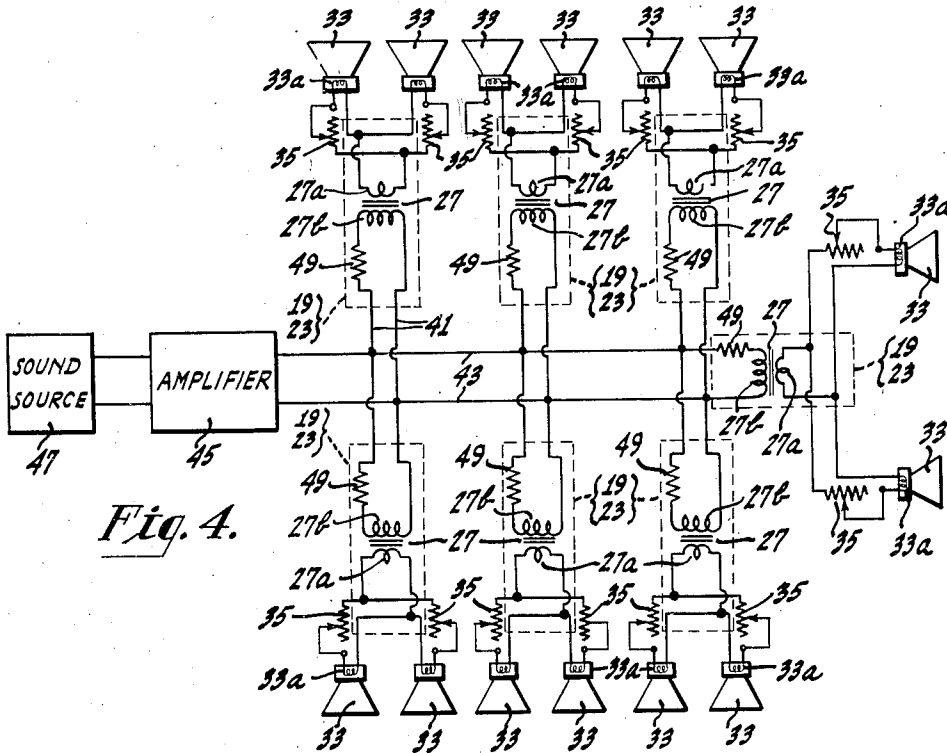


Fig. 4.

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2 Sheets-Sheet 2

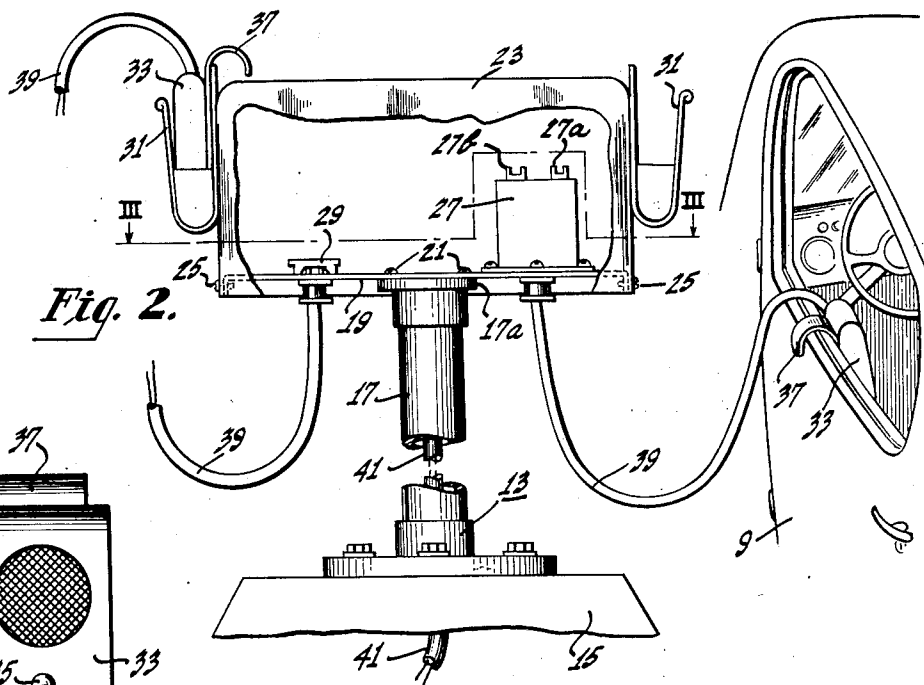


Fig. 2.

