United States Patent

[11] 3,548,125

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a corporation of Illinois

[54] **TIME SWITCH FOR MOUNTING ON A WALL-MOUNTED OUTLET BOX**
3 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** **200/38**
[51] **Int. Cl.** **H01h 43/10**
[50] **Field of Search** 200/38D, 35, 38D1, 38, 51, 168C; 307/141, 141.4, 141.8, 112OR

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Primary Examiner—H. O. Jones
Attorney—Robert R. Lockwood

ABSTRACT: A time switch continuously driven by a synchronous motor is mountable on a wall-mounted energized outlet box and is arranged to close and open contacts at manually presettable times during a day to energize and deenergize an electrical device or devices at such time.

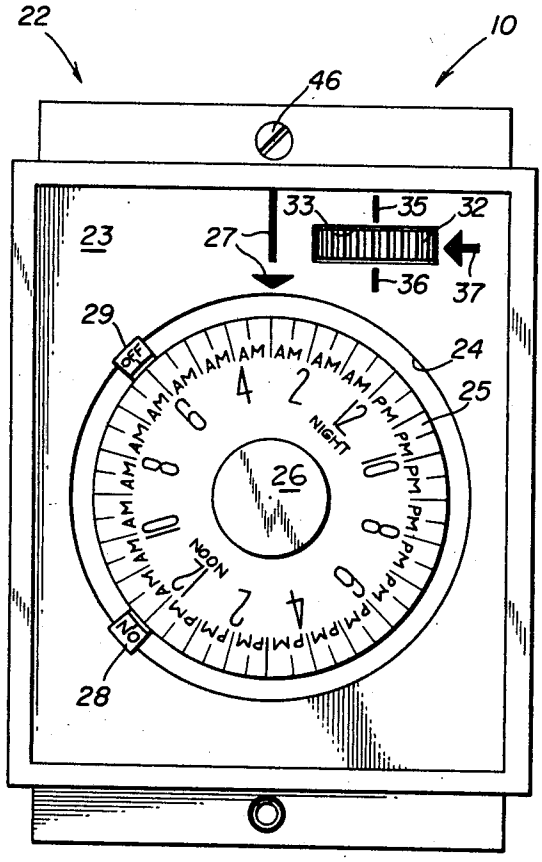


FIG. 2

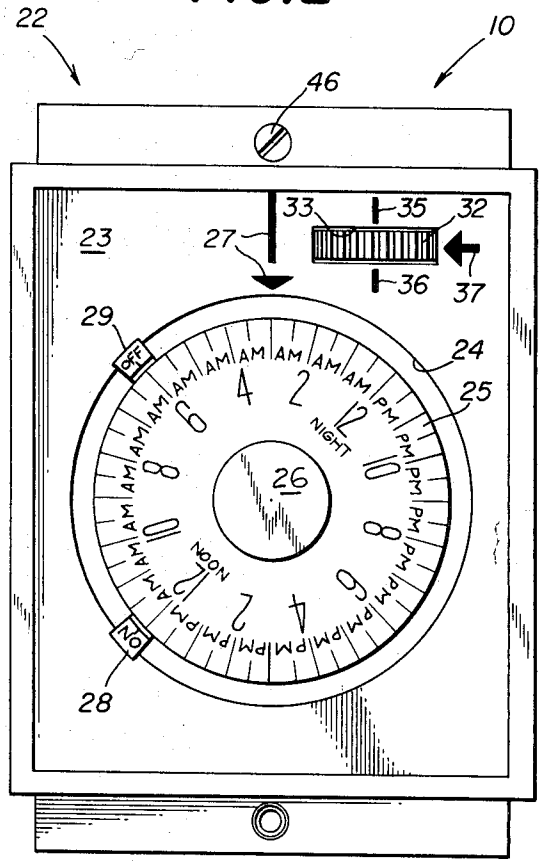


FIG. 1

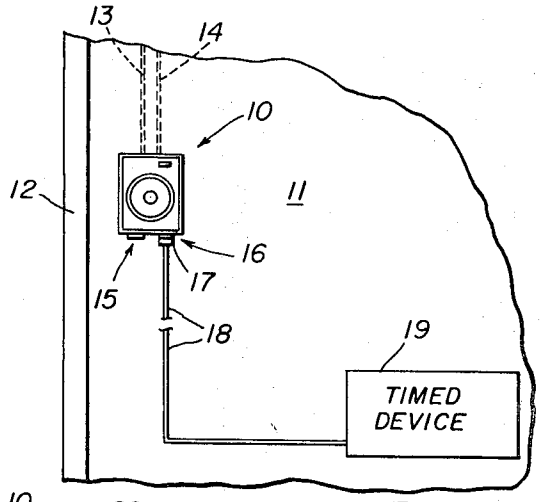
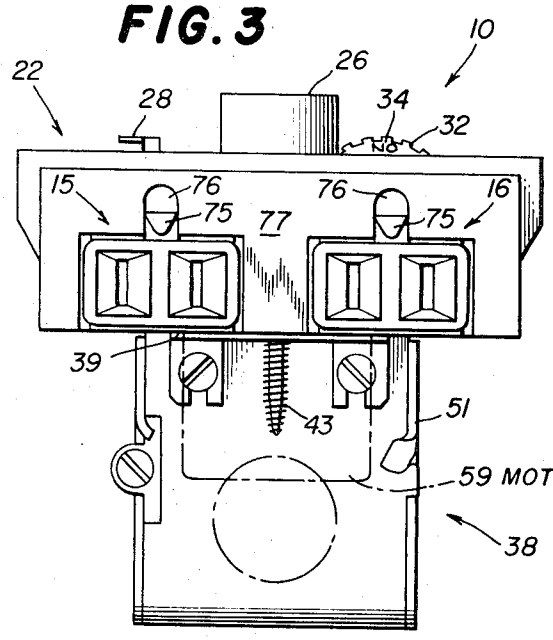


