July 4, 1939. W. L. DOUDEN 2,164,736

SOUND PICTURE FADER

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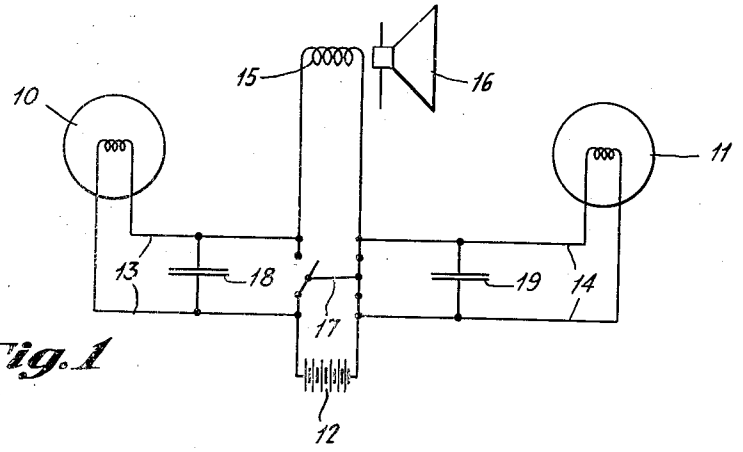


Fig. 1

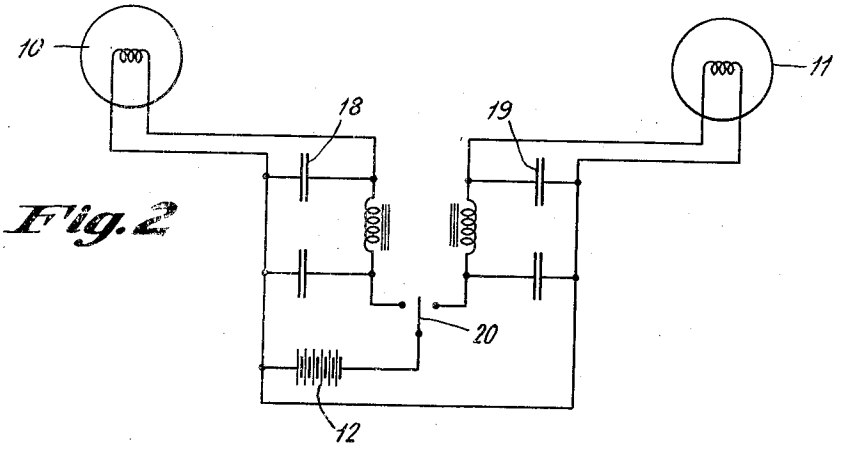


Fig. 2

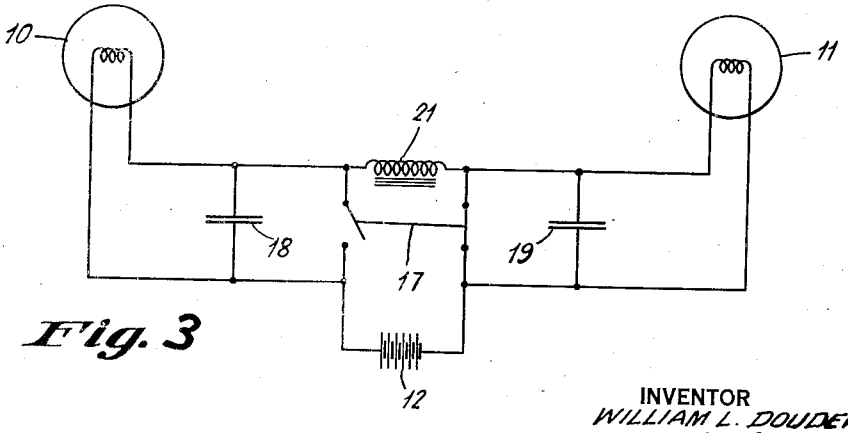


Fig. 3

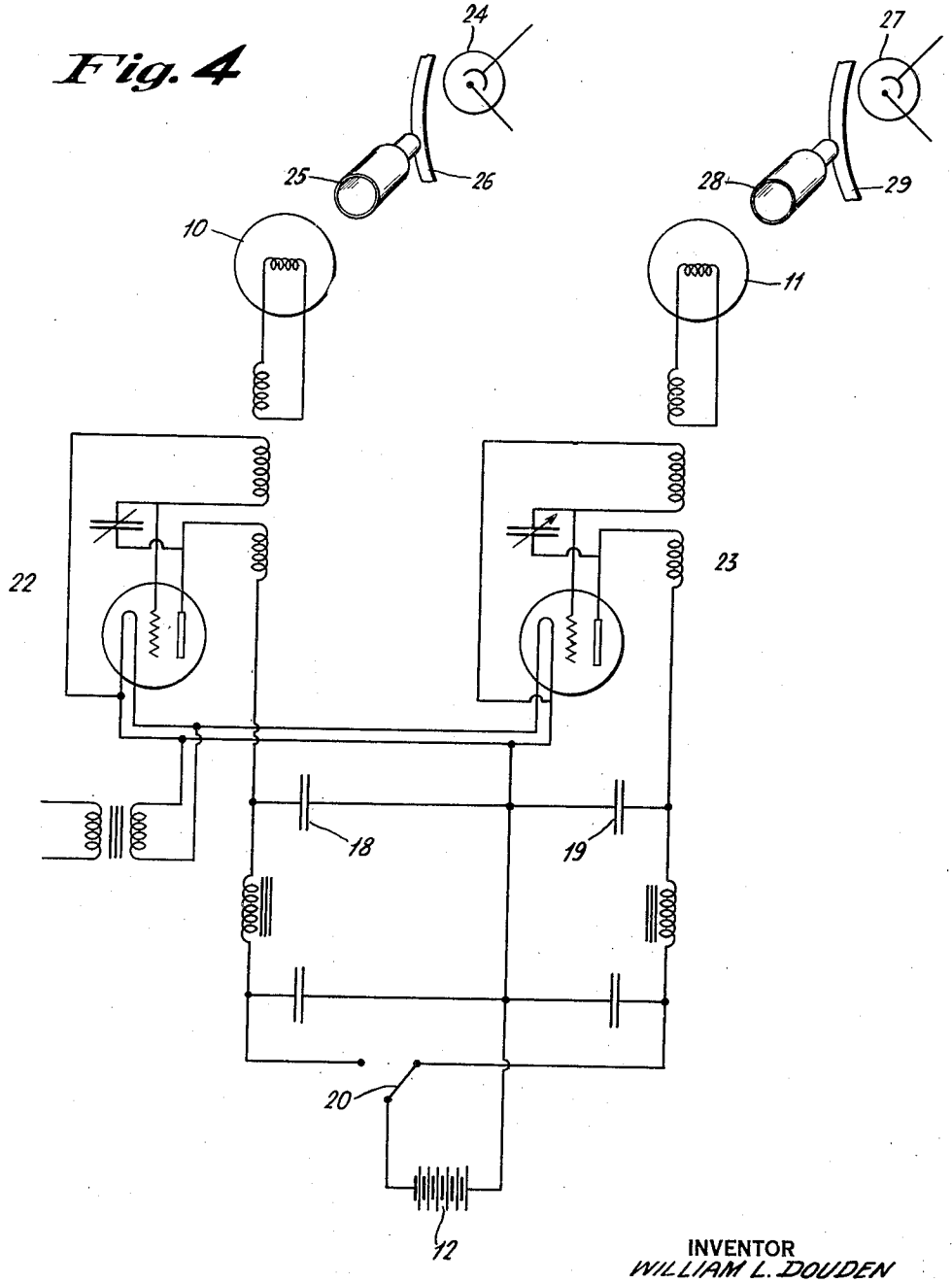
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Fig. 4



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2,164,736

SOUND PICTURE FADER

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Application February 9, 1935, Serial No. 5,876

12 Claims. (Cl. 179—100.3)

This invention relates to sound faders suitable for use in connection with sound pictures and the like, and has for its principal object the provision of an improved apparatus and method of operation whereby current may be readily switched from the exciter lamp of one sound head to that of another without producing undesired noise in the loudspeaker with which the sound heads are associated.

The various types of sound faders provided in the past have not been altogether satisfactory for the reason that they are unduly complicated and expensive or can not be operated without the production of click or other extraneous noise when the circuit is switched from one excited lamp to another. In accordance with this invention, this difficulty is avoided by providing between the control switch and the exciter lamp a delay circuit which produces a more or less gradual decrease in the current of the going-out lamp and a more or less gradual increase in the current of the coming-in lamp. As hereinafter explained, the delay circuit or network may include as one of its elements the field coil of the loudspeaker which forms a part of the sound reproducing apparatus and is readily applicable to different types of exciter lamp energization systems.

