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ALARM

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Fig. 1.

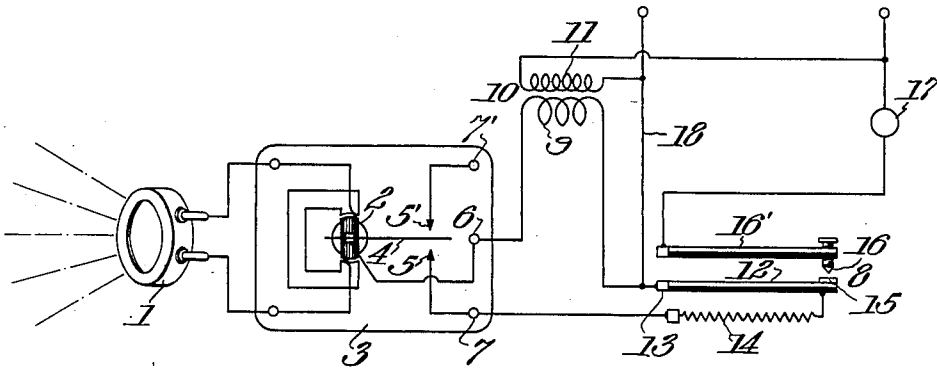
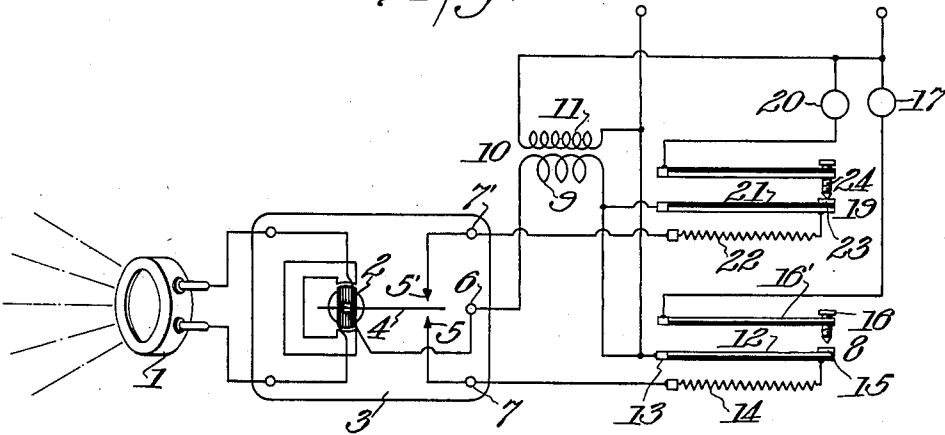


Fig. 2.



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ALARM

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1 Claim. (Cl. 177—311)

This invention relates to an alarm for indicating critical light intensities and particularly to a photoelectrically controlled alarm.

It is very desirable that warning of critical light conditions such as the advent of excessive or inadequate light be given automatically so that steps may be taken to produce, artificially, a normal light. It is an accepted fact that working in semi-darkness, or light of brilliant intensity, not only severely strains the eye muscles but also contributes to general loss of health, both of which result in lowered efficiency of the worker.

Unfortunately, the eye itself does not give warning of dangerous changes in illumination but adapts itself to slow changes and it is not until other parts of the body give warning that a worker notices the changes, so that, without some warning, it very frequently happens that lights are not switched on to increase illumination or shades drawn to decrease it until the damage has been done.

It is, therefore, an object of this invention to provide an alarm automatically responsive to critical changes in the intensity of light.

Another object of this invention is to provide an alarm automatically responsive to inadequate light conditions.

A further object of this invention is to provide an alarm automatically responsive to excessive light conditions.

A still further object of the invention is to provide an alarm automatically responsive to the critical light intensities in which a neon lamp or combinations of a plurality of neon lamps give the indication.

These and other objects will be apparent when taken with the accompanying drawing, in which:

Fig. 1 illustrates diagrammatically a system in which a single indicating device provides the alarm, and

Fig. 2 illustrates diagrammatically a system in which combinations of a plurality of indicating devices provide different alarms for different predetermined light conditions.

Referring to Fig. 1, the reference numeral 1 indicates a light sensitive alarm such as a photoelectric cell or photocell which is placed at the point at which the illumination or light intensity is to control the operation of the alarm. The cell or cells 1 is or are connected to the moving coil 2 of the sensitive relay 3, the movable coil having a contact arm 4 movable between two relatively fixed contacts 5, 5' in accordance with the current flow established in the coil. The movable arm 4 and the contacts 5, 5' are con-

nected to the relay terminals 6, 7, and 7', respectively.

The terminals 6 and 7 are connected to a retarding thermal relay or switch 8, the connecting circuit including a source of current such as the secondary 9 of a step-down transformer 10 that has its primary 11 connected across the customary 110 volt power or light line. The retarding relay 8 includes a bimetallic strip 12 supported at 13 and a heating coil 14 for the strip, the strip flexing with changes in temperature to move its contact 15 toward and away from the relatively fixed contact 16. To prevent variation of the delay period with changes in the atmospheric temperature, the contact 16 is mounted on a bimetallic strip 16' that has the same temperature characteristic as the contact strip 12.