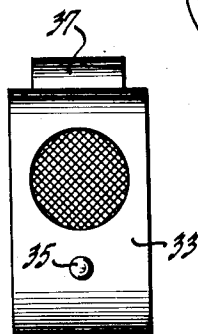


Fig. 5.

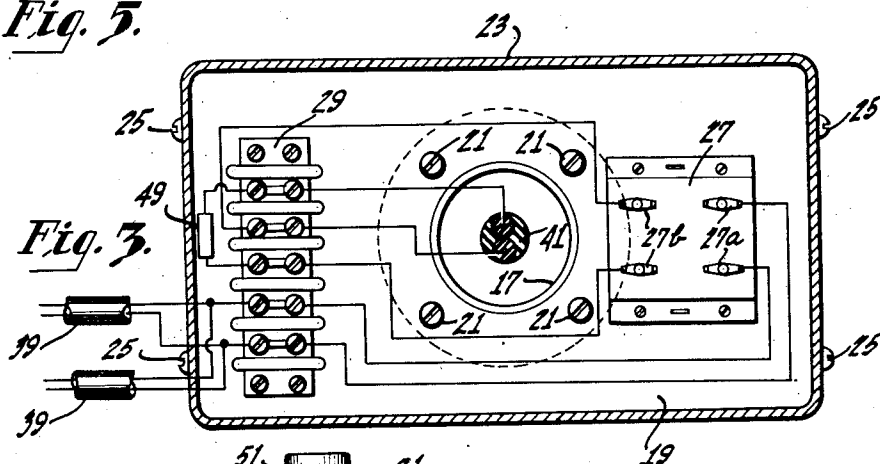


Fig. 3.

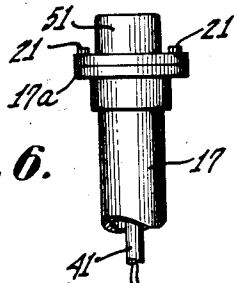


Fig. 6.

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UNITED STATES PATENT OFFICE

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SOUND DISTRIBUTING SYSTEM FOR
DRIVE-IN THEATERS

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13 Claims. (Cl. 179—1)

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This invention relates to sound distributing systems, and more particularly to a system of loudspeakers for distributing sound in arenas, amphitheaters, and the like, such as the so-called open air "drive-in" theaters.

Theaters of this type for the exhibition of motion pictures generally comprise a series of arcuate ramps divided into parking stallways arranged to face an elevated screen at a central point which may be the focal point of the ramps. The ramps are so inclined with respect to the screen that, when automobiles are parked thereon, the occupants thereof can view the screen through the windshields. Such a theater is shown, for example, in U. S. Patent No. 1,909,537 granted to R. M. Hollingshead, Jr.

For the exhibition of talking motion pictures, a sound distributing system is, of course, necessary to go with the action portrayed on the screen. Various forms of loudspeaker arrangements have been suggested heretofore, among which is an arrangement of loudspeakers behind the screen; mounting individual speakers at each stallway to face the radiators of cars parked therein; and mounting portable loudspeakers between stallways so that the patrons can lift the loudspeakers into the cars. Of the systems heretofore proposed, the latter was found most advantageous in certain respects. However, as arranged heretofore, the latter system has several serious disadvantages, the chief one of which is that if any one of the loudspeaker cables were short circuited, either the particular ramp in which it is installed or the entire system would go dead, or else a serious loss of volume would result on account of the adverse loading effect on the amplifier output.

The primary object of my invention is to provide an improved sound distributing system for open air theaters and the like which will not be subject to the aforementioned and other disadvantages characteristic of prior art systems.

More particularly, it is an object of my present invention to provide an improved mounting and circuit arrangement for so called "in-car" loudspeakers, that is, loudspeakers which may be taken into the automobiles by the occupants.

Another object of my present invention is to provide an improved method of mounting and connecting "in-car" speakers to ramp wiring in "drive-in" theaters.

Still another object of my present invention is to provide an improved mounting for "in-car" speakers such that the speakers may be more easily reached by the patrons without having to leave their automobiles.

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A further object of my present invention is to provide an improved sound distributing system for "drive-in" theaters in which the short circuiting of any one loudspeaker will have no adverse effect on the remainder of the system but will affect only the particular channel in which the short-circuited loudspeaker is connected.

