

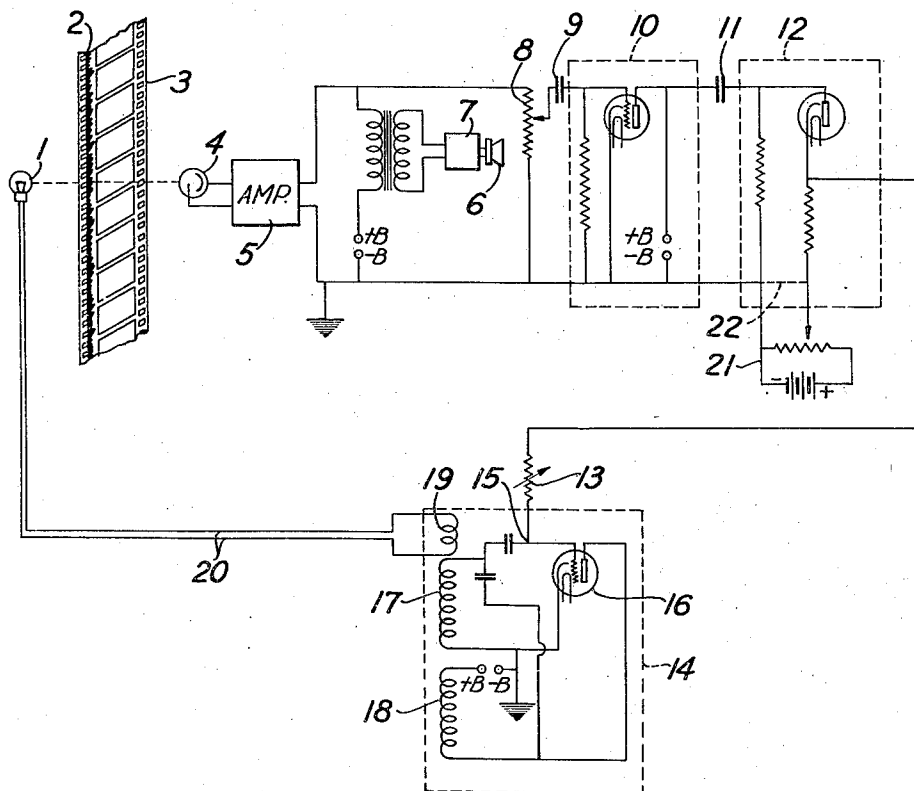
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SOUND REPRODUCTION

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SOUND REPRODUCTION

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4 Claims. (Cl. 179—100.3)

This invention relates to sound reproduction and particularly to electric circuits used for the reproduction of sound from sound-on-film records, such as used with motion pictures.

It is an object of the invention to provide a sound reproducing system having high fidelity over a greater range of sound volume than hitherto available.

Ordinarily, the volume range of sound is limited at the lower end by extraneous noise due to various causes and at the higher end by the capacity (i. e. 100 per cent modulation) of the recording device employed. Between such limits there is a range of about 40 to 50 decibels which is, however, inadequate for many types of orchestral renditions. This range may be extended by using some system of volume compression during recording and then to compensate for this compression, a system of volume expansion during reproduction.

It is a particular object of the invention to provide a simple method of volume expansion during reproduction and more specifically one which can be readily employed with systems wherein an exciter lamp is operated from a high frequency oscillator.

According to the invention, a portion of the photoelectric cell output carrying the signal being reproduced, is sidetracked before reaching the loud speaker and after amplification and rectification presents a D. C. potential which is a function of the amplitude of the signal (not necessarily linear). This D. C. potential is introduced to the grid of a high frequency oscillator tube and regulates the output thereof, which supplies power to the exciter lamp illuminating the photoelectric cell through the sound record. Thus any increase in signal volume, increases the oscillator regulating potential which in turn increases the oscillator output and the brightness of the exciter lamp. This causes an increase in the sensitivity of the "exciter lamp-photocell" combination which results in an increase of the photocell output. Thus the desired automatic volume expansion is obtained which is opposite in effect to the usual automatic volume control systems used in radio receiving sets wherein approximately constant output is sought.

