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W. E. TILTON ET AL
ELECTRONIC SOUND TRANSMISSION

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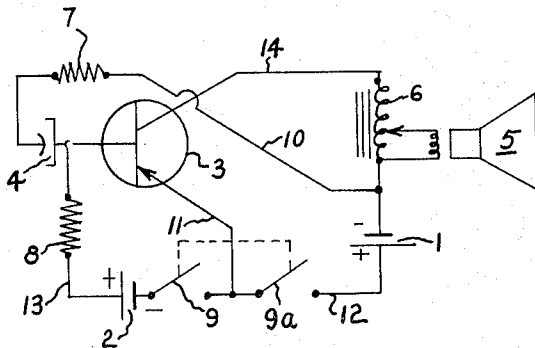


Fig. 1

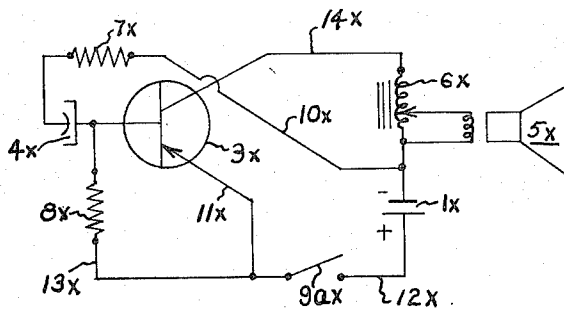


Fig. 2

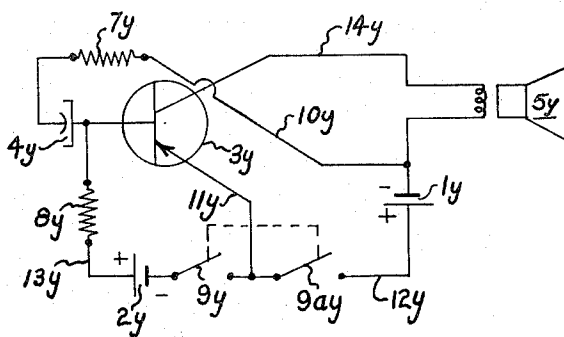


Fig. 3

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ELECTRONIC SOUND TRANSMISSION

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This invention relates to electronic sound transmission and particularly to such transmission between relatively remote points.

An object of the invention is to provide a simple and inexpensive electronic system whereby the ringing of a telephone bell or a spoken message or some other sound or signal may be transmitted to some point remote from the source of the sound.

Another object is to materially amplify the transmitted sound in the course of its electronic transmission.

Another object is to provide a sound transmission system that will employ a negligible, if any, current flow except when exercising its transmission function.

These and various other objects are attained by the construction hereinafter described and illustrated in the accompanying drawing, wherein:

FIG. 1 diagrammatically shows the invention in a preferred form.

FIGS. 2 and 3 are diagrams showing modifications of the invention.

Referring in greater detail to FIG. 1, the illustrated system includes batteries 1 and 2, a transistor 3 of a power type, a microphone 4 of a carbon granule type, a loud speaker 5, a transformer 6 operatively coupled to the speaker, resistors 7 and 8 suitably limiting the current flow, and two switches 9 and 9a interconnected for opening or closing in unison. Carbon microphones such as used in this system commonly have a disk from suiting them to lie on one of their sides, when underlying a telephone stand and to be manually held in a vertical position when receiving spoken sounds.

When the switches 9 and 9a are closed, current will tend to flow from the battery 1 through a conductor 10 and the resistor 7 to the microphone, then through the transistor base to the emitter, and back to the battery 1 through series-connected conductors 11 and 12. Such flow would, however, put a useless load on the battery 1 during intervals of nonuse of the system, and to avoid such load, the battery 2, of opposite polarity to the battery 1, is interposed in a shunt 13 wherein the switch 9 is in series with the resistor 8, such shunt being in parallel with the transistor base and emitter. Due to opposing potentials of the batteries, to low impedance of the carbon microphone, and to the relative values selected for the resistors 7 and 8, there will be no material current flow through the microphone when lying on its side as is the case in absence of sound transmission. Also the base of the transistor will be biased to cut off, eliminating material flow from either the base or collector to the emitter. During sound transmission, however, the carbon granules are vibrated responsive to sound waves, which thus materially reduce the microphone resistance, and so permit an effective flow of current. So that the speaker may respond fully to the microphone, the transformer is interposed in a conductor 14 leading from the battery 1 to the collector and controlling current flow

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from the transformer to the collector. In use of the described system to transmit the ringing signal of a telephone bell (not shown), the microphone is usually disposed beneath the dial-mounting stand (not shown) and in such proximity to the usual sound outlets of such stand as to obtain a maximum response of the microphone to sound waves delivered through said outlets. The current-supplying capacity of the battery 1 materially exceeds that of the battery 2, the former being preferably about four times the latter. As compared to prior developments, our improved system achieves a longer battery life, increased sensitivity, a greater amplification of transmitted sounds or signals, and a more compact arrangement of the apparatus. The voltage of the two batteries should be substantially the same.

In the modification illustrated by FIG. 2, the battery 2 and switch 9 are eliminated, the other elements of the system being designated by the reference characters employed in FIG. 1, with "x" added. The resistor 8x is materially reduced in value to keep base current at a minimum consistent with the best performance. For example, the resistor 8 may in FIG. 1 have a value of 270 ohms, while in FIG. 2, such resistor will preferably be reduced to about 60 ohms.

FIG. 3 differs from FIG. 1 only in elimination of the transformer 6, the remaining elements being designated as per FIG. 1 with addition of "y" to the reference characters. FIG. 3, however, requires a speaker of higher impedance than will serve for FIG. 1 to compensate for elimination of the transformer 6.

What we claim is:

1. An electronic sound transmission system comprising a current source with two poles, a loudspeaker, a transistor including a base, an emitter, and a collector, a first conductor joining one pole of said source to said base, a microphone of a carbon granule type operatively interposed in said conductor in series with the base and proportioned for insertion beneath and adjacent to a telephone stand having a sound signal with means for sounding said signal to indicate an incoming telephone call, a second conductor operatively connecting said pole to the collector, means interposed in the second conductor in series with the collector to activate the loudspeaker, and a third conductor joining the other pole of the source to said emitter.

2. In an electronic sound transmission system as set forth in claim 1, a fourth conductor forming a shunt in parallel with the base and emitter, and a resistor in said shunt predeterminedly opposing current flow through the shunt.

3. In an electronic sound transmission system as set forth in claim 2, another current source interposed in said shunt in series with said resistor.

4. An electronic sound transmission system as set forth in claim 1, said microphone being of the carbon granule type.

5. In an electric sound transmission system as set forth in claim 1, a resistor in the first conductor predeterminedly limiting opposing current flow through such conductor.

6. An electronic sound transmission system as set forth in claim 3, the two current sources being of opposite and substantially equal voltage.

7. An electronic sound transmission system comprising a transistor including a base, an emitter and a collector, a first current source, a microphone and a resistor energised by and in series with said current source and further in series with said base, a second current source, a loud speaker in series with the collector and also in series with and energised by said first current source, and a second resistor interconnected in series with the base, the joint resistance of the first-mentioned resistor and the microphone being substantially equal to the resistance of the second resistor.

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10 ROBERT H. ROSE, *Primary Examiner*.

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