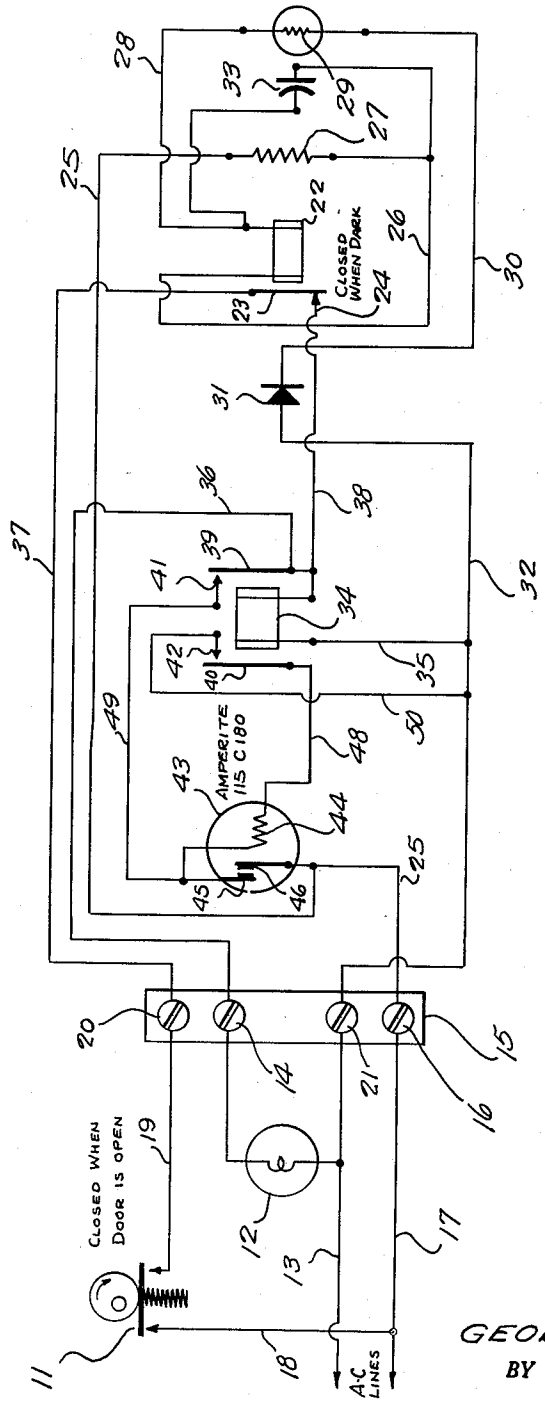
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AUTOMATIC GARAGE LIGHT

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AUTOMATIC GARAGE LIGHT

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This invention relates to control systems for electric lighting circuits, and more particularly to an improved lighting system for an enclosure having a door, for example, for a garage, wherein the lighting circuit associated with the enclosure is automatically energized when the door is opened and is deenergized responsive to the closure of the door.

A main object of the invention is to provide a novel and improved lighting system for a garage or similar enclosure, the system involving relatively simple components, being easy to install, being reliable in operation, and providing a time delay subsequent to the closing of the door of the garage or similar enclosure, after which the lighting system associated with the enclosure becomes deenergized, said time delay being sufficient to allow the person using the garage to leave the car, remove packages therefrom, and the like, before the garage lighting system becomes deenergized.

A further object of the invention is to provide an improved automatically operated lighting system for an enclosure such as a garage or the like, the system being automatically operated responsive to the opening of the door of the enclosure to energize the lighting system only in the event of absence of light outside the enclosure, and providing a time delay after the door of the enclosure is closed, during which the lighting circuit of the enclosure remains energized to allow the person using the enclosure sufficient time to perform necessary operations such as removing packages from an automobile, locating keys for entry into the building adjacent to the enclosure, and the like, before extinction of the lighting units of the enclosure.

A still further object of the invention is to provide an improved automatic lighting system for a garage or similar enclosure having a door and a door-operated switch which closes when the door is open to energize a lighting circuit associated with the garage and which opens when the door is closed to alternately deenergize the lighting circuit, the system involving inexpensive components, being reliable in operation, and providing a time delay subsequent to the closure of the garage door during which the lighting system associated with the garage is maintained energized to enable the user to descend from his automobile, remove packages therefrom, and enter the adjacent building associated with the garage before the lighting system becomes denergized, the system being provided with means to automatically render same operative in the absence of external light, so that it is effective only at night and does not function under daylight conditions.

