

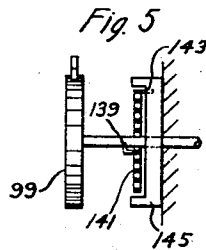
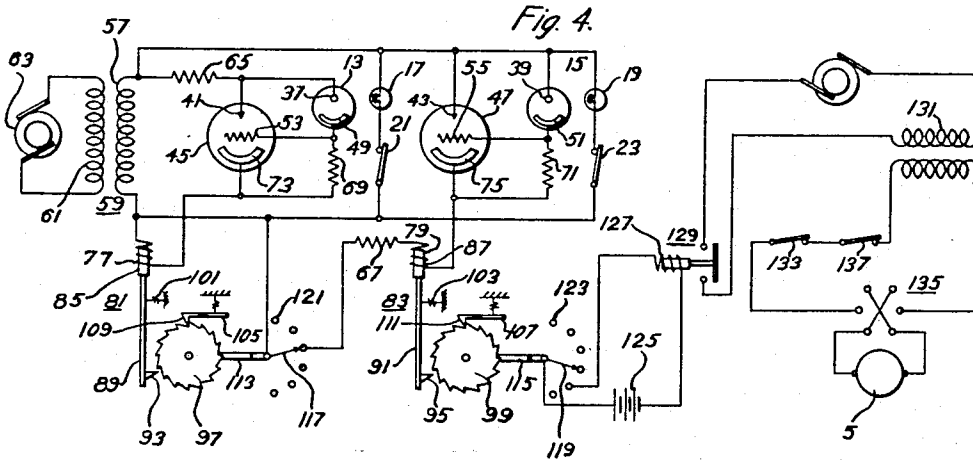
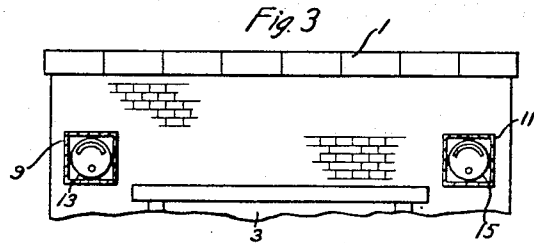
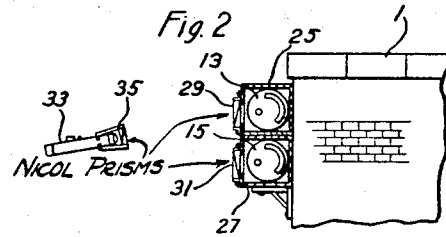
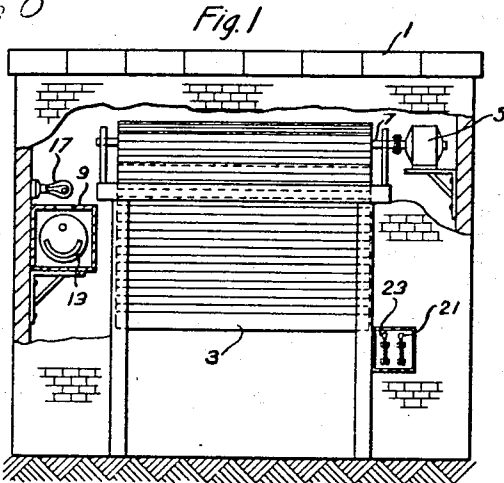
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RELAY

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RELAY

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17 Claims. (Cl. 250—41.5)

My invention relates to relays and has partic-
ular relation to photo-sensitive relays.

It is an object of my invention to provide a
relay capable of being operated only by an indi-
vidual equipped with certain data relative to its
operation.

Another and more specific object of my inven-
tion is to provide a photo-sensitive relay operated
by a combination of light impulses.

A further specific object of my invention is to
provide a locking device operated by photo-
sensitive means.

An additional specific object of my invention
is to provide a locking device operated by a com-
bination of light impulses.

An ancillary object of my invention is to pro-
vide a device whereby a plurality of cells disposed
adjacent to each other may be successively ex-
cited.

Another ancillary object of my invention is to
provide a door to be operated by a photo-
sensitive device that shall be responsive to a
predetermined combination of light impulses.

Still another ancillary object of my invention
is to provide a door for an enclosure that shall
be adapted to be opened by a remotely situated
individual.

