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POLARIZING AND OUTPUT CIRCUIT FOR PHOTOSENSITIVE DEVICES

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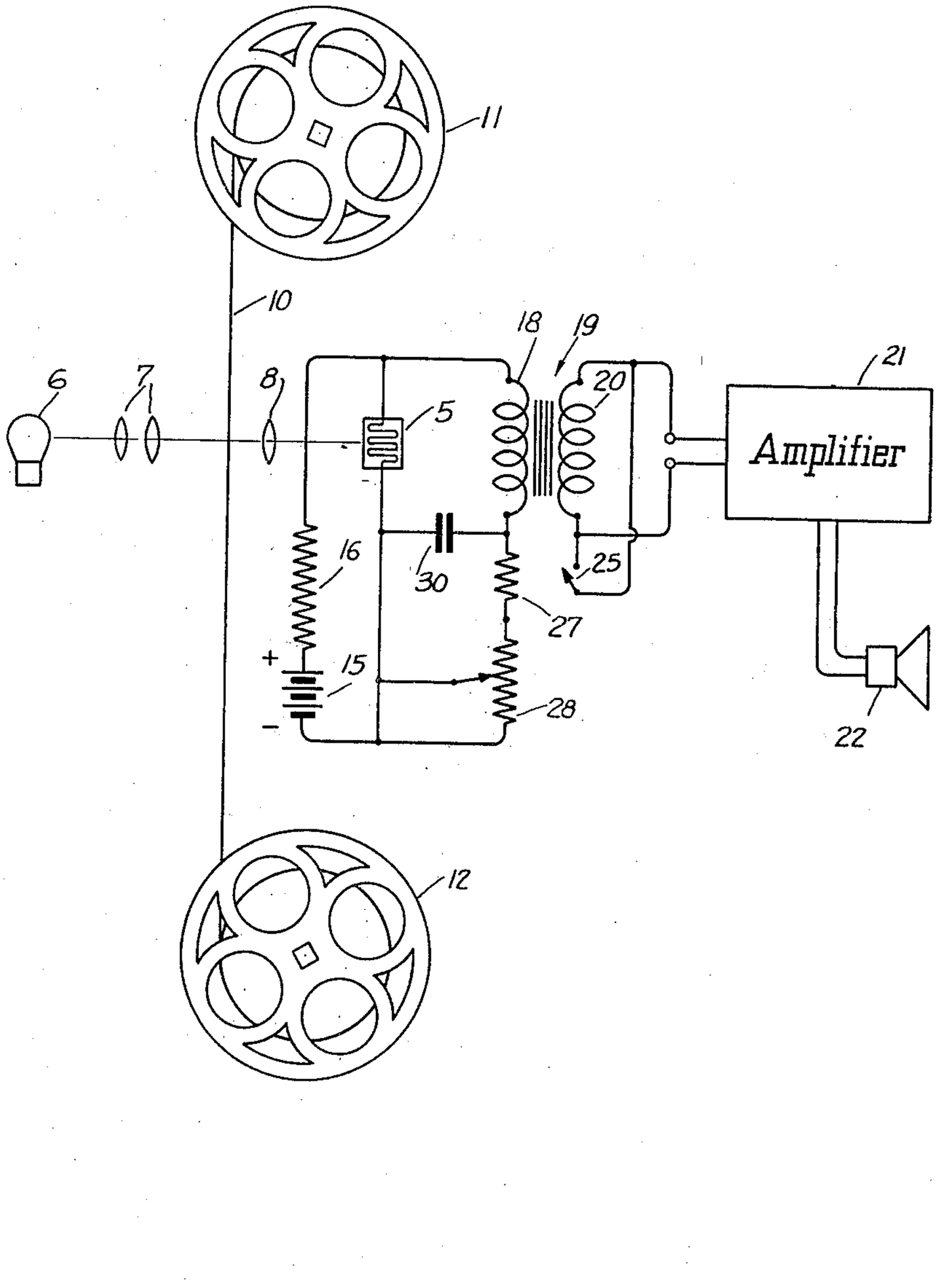

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POLARIZING AND OUTPUT CIRCUIT FOR PHOTOSENSITIVE DEVICES

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2 Claims. (Cl. 250—41.5)

This invention relates to electrical circuits and particularly to an energizing and output circuit for a light sensitive device such as a selenium cell.

