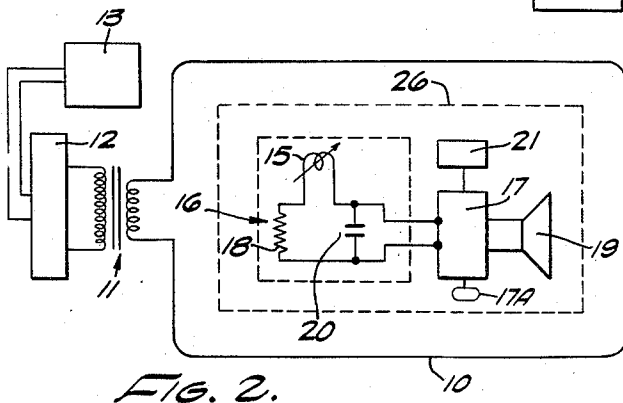
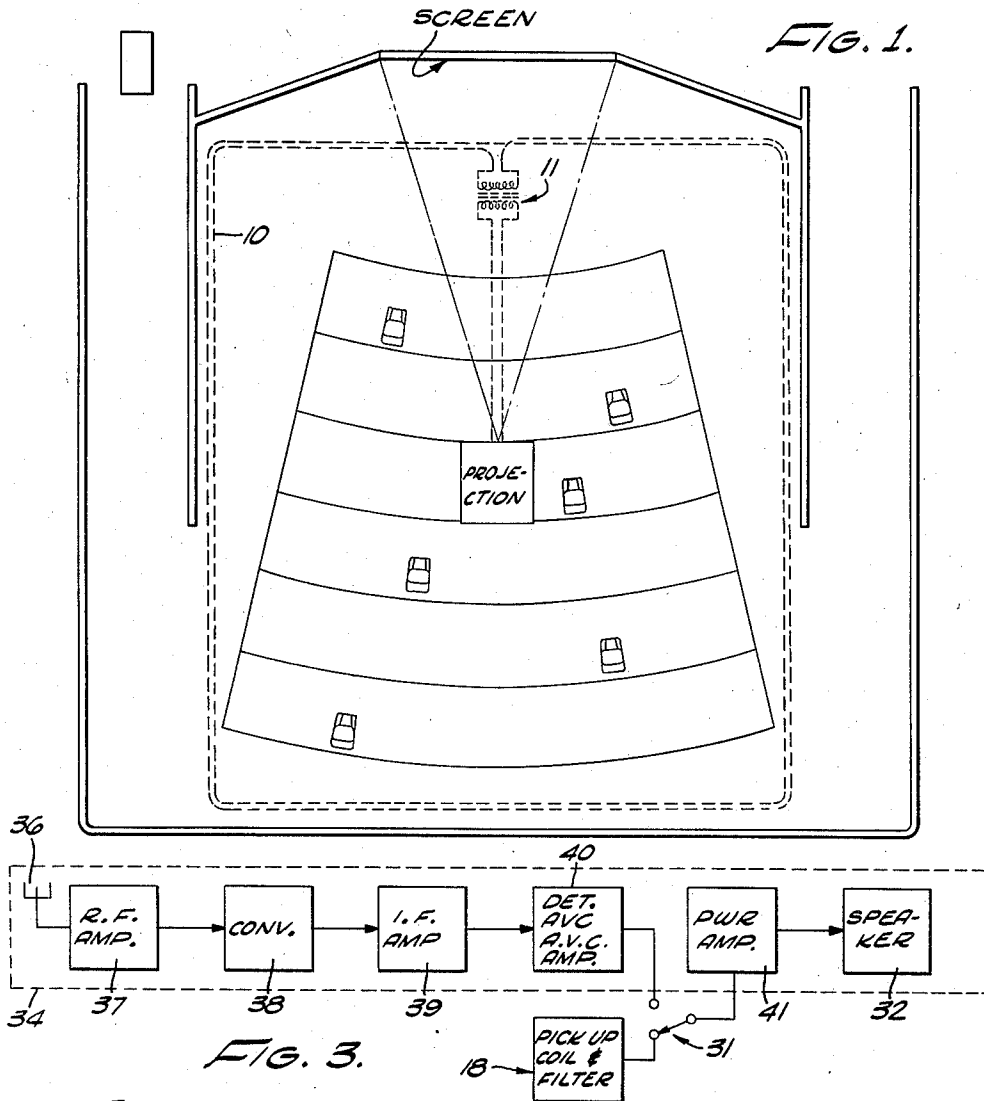