More concisely stated, it is an object of my
invention to provide a photo-sensitive relay that
shall respond to a predetermined combination of
radiation impulses and only to this combination
of radiation impulses.

According to my invention, I provide a photo-
sensitive relay comprising a plurality of photo-
sensitive circuits. Each circuit remains inactive
under the influence of light until a predeter-
mined number of circuits of the group have been
subjected to a predetermined combination of
light impulses. Thus, if only two circuits are
utilized, the first must be excited a predeter-
mined number of times before the second is capa-
ble of being excited. The second circuit, on the
other hand, must be excited a predetermined
number of times before the relay operates as a
unit.

My invention can be applied with facility in a
number of situations. However, in the following
discussion, it is specifically illustrated as applied
to the operation of a door for an enclosure.

The novel features that I consider character-
istic of my invention are set forth with particu-
larity in the appended claims. The invention
itself, however, both as to its organization and
its method of operation, together with additional

objects and advantages thereof, will best be un-
derstood from the following description of spe-
cific embodiments, when read in connection with
the accompanying drawing, in which:

Figure 1 is a view, in front elevation, illustrat-
ing a preferred embodiment of my invention.

Figure 2 is a view, in side elevation, illustrating
a specific feature of a modification of my inven-
tion.

Fig. 3 is a view, in front elevation, illustrating
a specific feature of another modification of my
invention.

Fig. 4 is a schematic view showing the electri-
cal circuit associated with a preferred embodi-
ment of my invention.

Fig. 5 is a view, partly in section and partly
in elevation, illustrating a ratchet assembly in-
corporated in my invention.

The apparatus shown in the drawing comprises
an enclosure 1, such as a garage, equipped with
a door 3 that is capable of being opened by the
action of a motor 5. As is illustrated in Fig. 1,
the door 3 comprises a flexible sheet that is
wound on a reel 7 rotated by the motor 5.

Doors of other types are well known in the
art and their application to the present situation
is apparent. A type that has been utilized to a
great extent in the past is a door resembling, in
its operation, a steel curtain. My invention may,
of course, be applied to the operation of such a
door.

A device for opening a door, such as is illus-
trated herein, is substantially useless unless it
can only be opened by such individuals as should
legitimately have access to the enclosure. My
invention specifically provides such an opening
device, as will presently appear.

The enclosure 1 is equipped with a plurality
of chambers 9 and 11 wherein are disposed a
plurality of photo-sensitive devices 13 and 15.
Adjacent to the enclosures are situated a plu-
rality of lamps 17 and 19, adapted to excite the
devices 13 and 15.

As will appear hereinafter, it is essential, in
practicing my invention, that the photo-sensitive
devices 13 and 15 be excited successively and not
simultaneously. Provision must, therefore, be
made for exciting the cells in this manner. Figs.
1, 2 and 3 illustrate specific systems wherein
this object is accomplished.

A door, of the type illustrated in Fig. 1, is
adapted to be opened by an individual standing
in the vicinity thereof. The lamps 17 and 19,
whereby the photo-cells 13 and 15 are excited, 55

are connected in a circuit controlled by a plurality of switches 21 and 23 that may be manually operated to open and close the circuit there-through and thus to intermittently excite the photo-cells. The latter are connected in a circuit that will be hereinafter described and respond to a combination of impulses by opening the door.

In Fig. 2, a system of a type adapted to be operated from a distance is illustrated. The system illustrated is a two-cell arrangement. However, as will appear from the following description, the device is applicable to a system wherein any number of cells are utilized.

In apparatus of this type the enclosure 1 is equipped with a plurality of containers 25 and 27 wherein the photo-cells 13 and 15 are disposed. The containers 25 and 27 are provided with light-polarizing windows 29 and 31, such as Nicol prisms. The windows 29 and 31 are so disposed that they are capable of transmitting light polarized in different planes. Thus, one window 29 transmits light polarized at 90° to the light transmitted by the other window 31.

To excite the cells 13 and 15, a flash light 33 is provided that is equipped with a light-polarizing window 35. By properly orienting the flash-light 33, it is possible to excite one cell without exciting the other. As will appear hereinafter, the system is entirely inoperative if the cells 13 and 15 are both excited, that is, if a flash-light not equipped with a polarizing window is utilized.

