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[54] **TIME INTERVAL LIGHTING SYSTEM**

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[52] **U.S. Cl.** ..... **315/320,** 307/157, 315/360, 317/141 R

[51] **Int. Cl.** **H05b 37/02,** H05b 39/06

[58] **Field of Search** ..... 315/313–315, 315/360, 320, 323; 307/141 R, 141.4, 141.8, 157; 317/141 R

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[57] **ABSTRACT**

A lighting system for homes and the like comprising a voltage source, a plurality of lamps at various locations, a time interval relay for connecting the lamps to the voltage source for a predetermined time interval, and control switch means connected to the voltage source for selective energization of the time interval relay from an entranceway to light the corridors and other areas in the home to allow an individual sufficient time to walk through such areas before the lights turn off.

16 Claims, 4 Drawing Figures

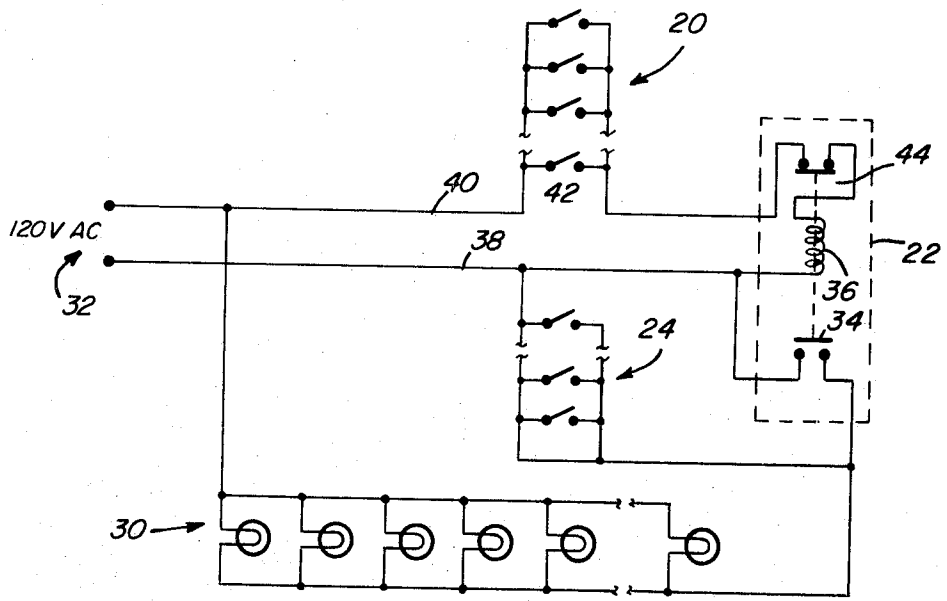


Fig. 1

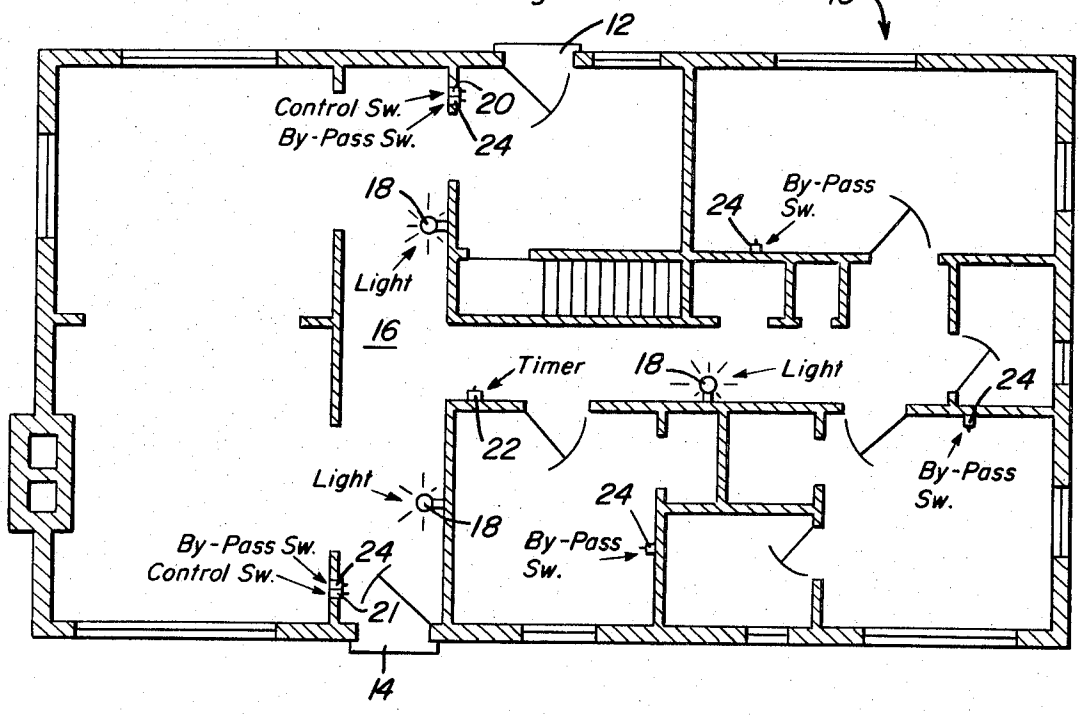

10
12
Control Sw.
By-Pass Sw.
20
24
18
Light
16
By-Pass Sw.
24
Timer
18
Light
24
22
By-Pass Sw.
Light
18
24
By-Pass Sw.
By-Pass Sw.
Control Sw.
24
21
14