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AUDIO SYSTEM FOR DRIVE-IN THEATER

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1

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AUDIO SYSTEM FOR DRIVE-IN THEATER

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The present invention relates to improved means and techniques useful in transferring sound information from a central station to a plurality of remotely located stations, such as in drive-in motion picture theatres.

In present day drive-in motion picture theatres, electrical energy representing the sound portion of the motion picture is distributed throughout the theatre to a plurality of speakers, each of which is located adjacent to a parking area or auto station. The speaker is connected to an elongated flexible cable, to allow a patron to remove the same from a supporting post and to place the same within the interior of his automobile, such speaker usually being provided with hooks to allow it to be hung on the upper edge of a window of an automobile. While such arrangement is generally satisfactory, certain inconveniences and difficulties are encountered, such as those attendant upon handling and placement of the speaker and its subsequent replacement on the theatre supporting post at the time the patron wishes to leave the theatre, particularly since such operations are required usually to be performed in darkness or semi-darkness. It is not uncommon for a patron to drive away with a speaker still attached to his automobile, causing damage to the supporting post, connecting cable, speaker and/or automobile.

It is, therefore, a general object of the present invention to provide improved means and techniques particularly useful in drive-in theatres whereby the aforementioned difficulties and inconveniences are minimized or obviated.

For these purposes, use is made of the speaker which is already mounted in the automobile, such speaker being either a speaker of a conventional automobile radio receiver or a speaker previously installed for these particular purposes, or the speaker may be part of equipment which is loaned to the person when and as he enters the theatre, and which is returned when leaving the theatre.

The patron is allowed to use theatre speakers in the manner indicated above, but the patron is encouraged to provide his own speaker by expending some type of premium to him, such as, for example, a reduction in admission price. In such instances the patron, having his automobile equipped with the speaker, not only enjoys the advantages of such premium but also enjoys a better reproduction of the sound, since usually the speaker in his automobile is mounted in a better position for that purpose.

A specific object of the present invention is to provide an arrangement of this character which avoids the necessity of a separate cable for each automobile.

Another specific object of the present invention is to provide an arrangement of this character in which audio frequency energy is transferred to each automobile in the theatre without conductive underground connections extending to each automobile.

Another specific object of the present invention is to provide an arrangement of this character in which audio

2

frequency energy is inductively coupled to a pick-up coil in each automobile.

Another specific object of the present invention is to provide an improved system of this character which is not easily susceptible to "jamming" by electrical or radio disturbances produced either unintentionally or intentionally by pranksters.

A specific object of the present invention is to provide an arrangement of this character which eliminates the necessity for speaker supporting posts for each automobile.

Another specific object of the present invention is to provide an arrangement of this character which, by eliminating the necessity for speaker supporting posts, permits the accommodating of an increased number of automobiles for any given area.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. This invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawings, in which:

Figure 1 illustrates generally a plan view of a drive-in theatre which incorporates features of the present invention;

Figure 2 represents generally in schematic and diagrammatic form the electrical circuitry embodying features of the present invention; and

Figure 3 illustrates electrical circuitry whereby a conventional radio receiver mounted in an automobile may be adapted to receive the sound portion of the motion picture, in accordance with other features of the present invention.

In accordance with an important feature of the present invention, energy of audio frequency, representing sound, is inductively coupled from a central station, such as the projection booth of a drive-in theatre to a plurality of remotely located stations, such as automobiles in the theatre.

Another important feature of the present invention is that such audio frequency inductive coupling is accomplished using a loop of wire which embraces all of the remote stations, i. e. automobiles.