A still further object of the invention is to provide an improved automatically operated lighting system adapted to operate in conjunction with radio or electrically-controlled garage door opening devices, said system being responsive to the opening of the door of the associated enclosure to energize the lighting system.

A still further object of the invention is to provide an improved automatically operated lighting system adapted to be employed with radio or electrically-controlled automatic garage door opening devices presently installed and in use.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

The single FIGURE is an electrical wiring diagram

showing an improved automatic lighting system for a garage constructed in accordance with the present invention.

Referring to the drawing, 11 designates a conventional door-operated switch which is employed with a garage door, or with the door of a similar enclosure, the switch being closed when the door is open and being open when the door is closed. The switch itself is conventional in construction, and therefore the details thereof are not disclosed herein.

The switch 11 is mounted to therefore close automatically responsive to the opening of the garage door, assuming that the system is to be employed in conjunction with a garage. Designated at 12 is an electric lamp which is associated with the garage, or other enclosure employing the system, the lamp 12 having one terminal thereof connected to a first supply line wire 13 and having the other terminal thereof connected to the terminal fastener 14 of a terminal strip 15. The terminal strip 15 has a terminal fastener 16 to which is connected the remaining supply line wire 17, as shown. The door-operated switch 11 has one terminal thereof connected by a wire 18 to the line wire 17 and has the other terminal thereof connected by a wire 19 to the terminal fastener 20 on terminal strip 15.

As shown, the supply line wire 13 is connected to the remaining terminal fastener 21 of terminal strip 15.

Designated at 22 is a first relay provided with an armature 23 and a stationary contact 24 which is engaged by the armature 23 when the relay 22 is deenergized and which is disengaged therefrom responsive to the energization of said relay. A wire 25 connects the line terminal 16 to one terminal wire 26 of the winding of relay 22 through a current limiting resistor 27. The remaining terminal of the winding of relay 22 is connected through a wire 28, a photo-sensitive resistor 29, a wire 30, a rectifier 31, and a wire 32 to the line terminal 21. The photo-sensitive resistor 29 is of a conventional type, for example, of the Selenide type, which has a relatively high resistance when no radiation is impinging thereon but which substantially reduces its resistance responsive to the reception of daylight or similar visible radiation of substantial intensity. Thus, in the absence of substantial intensity of light thereon, the photo-sensitive resistor 29 acts as an open circuit, so that there is insufficient current in the winding of the relay 22 to affect the armature 23, and the armature thus remains in contact with the stationary contact element 24. However, in the presence of daylight, the resistance of the photo-sensitive member 29 diminishes substantially, allowing sufficient current to flow in the winding of relay 22 to cause the armature 23 to be disengaged from contact element 24.

The photo-sensitive resistor 29 is suitably mounted adjacent the garage or other enclosure to be supervised, so that it will be exposed to daylight.

A suitable filter condenser 33 is connected across the wires 26 and 28 to filter the rectified current applied to the winding of relay 22.

Designated at 34 is a second relay which has its winding connected in parallel with the lamp 12, to be energized simultaneously therewith, one terminal of the winding of relay 34 being connected to the wire 32 by a wire 35 and the other terminal of the relay 34 being connected to the terminal 14 of the strip 15 by a wire 36.

In the absence of daylight and with the switch 11 closed, namely, when the garage door is opened, lamp 12 becomes energized by a circuit comprising line wire 17, wire 18, the switch 11, wire 19, a wire 37 connecting terminal 20 to armature 23, the relay contact 24, a wire 38 connecting relay contact 24 to wire 36, said wire 36, terminal 14, the lamp filament, and line wire 13. As

above mentioned, since the winding of relay 34 is connected in parallel with lamp 12, the relay 34 becomes energized simultaneously with the energization of lamp 12.