FIG. 3



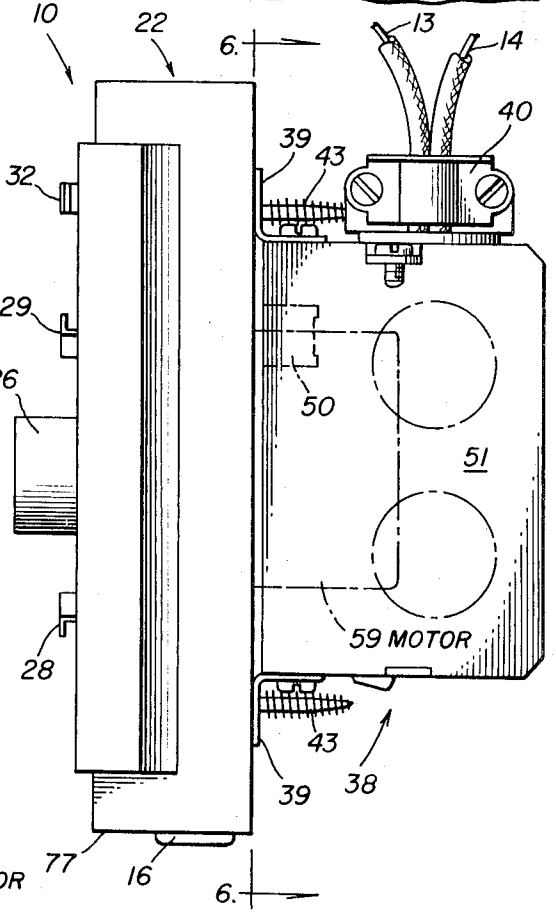


FIG. 4

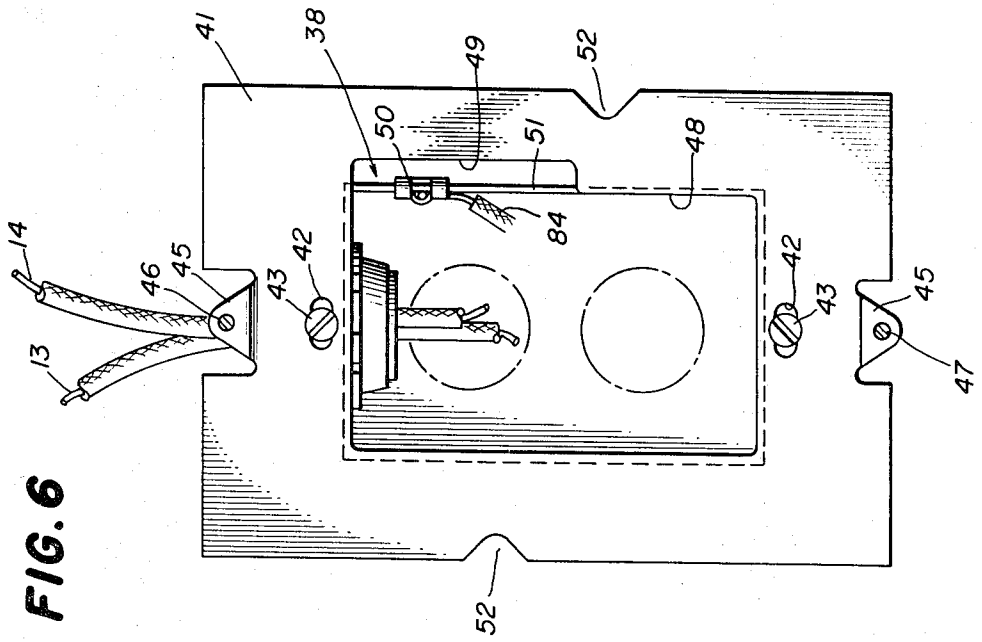

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FIG. 6

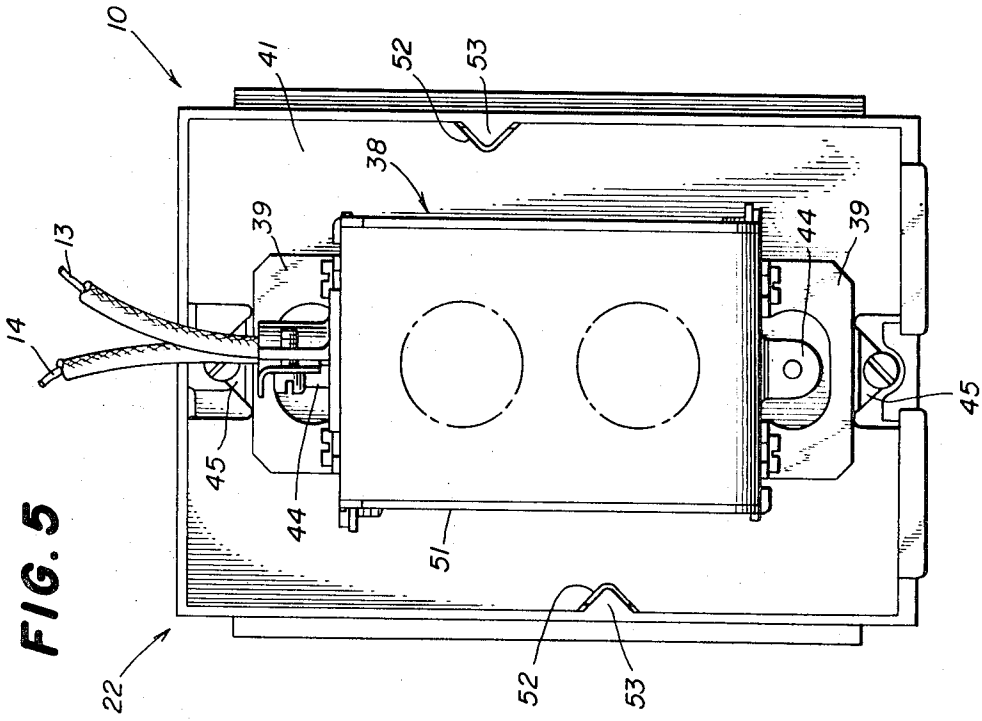