Fig. 2

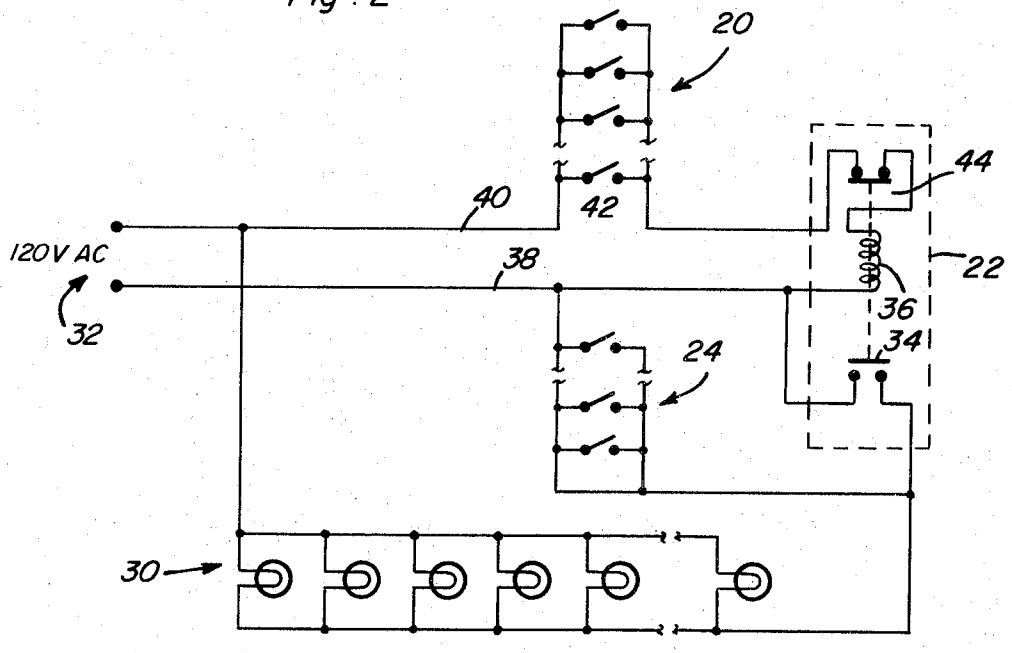

20
44
40
42
120V AC
38
22
36
32
34
24
30

Fig. 4

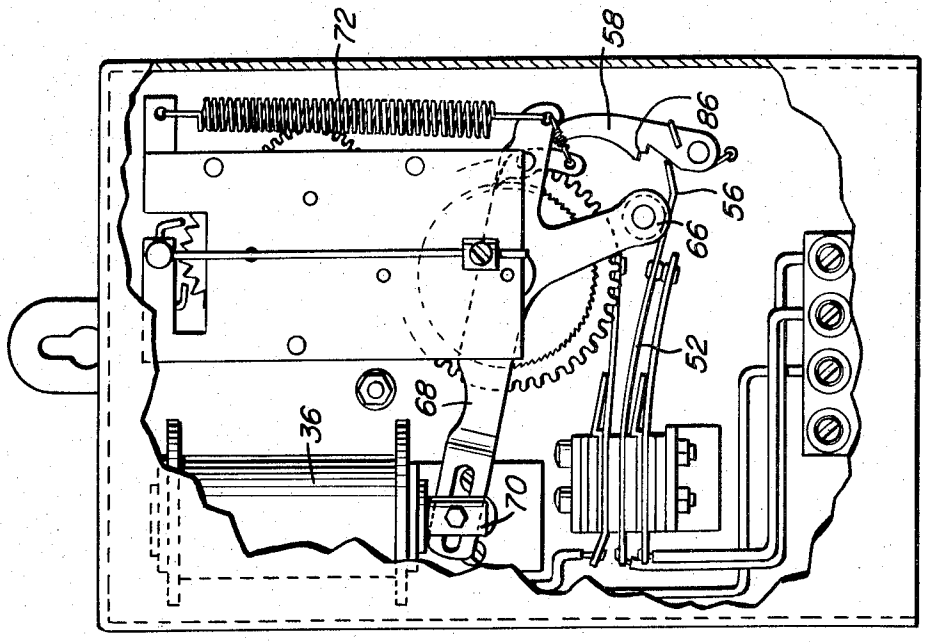
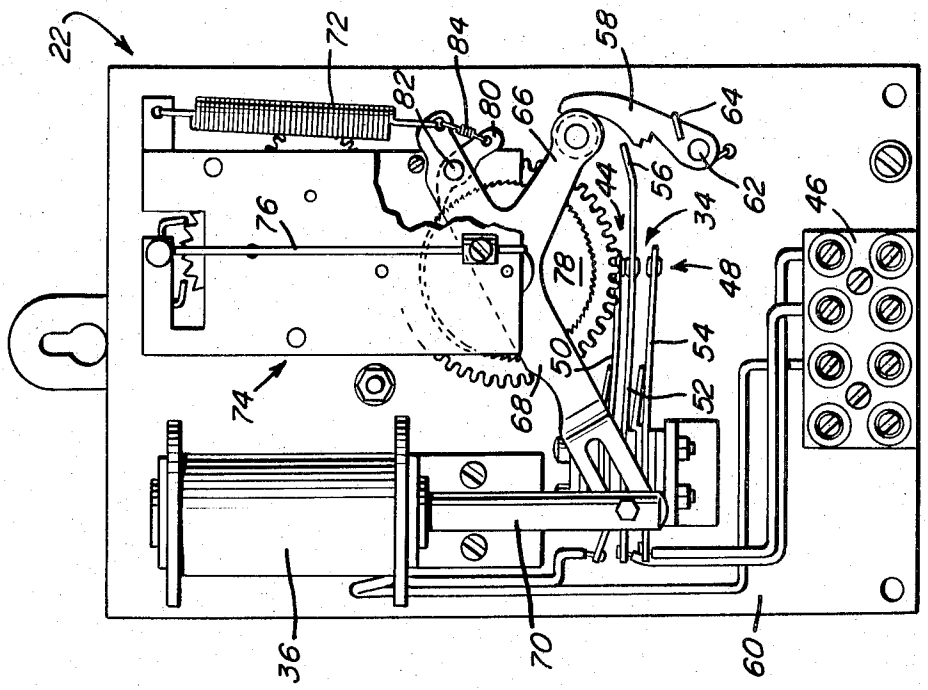

72
58
86
56
66
52
68
36
70

Fig. 3


22
72
84
58
82
80
66
64
56
62
44
34
46
76
78
48
50
54
52
74
68
36
70
60

TIME INTERVAL LIGHTING SYSTEM

The present invention is generally related to lighting systems, and, more particularly, to a versatile time interval lighting system for use in the homes and other buildings.