As shown with reference to Figure 1 and 2, a loop of wire consisting of one or more turns completely surrounds the entire speaker area of the theatre. This loop can be placed above or below ground, and its resistance is preferably such that it is substantially equal to the secondary impedance of the output transformer 11 for impedance matching purposes.

The loop 10 is connected to the secondary winding of transformer 11 and is preferably buried in the ground. The primary winding of transformer 11 is connected to the output terminals of power amplifier 12 which, in turn, is coupled to the pick-up head 13 associated in conventional manner to the sound recording on the motion picture film being viewed by the patrons of the theatre.

It is contemplated that each automobile is equipped with the apparatus illustrated in Figure 2 or equivalent apparatus. Such apparatus includes a pick-up coil 15 which comprises an element of the low pass filter 16, a low power audio frequency amplifier 17, a battery supply 21 and a speaker 19.

The pick-up coil 15 is, of course, inductively related to the loop 10 so that voltages of audio frequency are induced in the same in accordance with the current variations in the loop 10. The coil 15 has one of its terminals connected to the input terminal of amplifier 17, the other terminal of coil 15 being connected through filter resistance 18 to the other input terminal of amplifier 17. A filter condenser 20 is connected across the input terminals

3

of amplifier 17. The output terminals of amplifier 17 are connected to speaker 19. The amplifier 17 may be of the transistor type and be powered by a suitable battery pack 21.

The receiving apparatus shown in Figure 2 is mounted in a suitable cabinet or case and supplied to individual patrons when and as they enter the theatre and are collected upon leaving.

The sound pick-up coil 15 is an air core coil of suitable diameter to fit in such case or cabinet and may consist of 500 or more turns of small size, such as American wire gauge No. 32, enameled wire.

The amplifier 17 is a low power amplifier delivering about 25-50 milliwatts of audio power.

The battery supply 21 may be self-contained in such case or cabinet designated generally by the dotted rectangle 26, or in some cases the battery supply 21 is the automobile storage battery of 6 or 12 volts, and in such case a flexible elongated cable (not shown) may extend from the cabinet 26 with a terminating conventional plug (not shown) which is insertable in the conventional automobile cigarette lighter socket.

In other arrangements, the low pass filter comprising the elements 15, 18 and 20 may be installed in the automobile and a single pole-double throw switch 31, as shown in Figure 3, may be used to either apply to the automobile radio speaker 32, audio signals derived from a conventional automobile broadcast set, or audio signals derived from the pick-up coil 15.

Thus, in Figure 3, the elements within the dotted rectangle 34 comprise all elements of a conventional automobile receiver mounted in an auto. Such elements comprise an antenna 36, a radio frequency amplifier stage 37, a converter stage 38, an intermediate frequency amplifier stage 39 of the superheterodyne receiver, a detector, automatic volume control and audio frequency stage 40, a power amplifier stage 41, all coupled in that order to the speaker 32.

The switch 31 has one of its stationary contacts connected to the output circuit of the audio frequency stage 40, its other stationary contact connected to the output of the pick-up coil and filter circuit 18, the movable contact of such switch 31 being connected to the input of said power amplifier 41 so that a patron may selectively reproduce on speaker 32 either the audio components of a radio broadcast transmission or the sound portion of the motion picture film.

If desired, the switch 31 may be replaced by a conventional phone jack which normally renders the receiver fully operative, and the unit 18, Figure 3, loaned to a patron when and as he enters the theatre, is provided with an elongated flexible cable terminating in a conventional phone plug which is insertable in such jack to disable the receiver and to allow reproduction of the sound portion of the motion picture film.

Suitable manually adjustable volume control means may be provided in the different arrangements described. For example, in the arrangement shown in Figure 2, the audio amplifier may be provided with a manually adjustable volume control knob 17A for adjusting, for example, the position of a tap on a potentiometer; or the axis of the pick-up loop 15 may be adjusted with respect to the plane of the loop 10 so as to adjust the intensity of the signal induced in the pick-up coil, and hence the volume of the reproduced sound. For this purpose, the loop 15 may comprise wire wound in cylindrical form on a coil form and means may be provided for pivoting the coil form, Figure 2, as to change the orientation of the magnetic axis of the coil with respect to the plane of the inductive loop 10. An adjustable coil 15, as thus described, may be the sole means for manually adjusting the volume.