Relay 34 is provided with respective armatures 39 and 40 engageable with respective stationary contacts 41 and 42 responsive to the energization of the relay 34. Designated at 43 is a slow-acting switch device, for example, a slow-acting switch device of the thermal type having an operating winding 44 and having the switch contacts 45 and 46 which alternately open and close responsive to the thermal action of the heating winding 44, the closure of the contacts 45 and 46 taking place a predetermined relatively short time after the heating winding 44 becomes energized and correspodingly providing a relatively long time delay for the subsequent opening of said contacts 45 and 46 during energization of the heating winding 44. The time delay of the slow-acting switch device 43 may be any desired predetermined value, for example, a value of the order of three minutes for opening of the switch contacts 45 and 46, and of any suitable value for the closure thereof, which is preferably much less than that for the opening of the contacts. One terminal of the heating winding 44 is connected to the armature 40 by a wire 48 and the other terminal of the heating winding 44 is connected by a wire 49 to the stationary contact element 41. Stationary contact element 42 is connected by a wire 50 to the wire 32, and thus to line wire 13. Armature 39 is connected to the wire 38 and is thus connected to the line wire 17 through contact 24, armature 23, wire 37, terminal 20, wire 19, door-operated switch 11, and wire 18. Therefore, the heating winding 44 becomes energized responsive to the energization of the relay 34. Such energization of relay 34, which is connected in parallel with the lamp 12, takes place at the same time as the energization of said lamp.

As shown, one of the switch contacts 45 is connected to the wire 49 and the remaining switch contact 46 is connected to the wire 25. Thus, the switch contacts 45 and 46, when closed, connect the lamp 12 to the supply wires 13 and 17 through a circuit comprising the supply wire 13, the filament of lamp 12, terminal 14, wire 36, armature 39, contact 41, wire 49, the switch contacts 45 and 46, the wire 25, the terminal 16 and the line wire 17. It will therefore be readily apparent that once the contacts 45 and 46 have been closed, the lamp 12 will remain energized independently of switch 11 until said contacts 45 and 46 reopen.

It will be further noted that with the contacts 45 and 46 closed, the relay 34 is maintained energized by a holding circuit comprising line wire 17, wire 25, the contacts 45 and 46, wire 49, contact 41, armature 39, wire 38, the winding of relay 34, wire 35, wire 32 and line wire 13. Since the heating winding 44 is energized at this time, by a circuit comprising line wire 17, wire 25, the contacts 45 and 46, the wire 49, the winding 44, the wire 48, armature 40, contact 42, wire 50, wire 32 and line wire 13, contacts 45 and 46 remain closed for a predetermined time period, for example, a period of three minutes, after which said contacts 45 and 46 open. This deenergizes the relay 34 unless the door-operated switch 11 and the photo-sensitive relay contacts 23 and 24 remain closed. If the heating winding 44 remains energized, the contacts 45 and 46 will subsequently again close, and will continue to maintain intermittent opening and closing action until switch 11 opens or armature 23 disengages from contact 24. Thus, when the garage door is closed, switch 11 opens, and when the contacts 45 and 46 subsequently open at the end of the heating cycle, relay 34 becomes deenergized since its connection to the supply wire 17 is broken either at the switch 11 (opened by the closure of the garage door) or at the contacts 23 and 24 (opened by the presence of daylight received on the photo-sensitive resistor 29. Thus, when the switch 11 opens, the lamp 12 will be maintained energized for the time period required for the contacts 45 and 46 of the slow-operating switch 43 to open.

It will thus be apparent that a sufficient time is provided after the closure of the garage door to enable the driver of a vehicle driven into the garage to leave the vehicle, to remove packages therefrom, and to enter the building associated with the garage, prior to the deenergization of the lamp 12.

The switch device 43 may be of any conventional type, for example, may be similar to Model No. 115C180 manufactured by Amperite Company.

As previously mentioned, the photo-sensitive member 29 may be of the Selenide type, for example, of the cadmium Selenide type.