Other objects and advantages of the present invention will be apparent from the following description of one embodiment of it when read in connection with the accompanying drawing which shows:

An electric circuit for sound reproduction incorporating the invention.

In this drawing an exciter lamp 1 illuminates the sound record 2 on a film 3 and the light transmitted thereby falls on a photoelectric cell 4. The output of this photoelectric cell is thus modulated in the usual way by the sound track 2 and carries the signal to be reproduced. This signal is passed through an amplifier 5 and operates a loud speaker 6 through its accompanying circuit 7.

According to this invention a portion of this output is passed through a control 8, a condenser 9, an amplifier shown as a triode 10, another condenser 11 and a suitable rectifier 12 shown as a diode to present at the point 15 in an oscillator circuit 14, a potential which varies in accordance with the amplitude of the output of the photoelectric cell 4. The absolute value of this potential may be controlled by a variable resistance 13. This potential on the point 15 may be introduced to the oscillator 14 in any manner whereby the output thereof is controlled thereby. In the specific arrangement shown an oscillator tube 16 having a coupled grid coil 17 and plate coil 18 is arranged so that the point 15 is connected directly to the control grid of the tube 16.

The output of the oscillator 14 is passed through a coil 19, inductively coupled to the oscillator coils 17 and 18, and through leads 20 to operate the exciter lamp 1. Thus, any increase in amplitude of the signal on the sound record 2 is recorded as an increase in signal output of the photoelectric cell 4 which, in turn, increases the potential at the point 15 of the oscillator 14. This increase in potential at the point 15 increases the output of the oscillator, which output is carried by the coil 19 and leads 20 to the exciter lamp.

In cases where the sound track 2 has been recorded linearly up to some predetermined amplitude and above this point volume compression has been used, it is desirable to incorporate in the invention means for determining the point (in amplitude) at which volume expansion begins. For this reason, I prefer to include some form of time delay circuit many of which are well known; for example, a simple potentiometer circuit 21 may be included in the cathode circuit of the rectifier tube 12. On the other hand, this potentiometer 21 may be entirely omitted by connecting this circuit directly as shown by the broken line 22.

Having thus described in detail one embodi-

ment of my invention, I wish to point out that it is not limited to the specific arrangement shown, but is of the scope of the appended claims.

5 What I claim and wish to secure by Letters Patent of the United States is:

1. An electric circuit for reproduction of sound-on-film comprising an exciter lamp and photocell combination adapted to transform a sound-on-film record into electrical modulation, a high
10 frequency oscillator supplying power to the exciter lamp and including control means operable in accordance with an input potential for controlling the energy supplied to the lamp, means
15 including a rectifier across the output of the photocell for establishing a potential in accordance with the amplitude of said modulations and means for supplying the latter potential as said input potential to the control means.
2. In a sound-on-film reproduction system
20 adapted to operate a loud speaker, an exciter lamp circuit comprising a high frequency oscil-

lator connected to the lamp, means for controlling the output of said oscillator and rectifying means across the input of the loud speaker for operating said control means.

3. In a sound-on-film reproduction system
5 adapted to operate a loud speaker, an exciter lamp circuit comprising a high frequency oscillator connected to the lamp, means for controlling the output of said oscillator, rectifying
10 means across the input of the loud speaker for operating said control means and means cooperating with the rectifying means for delaying its operation until the amplitude of the signal in said input reaches a predetermined value.

4. In a sound on film reproduction system
15 adapted to operate a loud speaker, an exciter lamp circuit comprising a high frequency oscillator for energizing the lamp, means for controlling the output of said oscillator and means
20 across the input of the loud speaker for operating said control means.

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