The system illustrated in Fig. 3 is perhaps the most simple system that can be utilized and has been found to be most generally applicable. This system is adapted to both remote and near operation. The cells 13 and 15 are situated at a considerable distance from each other, and one cell may be excited by a flash light, or the head light of a vehicle, while the remaining cell remains in a comparatively unexcited state.

In Fig. 4, the system whereby the door is operated is schematically illustrated. The view shows a circuit for operating a door of the type illustrated in Fig. 1.

The anodes 37 and 39 of the photo-sensitive cells 13 and 15 are connected to the anodes 41 and 43 of a plurality of grid-controlled glow tubes 45 and 47, while the cathodes 49 and 51 of the cells are connected to the control electrodes 53 and 55 of the tubes. Power is supplied to the tubes 45 and 47 from the secondary 57 of a transformer 59, the primary 61 of which is connected to a generator 63 of suitable structure.

Suitable current-limiting impedances 65 and 67 are connected in the anode-cathode circuit of each tube, while high impedances 69 and 71 are connected between the grids 53 and 55 and the cathodes 73 and 75 of the tubes.

When a difference of potential exists between the anode and the cathode of any one of the tubes, a discharge may be produced therethrough by subjecting the cell associated therewith to light radiation. The tubes are operated from an alternating power supply and, consequently, they become deenergized when the light exciting the cell is removed. However, it is to be noted that, for effective operation, the frequency of excitation of the cell must be small, as compared with the frequency of the power supply.

The current through the tubes 45 and 47 is capable of passing through the exciting coils 77 and 79 of a plurality of relays 81 and 83, of a type that will now be described.

The cores 85 and 87 of the relays 81 and 83 have rods 89 and 91 mounted thereon which are equipped at their lower ends, with dogs 93 and 95 adapted to engage and rotate the ratchets 97 and 99, when the cores 85 and 87 are moved under electromagnetic force of the excited relay coils associated with them. The rods 89 and 91 are resiliently urged towards the ratchet 97 and 99 by the springs 101 and 103 fastened to the support of the relays 81 and 83. When the coils 77 and 79 of the relays are deenergized, the rods 89 and 91 fall under the action of gravity, and the dogs 93 and 95 are disengaged from the teeth of the ratchets 97 and 99.

The ratchets 97 and 99 however do not return to their original position but are held in their latest angular position by resiliently pivoted levers 105 and 107, equipped with dogs 109 and 111 that engage the teeth thereof. As each of the relay coils 77 and 79 are intermittently excited, the corresponding cores 85 and 87 are reciprocated, and the ratchets related thereto are rotated.

The ratchets are centrally supported on shafts 113 and 115 and are rotated therewith. The shafts 113 and 115 have movable contactors 117 and 119 mounted near their remaining ends, that are adapted to make contact with a plurality of fixed contact points 121 and 123. The movable contactors 117 and 119 move from one of the points 121 and 123 to the succeeding point when the corresponding relay is excited a single time.

The shaft 113 of the first ratchet 97 is conductively connected to a terminal of the secondary 57 of the power-supply transformer 59, while a predetermined one of the fixed contacts 121 is connected to the exciting coil 79 of the relay 83 associated with the second grid-glow tube 47. As is illustrated in the drawing, the relay 83, associated with the second grid-glow tube 47, is equipped with a system of contacts 119 and 123 similar to those associated with the first relay 81. The latter, however, are adapted to close a power circuit 125 through the exciting coil 127 of another relay 129 that closes the primary circuit 131 of a system whereby power is supplied to the motor 5 to actuate the door 8 of the enclosure 1. The modification of the system to adapt it to operate with more than two photo-sensitive devices, is apparent.

The operation of the system is evident. As the photo-cells 13 and 15 are intermittently excited from the light sources 17 and 19, operated by the switches 21 and 23, the ratchets 97 and 99 are rotated. However, before the second ratchet 99 can be rotated, the first ratchet 97 must receive a predetermined number of impulses.

If there are more than two photo-sensitive systems, the second system must be excited a predetermined number of times before the third is capable of being excited. The same principle holds for an entire system of tubes, regardless of their number.