In operation, assuming the absence of daylight, the armature 23 of relay 22 engages the contact 24. When the garage door is opened, by any suitable conventional means, the switch 11 closes and the lamp 12 becomes energized directly by the above described circuit which includes armature 23 and contact 24 and the door-operated switch 11. At the same time, relay 34, which is connected in parallel with the lamp 12 becomes energized and closes its contacts. Heating winding 44 then becomes energized through the circuit comprising wire 13, wire 32, wire 50, contact 42, armature 40, wire 48, the heating winding 44, wire 49, contact 41, armature 39, wire 38, contact 24, armature 23, wire 37, wire 19, switch 11, wire 18 and wire 17. Switch 43 then cycles as long as the door remains open and the photo-sensitive relay 22 remains deenergized. When the switch 11 opens by the closure of the garage door, the direct energizing circuit for the heating winding 44 is interrupted at the switch 11 so that eventually, namely, when contacts 45 and 46 open, the heating winding 44 can no longer be reenergized. This provides the time period during which lamp 12 is maintained energized, and also during which the relay 34 is maintained energized. When the contacts 45 and 46 open at the end of the aforesaid time period, the holding circuit for the relay 34 is opened and lamp 12 becomes deenergized.

While a specific embodiment of an improved automatic lighting control system for a garage or similar enclosure has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a lighting system for an enclosure having a door, an electric lamp, a source of current, a door-operated switch closed when the door is opened, means connecting the source of current to the lamp through the door-operated switch to energize the lamp when the door-operated switch is closed, a relay connected in parallel with the lamp to be energized simultaneously therewith, first and second pairs of relay contacts closing responsive to the energization of the relay, a slow-acting switch having an actuating winding, means connecting the lamp to the source through the first pair of relay contacts and said slow-acting switch, and means connecting said actuating winding to the source through said first and second pair of relay contacts and said door-operated switch, whereby said relay is held energized, to maintain energization of the lamp after opening of said door-operated switch, until said slow-acting switch opens.

2. In a lighting system for an enclosure having a door, an electric lamp, a source of current, a door-operated switch closed when the door is opened, a light-sensitive switch exposed externally of the enclosure and closed when it is dark externally, means connecting the source of current to the lamp directly through the door-operated switch and the light-sensitive switch to energize the lamp when both the door-operated switch and the light-

sensitive switch are closed, a relay connected in parallel with the lamp to be energized simultaneously therewith, first and second pairs of relay contacts closing responsive to the energization of the relay, a slow-acting switch having an actuating winding, means connecting the lamp to the source through the first pair of relay contacts and said slow-acting switch, and means connecting said actuating winding to the source through said first and second pair of relay contacts, said light-sensitive switch, and said door-operated switch, whereby said relay is held energized to maintain energization of the lamp after opening of said door-operated switch, until said slow-acting switch opens.

3. In a lighting system for an enclosure having a door, an electric lamp, a source of current, a door-operated switch closed when the door is opened, means connecting the source of current to the lamp through the door-operated switch to energize the lamp when the door-operated switch is closed, a relay connected in parallel with the lamp to be energized simultaneously therewith, first and second pairs of relay contacts closing responsive to the energization of the relay, a thermal switch having a heating winding closing the switch responsive to the energization thereof and opening same after a predetermined time subsequent to the energization thereof, means connecting the lamp to the source through the first pair of relay contacts and said thermal switch, and means connecting said heating winding to the source through said first and second pair of relay contacts and said door-operated switch, whereby said relay is held energized to maintain energization of the lamp after

opening of said door-operated switch until said thermal switch opens.

4. In a lighting system for an enclosure having a door, an electric lamp, a source of current, a door-operated switch closed when the door is opened, a light-sensitive switch exposed externally of the enclosure and closed when it is dark externally, means connecting the source of current to the lamp directly through the door-operated switch and the light-sensitive switch to energize the lamp when both the door-operated switch and the light-sensitive switch are closed, a relay connected in parallel with the lamp to be energized simultaneously therewith, first and second pairs of relay contacts closing responsive to the energization of the relay, a thermal switch having a heating winding closing the switch responsive to energization thereof and opening same after a predetermined time subsequent to the energization thereof, means connecting the lamp to the source through the first pair of relay contacts and said thermal switch, and means connecting said heating winding to the source through said first and second pair of relay contacts, said light-sensitive switch, and said door-operated switch, whereby said relay is held energized, to maintain energization of the lamp after opening of said door-operated switch, until said thermal switch opens.

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