Nov. 5, 1929. H. GREEN 1,734,944

SOUND AMPLIFYING SYSTEM

Filed Dec. 21, 1928

Fig. 1.

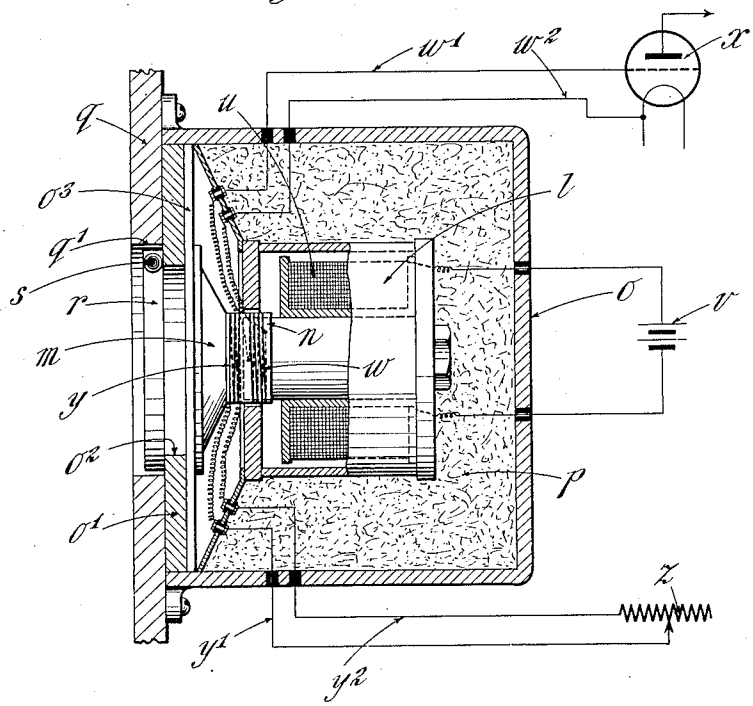
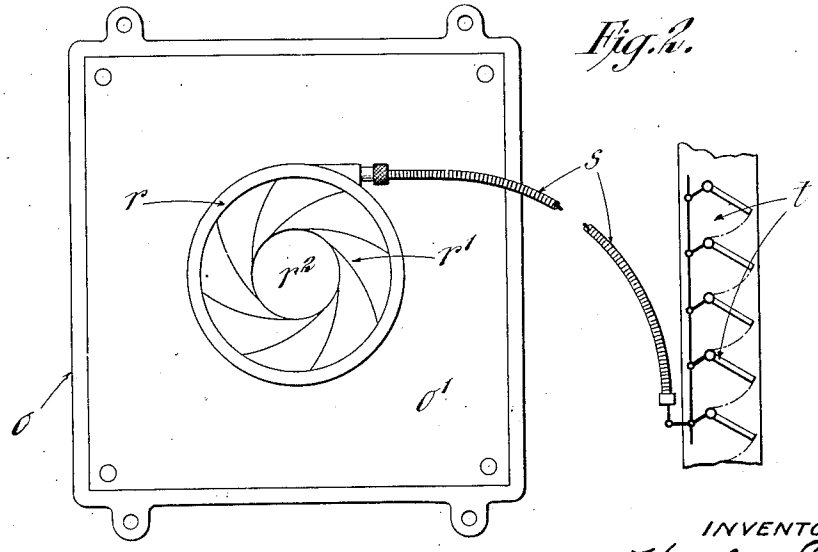


Fig. 2.



INVENTOR
Harold Green
BY Dowell & Dowell
his ATTORNEYS

Patented Nov. 5, 1929 1,734,944

UNITED STATES PATENT OFFICE

HAROLD GREEN, OF LONDON, ENGLAND, ASSIGNOR TO CELEBRITONE LIMITED, OF LONDON, ENGLAND, A BRITISH COMPANY

SOUND-AMPLIFYING SYSTEM

Application filed December 21, 1928, Serial No. 327,663, and in Great Britain October 11, 1927.

This invention relates to sound amplifying systems and particularly to those for use in theatres, auditoriums and the like. In such places, where an organ is frequently required as part of or supplementary to an orchestra, it may be possible to install only a small reed organ because of the cost of a large pipe organ and other considerations.

The present invention aims to provide means whereby the organ music may be amplified independently of the remainder of the orchestra so as to give results comparable with those obtainable by the use of a large pipe organ.

In accordance with my invention, I provide a microphone in a sound proof box having a single small opening through which alone sound may enter from the organ at a selected point where a correct balance between the high and low notes is obtained. This sound opening can be controlled by the organist to regulate the volume of sound emitted through the amplifier. It may be accomplished automatically by connecting the valve, slide or other element controlling said opening with the organ swells. The placing of the microphone in a sound proof box as aforesaid overcomes the difficulties due to the short distance between the organ and the loud speaker which might otherwise cause a howl effect at a pitch determined by the resonant points of the loud speaker and the microphone.

In the accompanying drawings:—Fig. 1 is a sectional side view of a microphone of the moving coil type and a sound proof enclosure therefor as adapted for carrying out the invention, certain electrical connections to the microphone being shown diagrammatically. Fig. 2 is a front elevation of the apparatus of Fig. 1, illustrating the connection of the device to the organ swells.