However, when the last relay is excited a predetermined number of times, the coil 127 of the relay 129 that is adapted to close the power circuit 125, is excited, and the power circuit is closed to start the motor 5.

The motor circuit is equipped with a switch 133 that automatically stops the motor 5 when the door 3 has been completely opened. The circuit is also equipped with a reversing switch 135, whereby the motor 5 may be reversed and the door 3 closed and is furthermore equipped with a

2,041,079

3

switch 137, whereby the motor 5 is stopped after the door 3 has been closed.

The ratchets 97 and 99 may be returned to their original positions by releasing the levers 105 and 107 that hold them in the positions that are given by the reciprocation of the cores 85 and 87 of the relays 81 and 83. The shaft of each ratchet has one terminal 139 of a watch spring 141 fastened thereto, the remaining terminal 143 of which is supported in the bearing 145, wherein the shaft rotates. It is, therefore, apparent that, by releasing the holding levers 105 and 107, the ratchets are returned to their original positions.

In the description given hereinabove, the actual system whereby the door is actuated is not described completely. However, a number of these systems are well known to the art and one skilled in the art can, with facility, provide a satisfactory arrangement.

In Fig. 4, my invention is shown as applied in a circuit wherein grid-glow tubes are utilized. The specific type of tube illustrated should not be regarded as a limitation of my invention. My invention operates equally well with thermionic amplifiers, mercury vapor tubes, hot-cathode grid-glow tubes, photo-glow tubes and other electric-discharge tubes of a similar nature.

Similarly, my invention should not be restricted to a radiation-sensitive device of a specific type. A selenium cell, a thermopile, or any device of the same general nature, is applicable.

Where claims in this application state that one of a plurality of light-sensitive devices is adapted to be energized in selective response only to a light beam peculiar to that device, it means that the device in question is the only one out of said plurality of light-sensitive devices which is responsive to one form of light beam, the other units of said plurality being respectively responsive to different forms of light beam.

Although I have shown and described certain specific embodiments of my invention, I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. A photo-sensitive device comprising a plurality of light-sensitive cells, means for supplying current to said cells, work means energized by current from said cells, a plurality of containers for said cells, said containers being provided with light-polarizing windows having their planes of polarization at an angle to each other, and a source of polarized radiations, said source being movable relative to said cells in such manner that the plane of polarization of the radiations emitted thereby may be made at will to correspond to the plane of polarization of any one of said windows to permit selective excitation of said cells by said source.

2. A mechanism adapted to be controlled at a distance by light, said mechanism comprising a circuit, means including a plurality of selectors for completing said circuit in response to a predetermined number of pulses of electrical energy received by each selector, means including a light sensitive device for supplying a pulse of electrical energy to one of said selectors in response to a transient energization by said light, and means including a second light sensitive device provided with means making it unresponsive to the aforesaid energization for supplying a pulse of electrical energy to another of said

selectors in response to another transient energization by said light.

3. A system for controlling the door of an enclosure said system comprising a plurality of light sensitive devices within opaque walls and provided with windows, each of said light-sensitive devices being positioned to receive light from a window, means for impressing light pulses first upon one of said devices through its associated window without impressing said impulses on another of said devices and then impressing light pulses without impressing the last said impulses on the first mentioned one of said devices upon another of said devices, and means responsive to a predetermined number only of said light pulses for controlling said door.

4. A photo-sensitive device comprising a plurality of light-sensitive cells, means for supplying current to said cells, work means energized by current from said cells, means for permitting only light polarized in a given plane to reach one of said cells, means for permitting only light polarized in a different plane to reach another one of said cells, and a source of polarized light, said source being movable relative to said cells to permit selective excitation of said cells by said source.

5. In combination with a mechanism to be operated, a plurality of light-sensitive devices each adapted to be energized in selective response only to a light beam peculiar to that device, and means for causing said mechanism to be actuated in response to a predetermined number of energizations of each of said devices respectively.

6. In combination with a mechanism to be operated, a plurality of light-sensitive devices each adapted to be energized only in response to illumination of an area individual to that device, and means for causing said mechanism to be actuated in response to only a predetermined number of energizations of each of said devices respectively.

7. In combination with movable means for barring a passage, a plurality of light-sensitive devices each adapted to be energized in selective response only to a light beam peculiar to that device, and means for controlling said movable means in response to a predetermined sequence of energization of said devices.