While the particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in

4

its broader aspects and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

We claim:

1. An audio distribution system in an automobile drive-in location comprising a first audio frequency inductive loop buried in the ground and circumscribing an area which includes a plurality of stations, each of said stations including an automobile having a metallic body, and a second audio frequency inductive loop within said metallic body at each of said stations inductively picking up audio frequency energy from said first loop.

2. A system as described in claim 1 in which the plane of said second loop is adjustable with respect to the plane of the first-mentioned loop for controlling the intensity of signals induced by the first loop into the second loop.

3. In an automobile drive-in theater, a sound reception system wherein it is desired to reproduce sound in a plurality of automobiles, each having a metallic body, in accordance with audio signals, audio signal receiving means in the metallic body of each automobile comprising an audio frequency inductive loop, and an audio frequency inductive loop buried in the ground in the theater and cooperating magnetically with said inductive loop in said magnetic body to transfer signals of audio frequency therebetween, and a source of audio signals connected to the second mentioned inductive loop to produce currents of audio frequency in said second loop.

4. In a drive-in theater, a sound reception system wherein it is desired to reproduce sound in a plurality of automobiles having metallic bodies in accordance with electrical signals, the improvement which resides in burying in the ground an extended audio frequency inductive loop to encompass said plurality of automobiles in said theater, and a source of audio frequency only connected to said loop to produce currents of audio frequency therein.

5. In a drive-in theatre as set forth in claim 4 including in combination therewith, audio signal receiving means on each automobile in said theatre comprising an audio frequency inductive loop cooperating magnetically with said extended audio frequency inductive loop to transfer signals of audio frequency therebetween.

6. In an automobile drive-in theater, a sound reception system wherein it is desired to reproduce sound in a plurality of automobiles having metallic bodies in accordance with audio frequency signals only, a first buried audio frequency inductive loop circumscribing an area which includes said plurality of automobiles, a source of audio frequency only connected to said loop to produce a flow of audio frequency currents therein, a second audio frequency inductive loop within each of said metallic bodies inductively picking up audio energy from said first loop.

7. An improved automobile drive-in theater having an inductive loop which is buried in the ground and which follows generally the perimeter of the theater to thereby circumscribe all of the automobiles in said theater, and a source of audio frequency only connected to said loop.

8. An arrangement as set forth in claim 7 in which an audio frequency inductive loop is mounted in each of the metallic bodies of said automobiles in magnetic relationship to the first mentioned loop.

9. The arrangement as set forth in claim 8 in which said loop in each automobile has its plane adjustable to thereby allow control of the intensity of the signal picked up by the loop in each automobile.

10. A sound reception system in an automobile drive-in theater comprising an audio frequency inductive loop buried in the ground and encompassing said theater, a source of audio frequency only connected to said loop to produce the flow of audio frequency in said loop, a receiving system in the metallic body of each automobile, said receiving system including an audio frequency amplifier having an input circuit and an output circuit, a speaker connected to said output circuit, a low pass audio

5

frequency filter connected to said input circuit, said low pass circuit including an audio frequency inductive loop magnetically associated with the first mentioned loop.

11. In a drive-in theatre in which a plurality of automobiles is parked on an extended surface area, the combination comprising an extended audio frequency inductive loop which is disposed below and encompasses said surface area to encompass said plurality of automobiles in said theatre, a source of audio frequency only connected to said loop to produce currents of audio frequency therein, audio signal receiving means on each auto-

5

10

6

mobile in said theatre comprising an audio frequency inductive loop cooperating magnetically with said extended audio frequency inductive loop to transfer signals of audio frequency therebetween.

References Cited in the file of this patent

UNITED STATES PATENTS

2,122,145	Kear et al. -----	June 28, 1938
2,567,431	Halstead -----	Sept. 11, 1951