June 1, 1926.

1,587,107

G. D. EDWARDS

PUBLIC ADDRESS SYSTEM

Filed May 12, 1922

Fig. 1

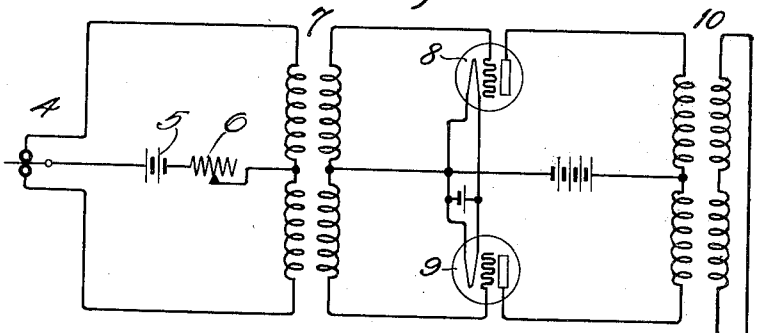


Fig. 2

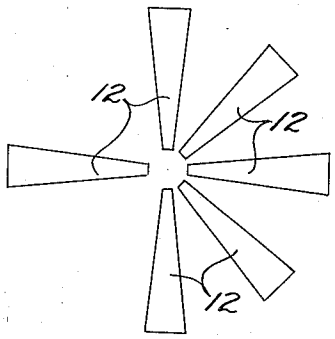
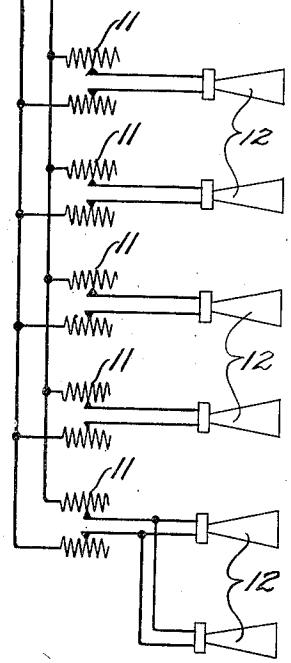
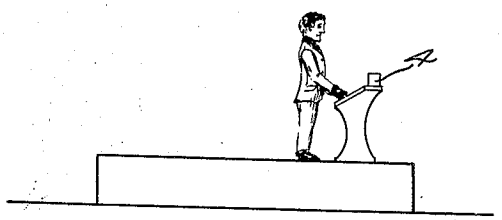


Fig. 3







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Att'y.

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UNITED STATES PATENT OFFICE.

GEORGE D. EDWARDS, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PUBLIC ADDRESS SYSTEM.

Application filed May 12, 1922. Serial No. 560,507.

This invention relates to electrical systems for the transmission of sounds and particularly to those employing a plurality of loud speaker projectors for use in addressing or entertaining audiences.

If loud speaking systems employing a plurality of loud speaking projectors could always be used under ideal climatic and acoustical conditions the projectors could advantageously be adjusted to the same volume. Although substantially ideal conditions may be provided so far as a speaker's voice is concerned, difficulties are encountered when his voice is highly magnified and distributed in all directions by loud speaker projectors. Sound reflecting surfaces and objects ordinarily out of the speaker's voice range may be well within the projector's range and unless means are provided to control the volumes of the projectors echoes and other interferences will result and materially interfere with the intelligibility and the proper distribution of the sound. This is true for both indoors and outdoors speaking.

It is also desirable to be able to control the volumes of the various projectors to compensate for the poor acoustics usually found in certain sections of auditoriums; and when the system is used outdoors, to compensate for the direction and velocity of the wind. While it is desirable to adjust the projectors to give uniform distribution, obviously in many cases this cannot be conveniently accomplished. It is, therefore, necessary to adapt a loud speaking system to the surrounding conditions in order to produce satisfactory results.

An object of the invention is to provide a public address system adaptable to the climatic and the acoustical conditions under which it may be used.

Another object of the invention is to provide a public address system having a plurality of loud speaking projectors with means for selectively and severally regulating their volumes.

Another object is to provide a public address system with adjustable resistances individual to each projector for controlling the power input thereto.

Other objects will appear hereinafter.

In general, the invention comprises a transmitter connected to a plurality of loud speaking projectors through means associated with the projectors for selectively and severally controlling their volumes.

In the drawing, Fig. 1 represents a schematic of a loud speaking system embodying the invention.

Fig. 2 is a plan view of the projectors.

Fig. 3 is an elevation of the arrangement shown in Fig. 2.