Still a further object of my present invention is to provide an improved sound distributing system as aforesaid which can be serviced very easily either for repairs, when necessary, or for winter conditioning.

Another object of my present invention is to provide a sound distributing system as above set forth in which the loudspeakers for the respective ramps are arranged in channels designed to feed two adjacent stallways and in which any one or more channels may be isolated or by passed, should a short circuit develop between any two channels, without affecting the operability of the remaining channels.

Still another object of my invention is to provide an improved sound distributing system as above set forth in which the necessity for underground splices or connections is obviated, thereby resulting in a safety factor not found in prior art installations.

It is also an object of my present invention to provide an improved sound distributing system for open air theaters, arenas, or the like which is less expensive to install and operate than comparable prior art systems, and which is highly efficient in use.

In accordance with my present invention, I arrange throughout the entire area of the theater and at alternate boundaries between adjacent stalls in the various rows or parking ramps suitable supporting standards on each of which is mounted a junction box. This junction box carries on opposite ends or sides thereof facing the two stallways on either side thereof suitable receptacles in each of which is removably mounted a portable loudspeaker. Each junction box is so dimensioned relative to the adjacent stallways that the occupant of an automobile parked thereon can reach the loudspeaker merely by reaching out of the window and without the necessity of getting out of the automobile. Preferably, the supporting standards are mounted on sloping, concrete bases so arranged that, should the driver approach close to the adjacent loudspeaker when parking his car, the adjacent wheel will strike the base before the body of the car would strike the speaker, so that damage to the speaker from this cause is avoided.

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The loudspeaker receptacles are so disposed on the junction boxes and the loudspeakers are so mounted thereon that the loudspeakers are arranged in an upright position. This makes it easier to reach and handle the loudspeakers. Moreover, such a mounting also permits the patron to enjoy the performance without bringing the loudspeaker into the car if he so desires. A volume control on the front panel of the loudspeaker casing enables the patron to readily adjust the volume to suit his taste whether the loudspeaker remains in its receptacle or is brought into the car.

Within the junction boxes are mounted a suitable terminal board and loudspeaker coupling transformer through which both loudspeakers of any one junction box may be connected to suitable feeder cables. Heretofore, so far as I am aware, similar installations have utilized an individual transformer for each loudspeaker. Thus, if a pin or other metallic object is pushed into the cable, as is occasionally done by pranksters to short circuit a loudspeaker, the entire system either goes dead or is considerably reduced in volume with accompanying distortion resulting. In accordance with my invention, by connecting the loudspeakers in groups of two to the secondary winding of a transformer housed in the junction box, the short circuiting of a cable leading to one of an associated pair of loudspeakers would merely reflect a short circuit at the secondary circuit of that particular transformer. The primary winding circuit according to my invention preferably has an isolating resistor in series therewith, and the impedance of the primary circuit is very high compared with the impedance of the secondary circuit. Thus, an undesired change in the secondary circuit such as results from short circuiting the same will have substantially no adverse effect upon the related primary circuit, and therefore the remainder of the sound distributing system will not be disturbed. Furthermore, by using only one transformer to each pair of loudspeakers, the number of transformers required is reduced by one half.

Another advantage of my improved system is that the parts within the junction box may be readily reached for servicing, when necessary, by merely removing the cover of the junction box. Also, the entire junction box may be held in place on the supporting standard by screws or bolts which, upon removal, will permit removal of the junction box and the two loudspeakers carried thereby as a unit. Thus, these units can be quickly removed and stored away for the winter. Suitable caps may then be placed on the standards to protect the feeder cables therein from attack by the elements during the winter season.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, as well as additional objects and advantages thereof, will best be understood from the following description of one embodiment thereof, when read in connection with the accompanying drawings in which

Figure 1 is a fragmentary, perspective view of an outdoor theater provided with a sound distributing system according to my present invention,

Figure 2 is an enlarged, detailed view showing a supporting standard with its junction box, and

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showing also the manner in which a loudspeaker may be supported on the junction box or mounted in an automobile,

Figure 3 is an enlarged, sectional view taken on the line III—III of Figure 2,

Figure 4 is a wiring diagram of one circuit according to my present invention,

Figure 5 is a front elevation of one form of loudspeaker according to my present invention, and

Figure 6 is a fragmentary, detailed view of the upper end of a supporting standard with a cover or cap applied thereto in place of the junction box of Figure 2.

