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M. LATOUR

ELECTRICAL SYSTEM

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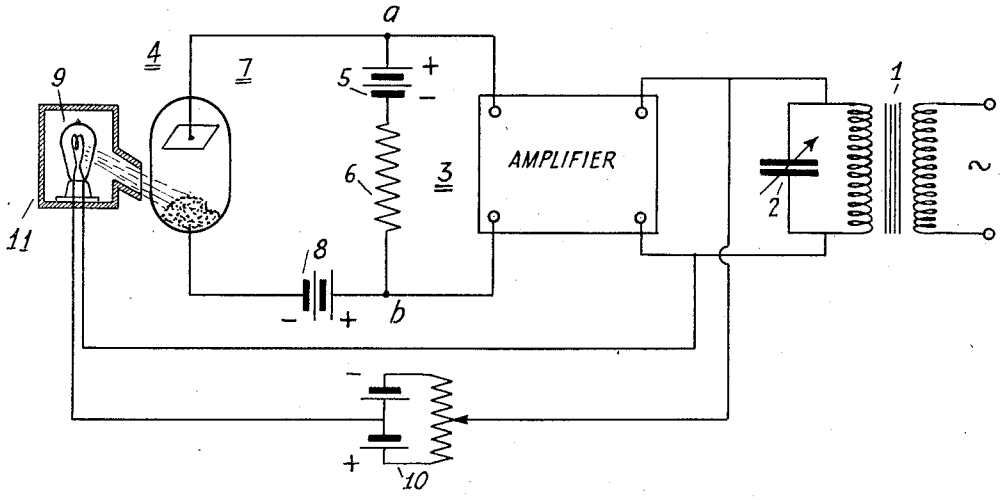


Fig. 1

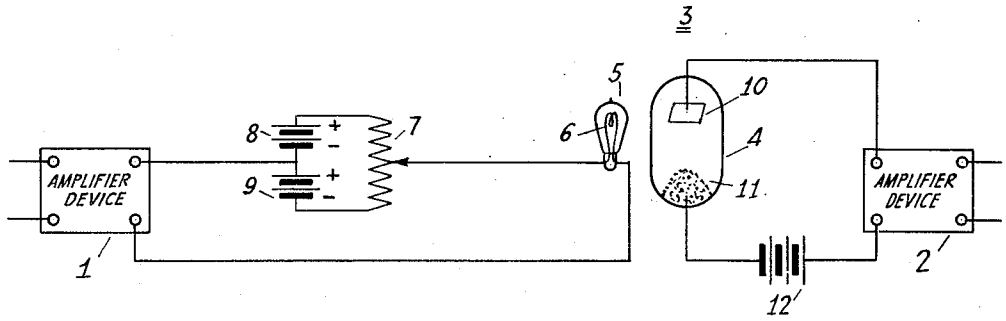


Fig. 2

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ELECTRICAL SYSTEM.

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My invention relates to electrical systems and particularly to the incorporation of photo-electrical cells in such systems.

One of the principal objects of my invention is the provision of an electrical system having an amplifying device in which the output of said device is coupled to the input of said device by means of a photo-electric coupling device.

Another object of my invention is the provision of an electrical system in which a photo-electric amplifying device is employed.

Other objects and advantages of my invention will be apparent from the following description taken in conjunction with the accompanying drawings in which:—

Fig. 1 is a schematic diagram of one modification of my invention.

Fig. 2 is a schematic diagram of another modification of my invention.

Referring to Fig. 1, the output of the amplifier device is connected across the terminals of the primary winding of the transformer 1, the secondary winding of which is arranged to be connected to any desired load such as another amplifier, detector, etc. A variable condenser 2 is connected across the terminals of the primary winding of transformer 1 for tuning the output circuit of the amplifier device to the desired frequency.

Two parallel circuits 3 and 4 are connected across the input of the amplifier device. Circuit 3 comprises a battery 5 having its + terminal connected to one of the input terminals of the amplifier device and its — terminal connected to the upper extremity of the resistance 6, the lower extremity of resistance 6 being connected to the other input terminal of the amplifier device.

Circuit 4 comprises a light responsive device 7, having its anode connected to the + terminal of battery 5 and its cathode connected to the — terminal of battery 8. The + terminal of battery 8 is connected to a lower extremity of resistance 6.

The filament of lamp 9 is connected across the output terminals of the amplifier device through a potentiometer 10 as shown. The lamp 9 may be mounted in an enclosing box 11 having an aperture for enabling the rays of light to impinge on the cathode of the light responsive device 7. By means of the potentiometer 10 and the batteries co-operating therewith a suitable regulating current may be made to flow through the filament of the lamp 9 in either direction. The filament of the lamp 9 is preferably supplied by a suitable direct current for maintaining it in a state of incipient incandescence in order that the frequency of the light variations will correspond to the frequency of the alternating current in the output of the amplifier device. Otherwise an alternating current would appear in the output of the amplifier device having a frequency differing from that of the frequency desired.