The invention will be better understood from the following description when considered in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

Referring to the drawings:

Figs. 1, 2 and 3 illustrate sound faders which include different arrangements of the delay network elements, and

Fig. 4 illustrates a combination of a combined delay network and oscillation generator for controlling the exciter current.

The arrangement of Fig. 1 includes exciter lamps 10 and 11 connected to be energized from a current source 12 through leads 13 and 14 respectively. Interposed between these two sets of leads is the field coil 15 of a loudpeaker 16. The connections of the circuits are controlled by a switch 17.

A condenser 18 is connected across the terminals of the lamp 10 and a condenser 19 is connected across the terminals of the lamp 11.

With the switch 17 in its illustrated position, the lamp 11 is short-circuited and the lamp 10 is supplied with current from the source 12 through the loudspeaker field coil 15 and the leads 13. Under these conditions, of course, the lamp 11 is dark. When it is desired to light the lamp 11 the switch 17 is moved to its left hand operating position. This movement of the switch first opens the short-circuit on the lamp 11 thus charging the condenser 19 at a sub-normal voltage and gradually building up the current of the lamp 11 through the loudspeaker field coil 15 and the lamp 10 and permitting the condenser 18 to discharge due to the reduced voltage applied to the lamp 10. Further movement of the switch 17 short-circuits the lamp 10 thus increasing the voltage applied to the condenser 19 of the lamp 11, the rate at which the current of the lamp 11 is increased being delayed somewhat by charging of the condenser 19 and speaker coil 15.