Referring to Fig. 1, the reference l denotes the magnetic system or pot magnet of the microphone, while m is the diaphragm thereof and n the form of holder for the moving coil attached to said diaphragm.

The whole of this microphone assembly is enclosed in a casing o the space between the pot l and the casing o being filled in with sound proof packing material p. The front cover o^1 of the casing o has an aperture o^2 for admitting sound to the diaphragm m while o^3 is an insert of felt or other soft, non-resonating material between the cover and the diaphragm. The casing o is attached to the organ casing q (at the back of the organ, for instance) in such a way that the aperture o^2 coincides substantially with an aperture o^1 in the casing q, through which aperture the sound from the organ can reach the diaphragm m. The volume of sound actually admitted to the diaphragm is regulable by means of a valve or shutter r, which in Fig. 2 is shown as comprising an iris diaphragm mechanism r^1. Assuming this valve or shutter to be set normally at a medium aperture, provision may be made for opening it wider when a larger volume of sound is required to be transmitted. For this purpose Fig. 2 shows the shutter r, r^1 coupled by transmission mechanism or cable s to the swells t of the organ, so that when the swells are operated the aperture r^2 of the iris diaphragm is simultaneously enlarged.

Referring now to the electrical connections of the microphone (Fig. 1) the pot magnet l is energized by a field coil u adapted to be energized from a direct current source v. The moving coil w in which are generated electric currents corresponding in frequency to the acoustic vibrations impressed on the diaphragm m is connected by leads w^1, w^2 to the input side of an amplifier, represented diagrammatically by the thermionic valve x.

The microphone is designed to smooth out the sound wave peaks, which would give a harsh and reedy reproduction, by means of suitable electrical damping. One convenient method consists in providing upon the form n, which carries the audio frequency moving coil w, a second or damping coil y which has the effect of producing a time lag sufficient to smooth out the undesirable wave peaks. If desired, the degree of damping produced by the coil y may be rendered adjustable by connecting the ends of said coil, through leads y^1, y^2, to a variable high resistance z instead of merely short circuiting said coil. With such a variable resistance in circuit, the tone

tends to be high pitched and harsh but a reduction of the resistance puts more electrical load across the coil y which, when a proper setting for z has been found, produces the desired time lag.

Instead of using a second coil such as y the form n for the audio-frequency coil w, may be provided by a light metal ring which, acting as a one-turn coil, will produce damping effects substantially the same as those set up by the second coil above referred to.

What I claim is:

1. In combination with an organ, an electrical system for amplifying the sound comprising a microphone having means damping the audio-frequency vibrations generated therein; a reproducer connected with the microphone and adapted to magnify the damped vibrations thereto transmitted; and a sound-proof container for the microphone connected with the organ and having a single size-controllable opening disposed toward said organ to admit sound only from the latter.

2. In combination with a organ, an electrical system for amplifying the sound comprising a microphone having means damping the audio-frequency vibrations generated therein; a reproducer connected with the microphone and adapted to magnify the damped vibrations thereto transmitted; a sound-proof container for the microphone having a single opening disposed toward the organ to admit sound only from the latter; and means for controlling said opening for varying the volume of sound thereby admitted to the microphone.

3. In combination with a source of sound production, an electrical system for amplifying the sound comprising a microphone having means damping the audio-frequency vibrations generated therein; a reproducer connected with the microphone and adapted to magnify the vibrations thereto transmitted; a sound-proof container for the microphone having a single opening disposed toward said source for admitting sound therefrom to the microphone; and a shutter device operable automatically by an operable part of the sound source for varying the size of said opening.

4. In combination with a source of sound production, an electrical system for amplifying the sound comprising a microphone having means damping the audio-frequency vibrations generated therein; a reproducer connected with the microphone and adapted to magnify the vibrations thereto transmitted; a sound-proof container for the microphone having a single opening disposed toward said source to admit sound therefrom to the microphone; and a shutter device connected for automatic operation from the sound source for varying the size of said opening according to the volume of sound emitted by said source.

5. In combination with a small organ used in connection with an orchestra, means for amplifying the organ music to produce an effect comparable to that resulting by use of a large pipe organ comprising a microphone having means for damping the audio-frequency vibrations generated therein, a reproducer connected with the microphone and adapted to magnify the damped vibrations thereto transmitted, a sound-proof container for the microphone having a single opening disposed toward said organ to admit sound only from the latter, and a shutter device connected with the swells of the organ for automatically varying the size of said opening according to the volume of sound emitted by the organ.

6. In a sound amplifying system as applied to a small organ, the combination with a microphone and a sound reproducer, of a sound-proof box for the microphone, said box being acoustically connected with the organ in a manner effecting a balance between the high and low registers and means automatically operable by a part of the organ for controlling the volume of sound admitted to the box from said organ.

7. A system for amplifying the acoustic output of the different instruments selectively of an orchestra, comprising a microphone within a sound-proof container disposed toward the instrument and having a single opening admitting sound therethrough to the microphone, means associated with the microphone for damping the audio-frequency vibrations generated therein so as to temper and clarify sound reproduction, and a reproducer connected with the microphone and adapted to magnify the damped vibrations thereto transmitted by the latter, together with a shutter device actuable to vary the size of the opening of said container for controlling the volume of sound admitted to the microphone from said instrument.

Signed at London, England, this 10th day of December, 1928.

HAROLD GREEN.