It is an object of the present invention to provide a novel lighting system which makes it possible for an individual, such as an elderly person, to turn on a group of lights in a home or the like from an entranceway, whereby the lights remain on for a sufficient time period to allow the person to walk through the lighted areas to his destination.

Another object of the present invention is to provide a time interval lighting system including a plurality of lamps at various locations in the home, such as corridors and the like, which are automatically energized from a single control switch and which remain on for a predetermined time interval.

It is a further object of the present invention to provide a versatile time interval lighting system including at least one control switch with normally opened momentary contacts which, when closed, effects energization of a solenoid which initiates a predetermined time interval during which the lights remain on.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

FIG. 1 is a diagrammatic illustration of a typical floor plan utilizing the lighting system of the present invention.

FIG. 2 is a schematic diagram of the circuitry associated with the lighting system of the present invention.

FIG. 3 is an elevational view of the time interval relay associated with the present invention prior to energization.

FIG. 4 is an elevational view of the time interval relay subsequent to energization.

Referring now, more particularly, to FIG. 1 of the drawings, the floor plan of a typical home is generally indicated by the numeral **10** and includes front and rear entranceways **12** and **14** which lead to various corridors, such as that indicated at **16.** Light fixtures **18** are mounted at various locations along the corridors to provide lighting for an individual at night after he enters the home. Of course, FIG. **1** merely illustrates an example of a typical installation utilizing the lighting system of the present invention and lighting fixtures may be provided at any location depending upon the particular floor plan and the particular application.

It will be appreciated that the lights are controlled by way of control switches **20** and **21** located adjacent to entranceways **12** and **14** and which are effective to energize all of the lights by way of an interval timer **22.** The interval timer includes a relay which is appropriately wired to the control switches for energization thereby, as hereinafter explained. Since the timer is remotely operated by electrical means, it is not necessary that it be mounted at a readily accessible location and, if desired, it may be installed in the basement, closet, or other out-of-the-way area. The control switch and timer arrangement provides automatic control of all of the lights from a single switch, such that a person may enter his apartment or home and travel safely through

its well lit corridors and stairways to a bedroom or other destination while the lights remain lit for a sufficient period of time. This eliminates the often encountered situation of individuals walking through a dark house or having to fumble in the darkness to locate light switches in corridors and the like as they head toward their bedroom or other location in the house. Since a considerable area within the house is lit at one time, the lighting system is also beneficial in scaring off would be intruders, or the like.

In addition to providing automatic lighting controlled by way of the timer, the system of the present invention is also provided with a plurality of by-pass switches **24** at various locations to permit normal uninterrupted energization of the lights if desired. Preferably, a by-pass switch is provided adjacent each entranceway and in each bedroom. This permits normal energization of all the lights upon entrance into the home or from bedside in the event of an emergency or other reason to light the corridor areas.

Referring now, more particularly, to FIG. **2** of the drawings the schematic diagram of the circuitry associated with the present invention will be observed to include a plurality of lamps **30** forming a utilization circuit, which may be greater or lesser in number than illustrated, connected in parallel to each other and connectible to a voltage source **32** by way of a set of normally open main contacts **34** associated with the time interval relay **22.** Upon closure of main contacts **34,** the lamps are connected in parallel to the voltage source to provide the desired illumination. The time interval relay includes a solenoid which is operatively connected to main contacts **34** to effect their closure when the associated coil **36** is energized. Coil **36** is connected to one side of the voltage source by way of line **38** and to line **40** on the opposite side of the voltage source by way of one of the control switches generally indicated by the numeral **20.** As mentioned above, the control switches are connected in parallel to each other. Preferably, each control switch is provided with a set of normally opened, momentary contacts **42,** such as commonly used with push button type switch structures.

Time interval relay **22** is provided with a switch device including a set of normally closed auxiliary contacts **44** which are serially connected to coil **36** and which must be closed to permit energization of the coil when any one of the control switches **20** is closed. The auxiliary contacts are operatively connected to the relay solenoid and are opened thereby in response to energization of coil **36,** while at the same time main contacts **34** also forming part of the switch device are closed. The by-pass switches associated with the circuitry are generally indicated by the numeral **24** and are connected in parallel with main contacts **34** and in parallel with each other. This arrangement is such that closure of any one of the by-pass switches completes a circuit with the lamps to effect their energization, even though the main contacts **34** are opened. Preferably, each of the by-pass switches is of a conventional single pole, single throw type such that the lights remain energized until the switch is returned to the off position.

