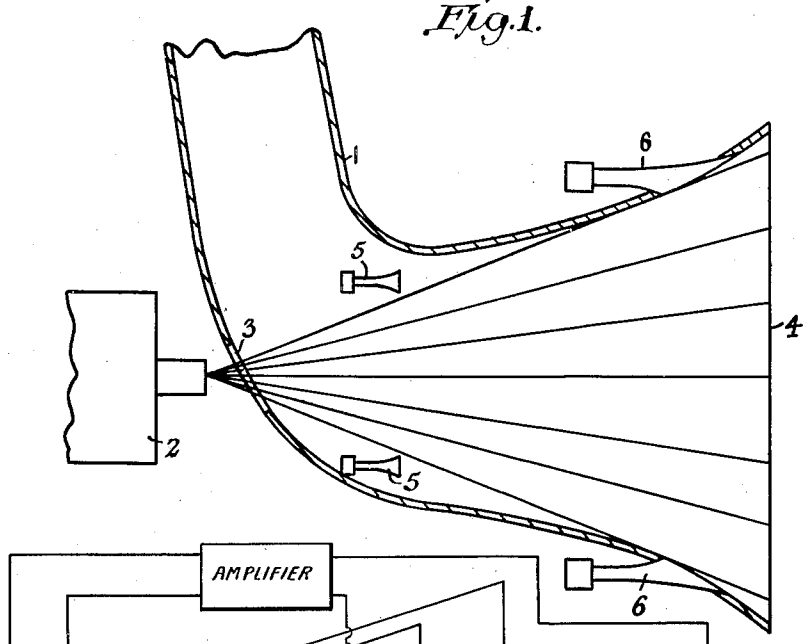
April 3, 1934. B. E. G. MITTELL 1,953,538

SIMULTANEOUS REPRODUCTION OF SOUNDS AND PICTURES

Filed Oct. 25, 1928

Fig. 1.



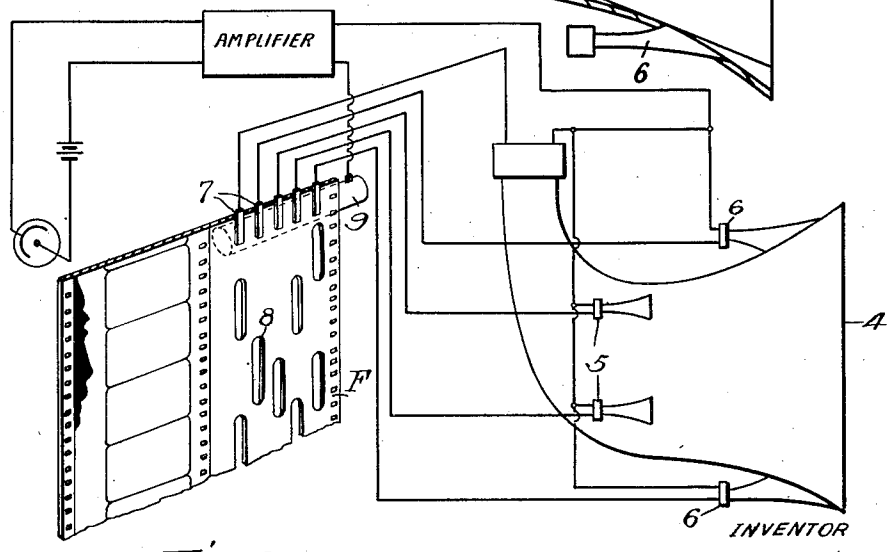


Fig. 2.

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Patented Apr. 3, 1934 1,953,538

UNITED STATES PATENT OFFICE

1,953,538

SIMULTANEOUS REPRODUCTION OF SOUNDS AND PICTURES

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Application October 25, 1928, Serial No. 315,050
In Great Britain November 8, 1927

8 Claims. (Cl. 88—16.2)

The present invention relates to the simultaneous reproduction of sounds and pictures.

The present invention, in one aspect, provides apparatus for the simultaneous reproduction of sounds and pictures comprising sound reproducing means disposed behind a picture screen and means whereby the distribution of the intensity of the sounds emitted through the screen may be controlled in accordance with the position upon the screen of the principal source or sources of sound.

It is known that the higher frequencies are of much greater importance than the lower frequencies in giving a sense of the direction from which the sounds appear to come. According to another aspect of the present invention therefore, the apparatus comprises a main sound reproducing device adapted to reproduce mainly the lower frequencies and one or more auxiliary reproducers adapted to reproduce mainly the higher frequencies and to give an audio impression of the position of the principal source or sources of sound in the picture. In this way, the position upon the screen at which the higher frequencies are most strongly reproduced can be made to coincide with or to be close to the point from which the sounds, or the larger part of the sounds, should appear to come.

The invention is particularly applicable, although not necessarily limited, to small apparatus suitable for home use and is illustrated in the accompanying drawing in which

Figure 1 is a sectional view, partly diagrammatic, showing a sound reproducing system in accordance with my invention, and

Fig. 2 is a view, partly in perspective and partly diagrammatic, showing the manner in which the various reproducers may be controlled.