The contact 16 is connected to one terminal of the alarm 17, the other terminal of which is connected to one side of the power supply. In order to complete the alarm circuit, the fixed end 13 of the strip 12 is connected by a conductor 18 to the other side of the power supply.

The relatively fixed contacts 5, 5' are so adjusted that, with normal illumination, the current flow established in coil 2 by the cell 1 will position the contact arm 4 in the gap between the fixed contacts. When the illumination departs from the desired or normal values range, the current flow established in coil 2 is such that the contact arm 4 engages one of the contacts, say the contact 5 in the case of excess illumination. The circuit is thus closed through the current source 9 and the heating coil, but the circuit to the alarm of signal 17 is not immediately closed, as premature or repeated signals corresponding to momentary fluctuations in illumination are to be avoided. The heating coil of the delay switch 8 must be energized for a predetermined time interval before the alarm circuit is closed to afford an indication that the illumination has definitely passed above the critical value.

It will be apparent that the heating coil circuit could be connected to the lower current contact 5' to provide an alarm when the illumination falls below the normal range of values, or a thermal delay switch and signal could be duplicated to provide an alarm when the illumination changes to either less or more than normal.

Preferably, however, such a double alarm system will be arranged as shown in Fig. 2 to provide a series of significant signals that are closely and directly related to their corresponding ranges of illumination.

In the alarm system of Fig. 2, a number of the

circuit elements may be substantially identical with those shown in Fig. 1, and such elements are identified by their corresponding reference numerals but will not be described in detail.

5 In addition to the thermal switch 8 which is connected across the terminals 6 and 7, of the sensitive relay 3, a second thermal switch 19 is employed for controlling the current flow to an alarm or signal 20. This switch includes a bi-metallic strip 21 and heating coil 22, the design 10 being generally the same as that of switch 8 but the strip is so arranged that its contact 23 is engaged with the relatively fixed contact 24 at normal temperatures. One end of the heating 15 coil 22 is connected to the terminal 7' of the back contact 5', and the other end of the heating coil 22 is connected to the bimetallic strip 21 which, in turn, is connected to that side of the secondary winding 9 which is not connected to 20 the center terminal 6 of the relay 3.

The alarms or signals 17, 20 may be of any desired style, such as lamps, bells or the like, but are preferably neon lamps of different colors. The alarm 20 may be a neon lamp that is so 25 colored as to produce a white or yellow light, while the alarm 17 may be the usual neon lamp which gives a reddish glow.

With low or less than normal illumination, the current flow produced in coil 2 by the cell 1 is 30 not sufficient to move the relay arm 4 from the contact 5', and current flows from the transformer secondary 9, through the heating coil 22, to open the contacts 23, 24, thus interrupting current flow through the alarm 20.

35 Within the range of normal illumination, the arm 4 does not engage with either of the contacts 5, 5' and therefore no current flows through either heating coil. Under these conditions, the switch 19 closes and the lamp 20 is lighted. With 40 excess illumination, the larger current output of cell 1 closes contacts 4, 5 and current is supplied to the heating coil 14, and the contacts 15, 16 are thereby engaged, thus lighting the second lamp 17. The signals displayed by the system 45 are thus directly related to the illumination, i. e., no light is displayed when the illumination is low,

a single white light shows when the illumination is normal, and both the white and red lights show when the illumination is above normal.

Visual signals are, in general, to be preferred 5 to audible signals since it would be necessary to provide additional manually controlled switches for opening the alarm circuits upon their closure by the cell, and a failure to reclose the manual 10 switches when the illumination was again normal would render the system inoperative. Neon lamps 10 are well adapted for this use since they draw but little current and may be operated from the usual power and light circuits.

I claim:

15 In a device for indicating illumination values, a pair of terminals for connection to a source of alternating current, a photocell and a relay having two spaced contacts and a contact arm movable therebetween and actuated by said photo- 20 cell in response to variations in the intensity of illumination values, a transformer, the primary of said transformer being connected to the said terminals, a pair of signal circuits each including a lamp, a pair of thermal switches each including an operating coil and a pair of contacts, circuit 25 means for connecting the secondary of said transformer to said operating coils and the contacts of said relay, one of said coils being in circuit with one of said relay contacts and the other in circuit 30 with the other relay contact, circuit means for connecting each lamp to the said terminals including the contacts of one of said thermal switches, one of said switches being normally open and the other being normally closed, where- 35 by movement of said contact arm against one of said contacts will result in lighting of both lamps, movement to neutral position will result in extinguishment of one lamp and movement against the other contact will result in extinguishment 40 of the other lamp, said thermal switches providing a time delay between the operation of said relay and a corresponding change in said signal circuits to prevent momentary fluctuations in illumination values from causing a change in the signal given. 45

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