It will be appreciated that when any one of the control switches **20** is closed, coil **36** is energized. This, in turn, causes movement of the associated solenoid member which ultimately effects closure of main contacts **34** and opens auxiliary contacts **44.** Opening

of the auxiliary contacts effects de-energization of coil **36.** Actuation of the solenoid is effective to initiate a predetermined time interval which maintains the main contacts **34** closed and auxiliary contacts **44** open until the time interval is completed, as hereinafter explained.

Referring now, more particularly, to FIGS. **3** and **4** of the drawings, the time interval relay associated with the present invention is generally indicated by the numeral **22** and is provided with a terminal board **46** which allows convenient connection to the external lighting circuits in accordance with the schematic diagram of FIG. **2.** A switch assembly generally indicated by the numeral **48** includes the above-mentioned set of normally opened main contacts **34** and normally closed auxiliary contacts **44** which are appropriately connected to terminals **46.** The main and auxiliary contacts of the switch device are mounted to three leaf springs **50, 52,** and **54.** Leaf spring **52** is intermediate the other two leaf springs and is provided with a finger extension or operator **56** which is adapted to operatively engage a latch member **58.** Leaf springs **50, 52,** and **54** are insulated from each other and appropriately fastened to a mounting base **60,** which also supports terminals **46.** Latch member **58** is pivotally connected to mounting base **60** at **62** and is provided with a biasing spring **64** which influences the latch in a counterclockwise direction. The outer end of latch **58** is normally engaged by a latch control arm **66** associated with a switch actuating winding lever **68,** one end of which is operatively connected to a plunger **70,** associated with the solenoid, and the opposite end of which is connected to a coil tension spring **72.**

The desired time interval is provided by way of a pendulum type timer generally indicated by the numeral **74** and including a pendulum **76** operatively connected to a conventional escape mechanism. The escape mechanism is drivingly connected to a ratchet wheel **78** which is engaged by a pawl **80** pivotally mounted to lever **68** at **82.** The pawl is influenced into engagement with the teeth of ratchet wheel **78** by way of a tension spring **84** extending between the ends of lever **68** and pawl **80.**

As mentioned above, the time interval relay is operated by the energization of coil **36.** Lever **68** and the related components are normally in the inactive positions illustrated in FIG. **3.** When coil **36** is energized, plunger **70** is pulled upwardly and lever **68** is rotated clockwise to the actuated position illustrated in FIG. **4.** This causes latch control arm **66** to engage extension **56** of leaf spring **52,** whereby contacts **44** are opened and contacts **34** are closed. It will also be noted that during this operation, coil tension spring **72** is expanded and pawl **80** slips over the teeth of ratchet wheel **78.** When coil **36** is de-energized, lever **68** is biased toward its initial position by spring **72,** but is prevented from returning by pawl **80** which is in retentive engagement with the teeth of ratchet wheel **78.** Lever **68** slowly rotates with ratchet wheel **78** in a counterclockwise direction, such rotation being retarded by the escapement mechanism. This provides the desired time interval during which the lights remain energized.

As lever **68** returns toward its original position, extension **56** of the intermediate leaf spring **52** retentively engages a latch surface **86** on latch member **58.** This holds contacts **34** closed and contacts **44** open until the time interval is completed. As lever **68** approaches its original position, actuator arm **66** engages the upper surfaces of latch member **58** to displace it in a clockwise direction, whereby leaf spring **52** is released from latch surface **86.** This opens contacts **34** and closes contacts **44,** whereby the lights are automatically turned off, as described above.