Referring to the drawing, a moving picture projector 2 is arranged outside the horn 1 through which the sounds are emitted, the light from the projector 2 passing through a window 3 in the horn 1 and falling upon a screen 4 arranged in the mouth of the horn. The screen 4 should be made of a suitable translucent material which affects as little as possible the sound passing through it. The horn 1 is adapted to reproduce mainly the lower frequencies. Within the horn 1 are arranged a number of small reproducers 5 adapted to reproduce mainly the higher frequencies. The horns of other small reproducers 6 are also shown in the drawing opening into the large horn 1. The small reproducers 5 which are arranged within the horn are, as shown, so disposed that they do not cast a shadow upon the screen 4.

These auxiliary reproducers 5, 6 are preferably so distributed that sound is emitted by each over a fraction of the surface of the screen. For example, if six such small reproducers are used, the screen may be imagined to be divided into six parts, each part being provided with a small reproducer. Switching means are provided, so that the small reproducer which is situated in that part of the screen on which the principal source of sound is visible will be operating, and the other small reproducers will be out of action. If there is more than one important source of sound, such as a number of singers or speakers in different parts of the picture, more than one small reproducer may be used simultaneously. The switching means are preferably controlled automatically by the film F upon which the picture is recorded. For this purpose, a plurality of holes 8 may be provided in the sides of the film, the position of the holes being determined by the position of the principal source of sound in the picture.

In reproducing, suitable switch mechanism may be operated pneumatically, for example as in a piano player, or the holes may be caused to control the switch mechanism in any other known or suitable manner, as by permitting contact of the switch brushes 7 with a conducting roller 9 over which the film F passes. The holes may either be put into the film by hand, or they may be inserted automatically during the making of the combined sound and picture record. The hole cutting mechanism may for example be controlled by a device sensitive to the direction from which sounds fall upon it.

Alternatively the switching mechanism may be controlled by suitable photographic markings upon the film working in conjunction with a light sensitive device. These markings may be made upon the film automatically, at the same time that the sounds are recorded, by optical means controlled by the direction from which the sounds proceed. In the reproduction of talking motion pictures in a theatre, the picture screen is frequently arranged in a flared proscenium opening. This flared opening may, according to the present invention, be made to constitute the mouth of the horn of an electrical loud speaker which is used in reproducing the sounds accompanying the picture. Behind the screen and within the horn may be arranged, as already described, a number of small electrical reproducers adapted to deal mainly with higher frequencies.

Instead of providing a number of small fixed reproducers with switching means such as already described, one or more movable reproducers may be used, and their position may be changed either manually or automatically according to the position of the principal source of sound.

The picture projecting apparatus may of course be arranged upon either side of the screen.

I claim:

1. In apparatus for the simultaneous reproduction of sounds and pictures, a main sound reproducing device adapted to reproduce mainly the lower frequencies and to distribute them over substantially the entire area of the screen and one or more auxiliary reproducers adapted to reproduce mainly the higher frequencies and to give an audio impression of the position of the principal source or sources of sound in the picture.

2. In apparatus as claimed in claim 1, a picture screen which may be regarded as divided into a plurality of parts each part being associated with an auxiliary reproducer.

3. In apparatus as claimed in claim 1, switching means for controlling the distribution of acoustic currents to the several auxiliary reproducers in accordance with the position on the screen of the principal source or sources of sound.

4. In apparatus according to claim 1, means for moving said auxiliary reproducer or reproducers in accordance with the movements of the principal source or sources of sound in the picture.

5. In apparatus according to claim 1, means for removing or attenuating the lower frequency oscillations in that portion of the acoustic currents to be reproduced which are fed to the auxiliary reproducers.

6. Apparatus of the class described comprising, in combination with a moving picture screen and projecting apparatus associated therewith, a main sound reproducer adapted to reproduce mainly the lower frequencies and to distribute sounds substantially evenly over said screen, and a plurality of auxiliary reproducers each adapted to distribute sound over a portion only of said screen, said auxiliary reproducers being adapted to reproduce mainly the higher frequencies and being selectively operable to provide localization of the source of sound on said screen.

7. Apparatus of the class described comprising, in combination with a moving picture screen and projecting apparatus associated therewith, a main sound reproducer adapted to reproduce mainly the lower frequencies and to distribute sounds substantially evenly over said screen, a plurality of auxiliary reproducers each adapted to distribute sound over a portion only of said screen and being adapted to reproduce mainly the higher frequencies, and means for selectively operating said auxiliary reproducers in accordance with the position on the screen of the principal source of sound.

8. In apparatus of the class described, the combination with picture projecting apparatus of a sound conduit, a translucent screen for said picture projecting apparatus extending over the mouth of said sound conduit whereby sound waves passing through said conduit are projected over substantially the entire area of said screen, said picture projecting apparatus being arranged to project light through said sound conduit and onto the rear face of said screen, and at least one other sound conduit associated with said first-named sound conduit external to the path of light from said picture projecting apparatus to said screen, said other conduit being arranged entirely within said first-named conduit.

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