8. In combination with a movable means for barring a passage, a plurality of light-sensitive devices, means to illuminate one of said devices without simultaneously illuminating any of the others, and means for controlling said movable means in response to only one predetermined sequence of illuminations of said light sensitive devices.

9. In combination with a vehicle-housing enclosure and a door or gate therefor, a plurality of light sensitive devices each adapted to be energized in selective response only to a light beam peculiar to that device, and means for controlling said gate or door in response to only one predetermined sequence of energization of said devices.

10. In combination with a vehicle-housing enclosure and a door or a gate therefor, a plurality of light-sensitive devices, means adapted to illuminate one of said devices without simultaneously illuminating the others, and means for controlling said gate or door in response to only one predetermined sequence of illuminations of said light-sensitive devices.

11. A mechanism adapted to be controlled at a distance, said mechanism comprising a circuit, means including a plurality of selectors for com-

pleting said circuit in response to a predetermined number of pulses of electrical energy received by each selector, means including a light-sensitive device for supplying a pulse of electrical energy to one of said selectors in response to a transient energization by light, means including a second light-sensitive device for supplying a pulse of electrical energy to another of said selectors in response to another transient energization by light, and a light source of such character that it may be disposed in a plurality of positions in each of which the light emitted thereby energizes one of said light-sensitive devices to the exclusion of others.

12. In combination with a mechanism to be operated, a plurality of light-sensitive devices each adapted to be energized in selective response only to a light beam of a kind peculiar to that device, and means for causing said mechanism to be actuated in response to a predetermined number of energizations of each of said devices respectively.

13. In combination with a mechanism to be operated, a plurality of light-sensitive devices each adapted to be energized in selective response only to a light beam polarized in a plane peculiar to that device, and means for causing said mechanism to be actuated in response to a predetermined number of energizations of each of said devices respectively.

14. In combination with a mechanism which it is desired to control from a distance by means of light beams, a control means therefor comprising a plurality of light-sensitive devices, each being adapted to respond only to light of a kind peculiar to itself and being connected to cause actuation of a movable element when said light-sensitive device is subjected to light of the amount generated by a hand flashlight, and means for causing said mechanism to be actuated in selective response to a predetermined program of energizations of the respective light-sensitive devices above-mentioned.

15. The method of controlling a mechanism from a distance by means of light beams which comprises providing said mechanism with control means including a plurality of light-sensitive devices, each adapted to be energized in selective response only to a light beam of a kind peculiar to that device, together with means for causing

said mechanism to be actuated in response to a predetermined program of energizations of said devices respectively, illuminating one of said light-sensitive devices with a light beam of the kind to which it is adapted to respond emanating from a hand flashlight and thereafter illuminating a different one of said light-sensitive devices with light of the kind to which it is responsive also emanating from said flash-light.

16. A system for controlling a mechanism from a point distant therefrom by means of light beams which comprises a plurality of light-sensitive devices, means for supplying current to said devices, work means energized by current flow in said devices, means for making each of said devices selectively responsive only to a light beam of a kind peculiar to that device, said work means being sufficiently energized so that it is actuated by the current of a light-sensitive device when the latter is subjected to light of the kind peculiar to it and of the intensity which a hand flashlight located at said distance would be able to throw upon it, means for causing said mechanism to be actuated by said work means in response to a predetermined program of energizations of said light-sensitive devices, and a hand flash-lamp adapted to be made to emit the respective light beams of the kinds peculiar to said light-sensitive devices.

17. A system for controlling a mechanism from a point distant therefrom by means of light beams which comprises a plurality of light-responsive electrical devices, means for supplying current to said devices, work means energized by current flow in said devices, means for making each of said electrical devices selectively responsive only to a light beam of a kind peculiar to that device, said work means being sufficiently energized so that it is actuated by the current of said electrical devices when the latter are subjected to light of a kind peculiar to themselves, respectively, and of the intensity which a hand flashlight located at said distance would be able to throw upon them, means for causing said mechanism to be actuated by said work means in response to a predetermined program in energizing said electrical devices, and a hand flash-lamp adapted to be made to emit the respective light beams of the kinds peculiar to said electrical devices.

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