A high quality transmitter 4 of the push-pull type, such as described in the Journal of the American Institute of Electrical Engineers for April 1923, page 352, is connected to the primary of a transformer 7. The diaphragm, or common electrode, of the transmitter is connected through a battery 5 and an adjustable resistance 6 to the neutral or center of the primary and the other electrodes are connected to opposite ends of the transformer. The secondary of transformer 7 is connected to the inputs of amplifiers 8 and 9 of an amplifying circuit, such as disclosed in Fig. 1 of Patent 1,128,294, E. H. Colpitts, February 16, 1915. In the output circuits is connected the primary of transformer 10. To the secondary of transformer 10 is connected a plurality of loud speaking projectors 12 in parallel. In series with the projectors is connected adjustable resistances 11 which permits individual adjustment of their volumes for the purpose of controlling the relative sound outputs to give the proper sound distribution.

The projectors 12 consist preferably of receivers of the type disclosed in Patent No. 1,365,898, January 18, 1921 to H. C. Egerton equipped with suitable horns.

In an installation for reinforcing a speaker's voice and extending its range, the projectors may be arranged in a horizontal plane above the speaker, but are usually adjusted so as to be slightly lower at their open ends than at their receiver ends. The receiver ends are usually disposed as near as practical at the same point, the horns projecting radially therefrom. The center of the group of projectors is substantially above the speaker. The transmitter, or transmitters as it may be desirable to use more than one in order to give the speaker more freedom, are located at any convenient place within the acoustical shadow of the projectors, that is, the region within the neighborhood of the projectors where the sound

therefrom is substantially inaudible. Such an arrangement is important to prevent interference or howling between the transmitter and the projectors.

Figures 2 and 3 represent schematically the relation between the speaker, the projectors and the transmitter. The actual arrangement of the projectors, as well as their volumes, is dependent upon the distribution of audience, and the acoustical characteristics of the surroundings. In the case of long distance transmission, the audience depends entirely upon the projectors. In this case the projectors may be grouped, as already described.

What is claimed is:

1. A public address system comprising a transmitter, a plurality of loud speaking projectors grouped substantially at the same point and extending radially therefrom for projecting sound over a large area and means associated with said projectors for controlling the distribution of the sound over said area.

2. A public address system comprising a plurality of loud speaking projectors grouped substantially at the same point and extending radially therefrom for projecting sound over a large area and adjustable resistances associated with the projectors for controlling the volumes thereof to effect proper distribution of the sound over said area.

3. A public address system comprising a plurality of loud speaking projectors grouped at substantially the same point for distributing sound over a large area, means associated with said projectors for controlling the distribution of the sound over said area and a transmitter disposed within the acoustical shadow of said projectors and under said projectors.

4. A public address system comprising a source of sound, a plurality of loud speaking projectors disposed substantially radially and substantially in a horizontal plane above said source, means to control selectively and severally the volumes from said projectors and a transmitter disposed within the acoustical shadow of said projectors.

5. In an electrical system for the transmission of sound, a plurality of loud speaking projectors in parallel, means individual to each projector and in series therewith for selectively and severally controlling the volume thereof, a transmitter substantially equally responsive to the frequencies of importance in speech and music disposed within the acoustical shadow of said projectors.

6. An electrical system for the transmission of sound, a plurality of loud speaking projectors in parallel, an adjustable resistance in series with each projector for controlling its volume, a transmitter substantially equally responsive to the frequencies of importance in speech and music disposed within the acoustical shadow of said projectors, and a substantially distortionless amplifier circuit connecting said transmitter to said projectors.

7. An electrical system for the transmission of sound, a plurality of loud speaking receivers in parallel, a substantially radially projecting horn for each receiver, an adjustable resistance in series with each receiver, a transmitter substantially equally responsive to all voice frequencies disposed within the acoustical shadow of said receivers and horns, and a substantially distortionless amplifier circuit connecting said transmitter to said receivers.

8. In a public address system, the method of distributing sound which consists in arranging a plurality of loud speaking projectors for radial distribution of the sound from a common center so that they will cover acoustically a large area and varying the volume of the sound emitted from the several projectors to effect the proper distribution of the sound over said area.

9. In an electrical system for the transmission of sound wave energy, a plurality of parallel operated circuits, a loud speaker projector in each circuit, said projectors being grouped and extending radially from a common point for distributing sound over a large area, and means in each circuit for controlling the intensity of the sound distributed over said area.

In witness whereof, I hereunto subscribe my name this 19th day of April A. D., 1922.

GEORGE D. EDWARDS.