From the foregoing description, it will be appreciated that the time interval lighting system of the present invention provides a relatively simple, yet versatile means of automatically controlling lights at various locations within a building, whereby an individual is afforded sufficient time within which to walk through areas of the building to a desired location prior to the lights being automatically de-energized. The manner in which the control switches are connected to the time interval relay permits operation of the relay from any one of several locations, without the need for resetting the particular switch. Of course, it is not intended that the system of the present invention be limited to the floor plan lighting arrangement illustrated in FIG. **1** or to the use of the particular timer illustrated in FIGS. **3** and **4.** Various lighting plans may be provided dependent upon the particular needs of each installation.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. An interior lighting system for buildings, said system comprising a voltage source, a time interval relay including a solenoid and a set of main normally opened contacts operatively connected to said solenoid for closure upon energization of the solenoid, at least one momentary control switch located in said building, and a plurality of parallel connected lamps each connected in parallel with said voltage source when said main contacts are closed, said control switch including a set of control contacts serially connected to said solenoid, whereby momentary closure of said control contacts effects actuation of said solenoid.

2. The system set forth in claim **1** including a plurality of said control switches at different locations in said building for convenient energization of said solenoid by manual operation of any one of said control switches at any one of the locations.

3. The system set forth in claim **2** wherein said control switches are located adjacent entranceways to the building for convenient energization of said lamps upon entry into the building.

4. The system set forth in claim **2** wherein said time interval relay includes means for maintaining said main contacts closed for a predetermined time interval subsequent to actuation of said solenoid.

5. The system set forth in claim **4** wherein said time interval relay includes a set of normally closed contacts operatively coupled to said solenoid for operation thereby and serially connected to a coil associated with said solenoid.

6. The system set forth in claim **5** including a plurality of by-pass switches at various locations in the building, each of said by-pass switches including a set of normally opened auxiliary contacts in parallel with said

normally opened main contacts associated with said relay.

7. A system for time interval lighting in a building, said system comprising a voltage source, a time interval relay connectible to said voltage source for energization thereby, said time interval relay including a set of normally opened main contacts serially connected to one side of said voltage source and a set of normally closed auxiliary contacts serially connected to one side of said voltage source, a plurality of lamps each connected in parallel to said voltage source by way of said set of normally opened main contacts when closed, and at least one control switch including a set of normally opened control contacts serially connected to one side of said voltage source and to said set of normally closed auxiliary contacts, said relay including a solenoid with a coil connected in parallel with said voltage source through said auxiliary and control contacts when closed, said main and auxiliary contacts being operatively coupled to said solenoid for operation thereby when said coil is energized.

8. The system set forth in claim **7** wherein said time interval relay includes means for maintaining said main contacts closed and said auxiliary contacts open for a predetermined time interval subsequent to de-energization of said coil.

9. The system set forth in claim **8** wherein said control contacts are normally opened, momentary contacts.

10. The system set forth in claim **9** including a plurality of said control switches connected in parallel with each other.

11. The system set forth in claim **10** including a plurality of manual by-pass switches each connected in parallel with said set of main contacts for selective energization of said lamps without energization of said relay coil.

12. In combination with a timer mechanism, a switch device including a normally closed contact and a normally open contact, a source of voltage, switch actuating means connected to the switch device for simultaneously opening the closed contact and closing the open contact when energized, momentary switch means connecting the source to the switch actuating means for momentary energization of the switch actuating means, switch holding means operatively connecting the switch actuating means to the timer mechanism for holding the normally open contact closed in response to said momentary energization of the switch actuating means, and a utilization circuit connected to the source by the normally open contact when closed by the switch actuating means during a time interval determined by the timer mechanism.

13. The combination of claim **12** wherein said switch holding means includes ratchet means driven by the timer mechanism for incrementally advancing the switch actuating means from an actuated position to an inactive position, latch means engageable with the switch device for holding the normally open contact closed and latch control means for releasing the latch means in response to approach of the switch actuating means toward said inactive position.

14. The combination of claim **13** including by-pass switch means interconnected between the source and the utilization circuit in by-pass relation to the normally open contact of the switch device.

15. The combination of claim **12** including by-pass switch means interconnected between the source and the utilization circuit in by-pass relation to the normally open contact of the switch device.

16. The combination of claim **12** wherein said utilization circuit includes a plurality of parallel connected lamps.

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