Referring more particularly to the drawings, wherein similar reference characters designate corresponding parts throughout, there is shown, in Figure 1, an outdoor theater provided with a plurality of parking ramps 1 each divided into a plurality of adjacent stallways 3 by suitable boundaries, such as the markers 5. The ramps 1 may be inclined upwardly toward a screen 7 so that occupants in automobiles 9 parked in the stallways 3 will have a clear view of the screen through their respective windshields. Moving pictures or the like are projected onto the screen 7 from a projection booth 11 in well known manner.

For the purpose of distributing uniformly throughout the entire theater sound related to the action portrayed on the screen, I provide at alternate boundaries 5 suitable mountings 13, each for a pair of loudspeakers in association with the adjacent two stallways. Each mounting 13 comprises a concrete or other suitable base 15 from which rises a tubular supporting standard 17 having a plate 19 removably secured to a flange 17a at the upper end thereof, as by screws 21. A cover 23 which is removably secured to the plate 19 by screws or the like 25 constitutes, with the plate 19, a junction box within which are housed a coupling transformer 27 and a terminal block or strip 29.

Secured to the junction box cover 23 at the opposite ends thereof alongside the adjacent stallways are a pair of wire baskets or other suitable receptacles 31 each of which removably receives a loudspeaker 33. The loudspeakers are preferably of the electrodynamic type and include a volume control 35 on the front panel of the casing thereof. Each loudspeaker casing is also provided with a mounting bracket 37 by means of which the loudspeaker may be mounted on the window frame of an automobile with the loudspeaker inside the car, as shown to the right of Figure 2. The junction box 19, 23 is of such a length that it extends into fairly close proximity with the automobiles properly parked in the adjacent stallways, so that the occupants of the cars can easily reach the loudspeakers by merely extending the arms out of the windows, thus avoiding the necessity of getting out of the cars. Similarly, the loudspeakers may be replaced in their receptacles 31 from within the car through the open window thereof and without getting out of the car.

Each loudspeaker 33 has its voice coil 33a connected to the secondary winding 27a of the associated transformer through the volume control 35 and an elongated flexible cable 39, the two loudspeakers of any associated pair being connected in parallel relation to each other across the transformer secondary winding, as seen in Figure 4. The primary winding 27b of each transformer is connected through a feeder

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cable 41, which extends through the associated tubular standard 17, to a main cable or transmission line 43 which is connected through a suitable amplifier 45 to a source of electrical signals 47 corresponding to the sound to be distributed and constituting a sound source. The sound source may be derived from the conventional sound track on the moving picture film or, in the case of a public address system or the like, it may be a microphone or similar device. Connections between the transformer 27, the cables 39 and the cable 41 are made, in each case, through the associated terminal board 29, as shown in Figure 3.

It will be apparent, from the foregoing description, that the main cable or transmission line 43, which is under ground, the cables 41 which are within the tubular standards 17 and the transformers 27 with connections thereto which are in the junction box 19, 23 are tamper-proof for practical purposes. A prankster seeking to upset the sound distributing system by pushing a pin through one of the cables 39 can only succeed in short circuiting the secondary winding circuit of the associated transformer and therefore will render inoperative only the two loudspeakers connected thereto. The secondary circuit, even when both loudspeakers connected thereto are operative, has a very low impedance (for example, approximately 2 to 4 ohms). The primary circuit, on the other hand, has a very high impedance (for example, from 5,000 to 10,000 ohms over the frequency range of interest). The primary winding impedance may be made high in any suitable way, as by providing a primary winding which has a relatively high D. C. resistance. In any case, by making the impedance of the primary circuit very high compared to that of the secondary circuit, and short circuiting or other undesired effect produced in the secondary circuit will have substantially no adverse effect in the primary circuit. Consequently, the main cable 43, across which all of the cables 41 and their associated channels are connected in parallel relation, will not become short circuited and therefore the remainder of the system will remain operative. If desired, an isolating resistor 49 may be connected in series with the primary winding 27b to provide the requisite impedance in the primary circuit. Inserting such an isolating resistor in the primary circuit has the advantage that, even if the primary winding 27b itself develops a short circuit, the series resistor 49 will prevent a short circuit to the ramp wiring. The resistor 49 is of such value in each case that only a slight loss of power will be effected when it is in circuit, but its value is large enough so that patrons utilizing the loudspeakers of any other of the channels will be unaware of a short circuit in any particular loudspeaker or coupling transformer.