The above described system functions in the following manner:—

Assume that the potentiometer 10 is adjusted to effect a state of incipient incandescence of the filament of the lamp 9. Under this condition due to the arrangement of batteries 5 and 8, no difference of potential will exist between the points *a* and *b*. Now assume that an alternating potential is impressed on the input terminals of the amplifier device and that the variable condenser 2 is adjusted to tune the output circuit of the amplifier device to the frequency desired. An amplified alternating potential will appear in the output circuit of the amplifier device. This alternating potential, being impressed on the filament of the lamp 9, will effect fluctuations in the intensities of light emanation from the lamp. These fluctuations will correspond in frequency to the frequency of the alternating potential in the output of the amplifier device, and will also effect fluctuations in the resistance of the photo-electric device 7 which will, in turn, effect potential variations across the points *a* and *b*. Due to the fact that points *a* and *b* are connected across the input terminals of the amplifier device, these potential variations will be impressed on said input terminals and will appear in an amplified form in the output circuit of the amplifier device. It is thus seen that the output circuit of an amplifier device is connected to the input circuit of said device by means of a photo-electric coupling device. This system may function as a generator of oscillations as well as a re-generative system.

Referring to Fig. 2, the output of amplifier device 1 is connected to the input of amplifier device 2 through a photo-electric coupling device 3. The photo-electric coupling device 3 comprises a light responsive device 4 and a source of light 5. The source

of light 5 comprises a filament 6 connected across the output of amplifier device 1 through a potentiometer device 7 having batteries 8 and 9 co-operating therewith.

The light responsive device 4 comprises an anode 10 connected to one of the input terminals of the amplifier device 2 and a cathode 11 connected to the other input terminal of the amplifier device 2 through a battery 12.

This system functions in the following manner:—The adjustable connection on the potentiometer 7 is so arranged as to preferably bring the filament 6 to a state of incipient incandescence. Potential variations appearing in the output of the amplifier device 1 will produce corresponding fluctuations in the light intensities emanating from the filament 6. These fluctuations of light intensities will, in turn, produce fluctuations in the impedance of the light responsive device 4. These fluctuations in impedance in the light responsive device 4 will, in turn, produce fluctuations of current from a battery 12. These fluctuations of current will, in turn, produce fluctuations of potential impressed on the input terminals of amplier device 2.

When it is desired to suppress the transfer of high frequency oscillations between the output of amplifier device 1 and the input of amplifier device 2, a light responsive device 4 having considerable inertia may be chosen. Such a light responsive device will prevent the transfer of undesired high frequency oscillations between the output of amplifier device 1 and the input of amplifier device 2.

It is also to be understood that the photoelectric device may be employed as a straight amplifier. This can be accomplished by employing an ultrasensitive light responsive device and a source of light of high efficiency in order that the oscillating energy appearing in the anode-cathode circuit be greater than the oscillating energy consumed by the source of light. With such an arrangement, the amplifier devices shown in Fig. 2 may be eliminated and the photoelectric device 3 employed as a straight amplifier.

The source of light may also be mounted directly in the enclosure for the light responsive device.

While I have shown and described several modifications of my invention, I do not limit myself to the same; but may employ such other modifications as may come within the spirit and scope of my invention.

I claim the following:—

1. In an electrical system, as amplifier having an input circuit and an output circuit, said amplifier being arranged so that potential variations in said input circuit produce corresponding current changes in said output circuit, a device having a cathode and an anode, said cathode serving to emit photoelectrons under the influence of light waves, an output circuit connected between said anode and said cathode and arranged to cause potential variations in said input circuit, a source of light adjacent said cathode, means for maintaining said source at incipient incandescence, and a circuit for said source connected across the output circuit of said amplifier whereby current variations in said last mentioned output circuit cause said source to be lighted to various degrees of brilliancy.

2. In an electrical system, an amplifier having an input circuit and an output circuit, said amplifier being arranged so that potential variations in said input circuit produce corresponding current changes in said output circuit, a device having a cathode and an anode, said cathode serving to emit photoelectrons under the influence of light waves, an output circuit connected between said anode and said cathode and arranged to cause potential variations in said input circuit, a lamp adjacent said cathode having a filament, means for maintaining said filament at incipient incandescence, and a circuit for said filament connected across the output circuit of said amplifier whereby current variations in said last mentioned output circuit cause said filament to be lighted to various degrees of brilliancy.

3. The method of amplifying signal energy by an amplifying device having input and output circuits, which consists in translating a portion of the energy from said output circuit into light waves, and employing said light waves to control said input circuit in accordance with the original signal energy.

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