In the art of sound reproduction wherein a beam of light is modulated directly by sound waves or by a record of sound waves, the modulated light is impressed upon a light sensitive device in the form of either a unit which varies in resistance proportionately to the light impinging thereon, such as a selenium cell, or a generator of electrical voltages proportionate to light, such as a photo-electric cell. In either case, the light sensitive device must be polarized and the variable current generated by the modulated light impressed on the device must be transmitted to an amplifier and sound reproducer. Various types of circuits interconnecting the cell and amplifier are well known, these circuits transmitting the variable components efficiently and also polarizing the cell unit.

This invention is directed to a cell circuit which not only provides the proper polarizing potential to the cell, and efficiently transmits the generated variable currents to an amplifier, but also provides a safety factor for the cell and intermediate transformer and prevents cell short circuits or open circuits from being transmitted to the sound reproducer with sufficient energy to cause annoyance to listeners. It also frequently happens that in removing and inserting the cells in their holders that short and open circuits occur and even during operation such incidents may happen.

The object of the present invention, therefore, is to eliminate extraneous noises at the reproducer caused by improper operation or handling of the cell, and to protect the subsequent apparatus such as the transformer from surges caused by short or open circuits.

The invention will be more fully understood by reference to the following description read in conjunction with the accompanying drawing, in which the single figure is a diagrammatic view of a sound reproducer system employing a film recording, and in which the cell circuit is shown schematically.

In the drawing, a light sensitive device 5 is shown as a selenium cell with interdigitated electrodes such as disclosed and claimed in U. S. application Serial No. 747,610 filed October 9, 1934. The light impressed on the cell 5 originates from a constant light source 6, is projected on the cell through an optical system which includes lenses 7 and 8, and is modulated by the sound track portion of a film 10, supplied from a reel 11 and taken up by a reel 12. Polarizing potential is supplied to the cell 5 from a direct current source 15 which may be either a battery or a source of rectified potential, in series with a high resistance 16 of approximately 300,000 ohms. In shunt to the cell 5 is a primary winding 18 of a transformer 19 having a secondary winding 20 connected to an amplifier 21 which in turn is connected to a sound reproducing device in the form of a loud speaker 22. The secondary 20 may be manually short circuited by a switch 25 if so desired.

In series with the primary winding 18 is a fixed resistance 27 of approximately 1000 ohms and a variable resistance 28 of approximately 30,000 ohms. A condenser 30 in the neighborhood of four microfarads is connected to the cell 5 at the negative terminal of source 15 and to a point intermediate the secondary 18 and fixed resistance 27, thus providing a variable current path for the currents produced by cell 5, as stated above, which includes cell 5, winding 18 and condenser 30. When light falls on the selenium cell 5, decreasing its resistance, the current through the parallel path 18, 27, will decrease accordingly. Also the condenser 30 when charged will tend to discharge through the low resistance path 18, 5 when the resistance of the selenium cell 5 decreases. This will cause a pulsating direct current through the primary 18 and the alternating current component of this pulsating direct current will appear in the secondary 20, as is well understood, since the direct current component cannot be transmitted through the transformer.

Not only is the arrangement of the above-described circuit important, but also the respective values of the resistances 16, 27 and 28 compared with the impedance or resistance of the cell 5 which is approximately 500,000 ohms but which may also have a lower value. First, since the resistance 16 has a value in the neighborhood of 300,000 ohms, the shunt direct current path comprising primary winding 18, resistances 27 and 28 will have a substantially constant current flowing therein at all times regardless of impedance variations in this or the cell circuit. Furthermore, this high resistance 16 prevents high voltage surges from reaching the cell 5. The second feature is that the resistances 27 and 28 further protect the primary winding 18 from voltage surges caused by breakdown or the short circuiting of the terminals of the cell 5, while the resistance 28 has the function of con-

trolling the volume output to the amplifier 21. By reducing the surges reaching the transformer 19, inductance kicks will not be present in the amplifier 21 and will be thus eliminated from the loud speaker 22.

It was found in practice that the circuit arrangement shown in the drawing with the elements having the values as stated above, provided a circuit which properly polarized the cell, efficiently transmitted the generated currents to the amplifier 21 and protected the cell 5 and the winding 18 from extraneous voltage surges. Although a selenium cell has been shown in illustrating the invention, it is to be understood that the circuit may also be employed for other light sensitive devices having comparable impedance.

What is claimed is:

1. A circuit for a light sensitive device comprising the combination of a source of polarizing potential, a high resistance in series with said source, and two paths in shunt to said serially connected source and high resistance, one of said paths comprising said light sensitive device, another of said paths comprising the primary winding of a transformer and a resistance lower in value than said high resistance, and a condenser for completing the variable current path through said light sensitive device and said primary winding.

2. A circuit in accordance with claim 1 in which a portion of said resistance lower in value than said high resistance is variably adjustable in value for varying the output of said light sensitive device.

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