From the foregoing description, it will be apparent to those skilled in the art that I have provided an improved sound distributing system for outdoor theaters and the like which has the advantages pointed out heretofore. Each channel, according to the present invention, is made independent of any other channel, and since only one transformer is needed for each pair of loudspeakers, the cost of the installation is reduced considerably. It will also be apparent that the system is, generally, more tamperproof than prior art systems, thereby insuring a longer life therefor. The fact that the cover 23 of the junction box can be removed easily merely by removing the

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screws 25 greatly facilitates access to the transformer 27, the terminal board 29, the resistor 49, and any of the other parts within the junction box for ready servicing or replacement thereof. Furthermore, by removing the screws 21, the junction box, its supporting brackets 31, and the two loudspeakers carried thereby can be removed as a unit and stored away during the winter season after disconnecting the cable 41 from the terminal board 29. In place of the junction box, a suitable cap 51 may be placed over the flange 17a to cover the cable 41 and prevent rain, snow, dust or any other foreign matter from entering the standard 17 and damaging the cable therein.

Although I have shown and described only a single embodiment of my invention, it will undoubtedly be apparent to those skilled in the art that many other variations thereof are possible. I therefore desire that my invention shall not be limited except insofar as is made necessary by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. In an outdoor theater having a screen and an area adjacent thereto comprising a plurality of automobile stallways in which automobiles may be parked facing said screen, a sound distributing system for simultaneously conveying to occupants of said automobiles at pairs of adjacent stallways sound related to action portrayed on said screen which comprises, in combination with a source of electric signals representing said sound, a supporting member located between the stallways constituting each of said pairs throughout said area, a pair of loudspeakers loosely carried by each of said supporting members for ready removal therefrom each into a separate stallway and an automobile in said stallway, and circuit means carried by said supporting members coupling said loudspeakers to said source.

2. In an outdoor theater having a screen and an area adjacent thereto comprising a plurality of automobile stallways in which automobiles may be parked facing said screen, a sound distributing system for simultaneously conveying to occupants of said automobiles at pairs of adjacent stallways sound related to action portrayed on said screen which comprises, in combination with a source of electric signals representing said sound, a supporting member located between the stallways constituting each of said pairs throughout said area, a pair of loudspeakers mounted on each of said supporting members one on each side thereof in association with an adjacent stallway, said loudspeakers being each loosely carried by said supporting members for ready removal therefrom into an adjacent stallway and an automobile therein, and circuit means carried by said supporting members coupling said loudspeakers to said source.

3. The invention set forth in claim 2 characterized in that said circuit means includes a cable connection carried by each of said supporting members and flexible cables connecting each of the associated loudspeakers to said cable connection, said flexible cables each being of a length sufficient to permit said loudspeakers to be displaced from said supporting member to the interiors of the automobiles in their respectively associated stallways.

4. In an outdoor theater having a screen and a plurality of adjacent automobile stallways in which automobiles may be parked facing said screen, a sound distributing system for conveying

to occupants of said automobiles sound related to action portrayed on said screen which comprises, in combination with a source of electric signals representing said sound, a plurality of supporting members distributed throughout the area occupied by said stallways and located at alternate boundaries between said adjacent stallways one at each of said alternate boundaries, a pair of loudspeakers mounted on each of said supporting members, each of said loudspeakers being associated with a separate one of the two stallways on each side of their respective supporting members and being loosely carried by their respective supporting members for ready removal therefrom into the automobiles of their respectively associated stallways, and circuit means coupling all of said loudspeakers to said source.

5. The invention set forth in claim 4 characterized in that each of said supporting members includes a junction box housing certain elements of said circuit means, and characterized further in that said circuit means also includes a plurality of flexible cables, one for each of said loudspeakers, connecting said loudspeakers to said certain elements of their respectively associated junction boxes.

6. The invention set forth in claim 4 characterized in that each of said supporting members includes a junction box, characterized further in that said circuit means includes (1) a transformer housed in each of said junction boxes and (2) means coupling the primary winding of each of said transformers to said signal source, and characterized still further in that said circuit means also includes a plurality of flexible cables, one for each of said loudspeakers, connecting each of said loudspeakers to the secondary winding of the transformer in its associated junction box.