The arrangement of Fig. 2 differs from that of Fig. 1 in that there is added to each of the delay networks a series inductance and an additional shunt condenser. This modified net-work produces a somewhat slower rate of exciter lamp current change than that illustrated by Fig. 1. It is controlled by a switch 20 movable to connect either circuit with the source 12.

The arrangement of Fig. 3 is similar to that of Fig. 1 except that the loudspeaker field coil 15 is replaced by choke coil 21.

Fig. 4 illustrates the application of the invention to an exciter lamp system wherein the excitation current is delivered at an inaudible frequency. As in the case of Fig. 2, a filter comprising a series inductance and a pair of shunt capacities are arranged to be interposed by a switch 20 between the exciting lamps and the current source 12. Interposed between each delay circuit or filter and its corresponding exciter lamp is an oscillation generator 22 or 23 adapted to deliver current at an inaudible frequency depending on its tuning. Light from the exciter lamp 10 is transmitted to a photocell 24 through an optical system 25 and a sound record 26. Similarly, light from the exciter lamp 11 is transmitted to a photocell 27 through an optical system 28 and a sound record 29.

This latter form of the invention is particularly effective. Since the filtering is accomplished in the plate circuit of the oscillator tube, the filter unit is acting on a small current at a high voltage and a very efficient filter can be used which is neither bulky nor expensive. If the filter of the other forms of the invention is used with the customary exciter lamps operating with a rather heavy current at a low voltage, the size of the condensers and inductances must of course be increased accordingly.

It will be apparent from the foregoing that I have provided an improved fader which avoids

clicks or thumps in the sound reproducing device during the change-over and that the device of my invention is also free from the noises and other difficulties inherent in the prior art devices having moving contacts as in rheostats, fading potentiometers and the like. Further, my device can be made in the form of a single unit which has no moving parts and is adapted to be installed in any usual sound picture system.

Attention is called to the fact that the system of this invention is not limited to the illustrated embodiments but is readily applicable to different types of illuminating circuits and to any desired number of light sources.

I claim:

1. Sound reproducing apparatus including a plurality of exciter lamps, power supply leads, means for controlling the rate at which said lamps are energized and de-energized, and circuit control means for operatively associating said lamps with said leads one after the other.

2. A sound reproducing apparatus including a plurality of light sources, power supply leads, circuit control means for operatively associating said sources with said leads one after the other, and means for controlling the rate at which said sources are energized and de-energized.

3. Sound reproducing apparatus including a loudspeaker, a plurality of exciter lamps, power supply leads, current delay means including the field coil of said speaker for controlling the rate at which said lamps are energized and de-energized, and circuit control means for operatively associating said lamps with said leads one after the other.

4. The method of energizing and de-energizing the exciter lamps of a sound reproducer including a loudspeaker which includes connecting the field coil of said speaker in series with said lamps, and short-circuiting one of said lamps.

5. A sound reproducing apparatus including a plurality of exciter lamps, power supply leads, current delay means, oscillator generator means, and circuit control means for alternatively connecting said leads to said lamps through said circuit delay and oscillation generator means.

6. An illumination system including a plurality of light sources arranged to be energized one after the other, power supply leads, current delay means for controlling the rate at which said sources are energized and de-energized, and circuit control means for alternatively connecting said sources to said leads.

7. Sound reproducing apparatus including a plurality of exciter lamps, power supply leads, means for controlling the rate of increase or decrease of current through said lamps when they are energized and de-energized, and circuit control means for operatively associating said lamps with said leads one after the other.

8. A sound reproducing apparatus including a plurality of light sources, power supply leads, circuit control means for operatively associating said sources with said leads one after the other, and means for controlling the rate at which the current increases or decreases through said sources when they are energized and de-energized.

9. Sound reproducing apparatus including a loudspeaker, a plurality of exciter lamps, power supply leads, current delay means including the field coil of said speaker for controlling the rate at which the current increases or decreases when said lamps are energized and de-energized, and circuit control means for operatively associating said lamps with said leads one after the other.

10. An illumination system including a plurality of light sources arranged to be energized one after the other, power supply leads, current delay means for controlling the rate at which the current through said sources increases or decreases, when said sources are energized and de-energized, and circuit control means for alternatively connecting said sources to said leads.

11. Photophonographic apparatus including two exciter lamps connected in series, means providing sufficient current and voltage for one of said exciter lamps, and means for short circuiting one of said exciter lamps.

12. Photophonographic apparatus including a plurality of exciter lamps connected in series, means for selectively short circuiting said exciter lamps, and fixed means for controlling the rate of change of temperature of said exciter lamps.

WILLIAM L. DOUDEN.