7. The invention set forth in claim 4 characterized in that each of said supporting members includes a junction box, characterized further in that said circuit means includes (1) a transformer housed in each of said junction boxes and (2) means coupling the primary winding of each of said transformers to said signal source, and characterized still further in that said circuit means also includes a plurality of flexible cables, one for each of said loudspeakers, connecting each of said loudspeakers to the secondary winding of the transformer in its associated junction box, said loudspeakers being normally mounted on their respectively associated junction boxes, and said flexible cables being each of a length sufficient to permit displacement of their respectively connected loudspeakers from their associated junction boxes to the interior of the automobiles in their respectively associated stallways.

8. The invention set forth in claim 4 characterized in that each of said supporting members includes a junction box, characterized further in that said circuit means includes (1) a transformer housed in each of said junction boxes and (2) means including an isolating resistor in series with the primary winding of each of said transformers coupling the respective primary windings to said signal source, and characterized still further in that said circuit means also includes a plurality of flexible cables, one for each of said loudspeakers, connecting each of said loudspeakers to the secondary winding of the transformer in its associated junction box.

9. In a sound distributing system, the combination with a source of electrical signals representing the sound to be distributed and compris-

ing a transmission line of a plurality of distribution channels connected in parallel relation to each other across the output of said source along said transmission line, each of said channels comprising an electrical network which includes (1) a transformer having a primary winding connected across the output of said source through said transmission line and a secondary winding, (2) a plurality of loudspeakers connected in parallel relation across said secondary winding, the circuit of said primary winding having an impedance which is high compared to the impedance of the circuit of said secondary winding, whereby an undesired change in impedance of said secondary winding circuit will have substantially no adverse effect upon the impedance of said transmission line, and (3) an isolating resistor in series with said primary winding, said isolating resistor having a value of resistance such that it further imparts to said primary winding circuit a relatively high impedance compared to the impedance of said secondary winding circuit.

10. In a sound distributing system, the combination with a source of electrical signals representing the sound to be distributed and comprising a transmission line, of a plurality of distribution channels connected in parallel relation to each other across the output of said source along said transmission line, each of said channels comprising an electrical network which includes a transformer having a primary winding connected across the output of said source through said transmission line and a secondary winding, a plurality of loudspeakers connected in parallel relation across said secondary winding, the circuit of said primary winding having an impedance which is high compared to the impedance of the circuit of said secondary winding, whereby an undesired change in impedance of said secondary winding circuit will have substantially no adverse effect upon the impedance of said transmission line, a plurality of supporting members, one for each of said channels, and a housing carried by each of said supporting members, the transformer of each of said channels being contained within its associated housing, and the loudspeakers of each channel being removably mounted on the junction box of their associated channel for ready removal to remote points while still remaining connected to the secondary winding of their associated transformer.

11. In a sound distributing system, the combination of a tubular supporting standard, a housing mounted on said standard and having communication with the bore thereof, a receptacle secured to said housing, a loudspeaker removably carried in said receptacle, and circuit means coupled to said loudspeaker for connecting said loudspeaker to a source of signal energy, said circuit means including a transformer within said housing, a first cable extending through said standard and connected to the primary winding of said transformer, and a second, flexible cable extending into said housing and connecting said loudspeaker to the secondary winding of said transformer, said second cable being of sufficient length to permit removal of said loudspeaker from said receptacle to a remote point while said loudspeaker remains connected thereby to said secondary winding.

12. The invention set forth in claim 11 characterized in that said housing is removably associated with said standard, and characterized further by the addition of a cap member adapted to serve as a cover for said standard upon removal

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of said housing therefrom whereby to protect said first cable from attack by the elements when said housing is removed from said standard.

13. In a sound distributing system, the combination of a base, a tubular supporting standard rising therefrom, a housing constituting a junction box mounted on said standard and having communication with the bore thereof, a pair of receptacles mounted on opposite sides of said housing, a pair of loudspeakers one of which is removably carried in one of said receptacles and the other of which is removably carried in the other of said receptacles, and circuit means coupled to each of said loudspeakers for connecting said loudspeakers to a source of signal energy, said circuit means including a transformer within said housing, a first cable extending through said standard and connected to the primary winding of said transformer, and a pair of additional, flexible cables each connected to a separate one of said loudspeakers, said additional cables extending into said housing and connecting said loudspeakers in parallel relation across

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the secondary winding of said transformer, and said additional cables being each of sufficient length to permit removal of their respective loudspeakers into the interiors of automobiles parked alongside of said junction box on either side thereof while said loudspeakers remain connected thereby to said secondary winding.

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The following references are of record in the file of this patent:

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