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FIG. 5

FIG. 8

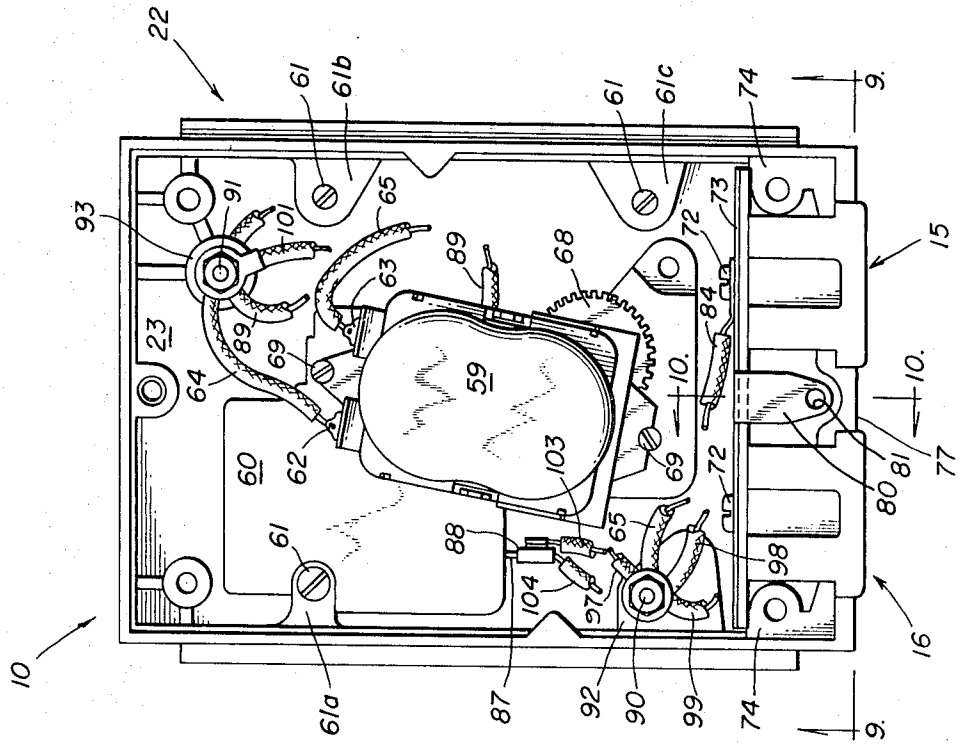

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FIG. 7

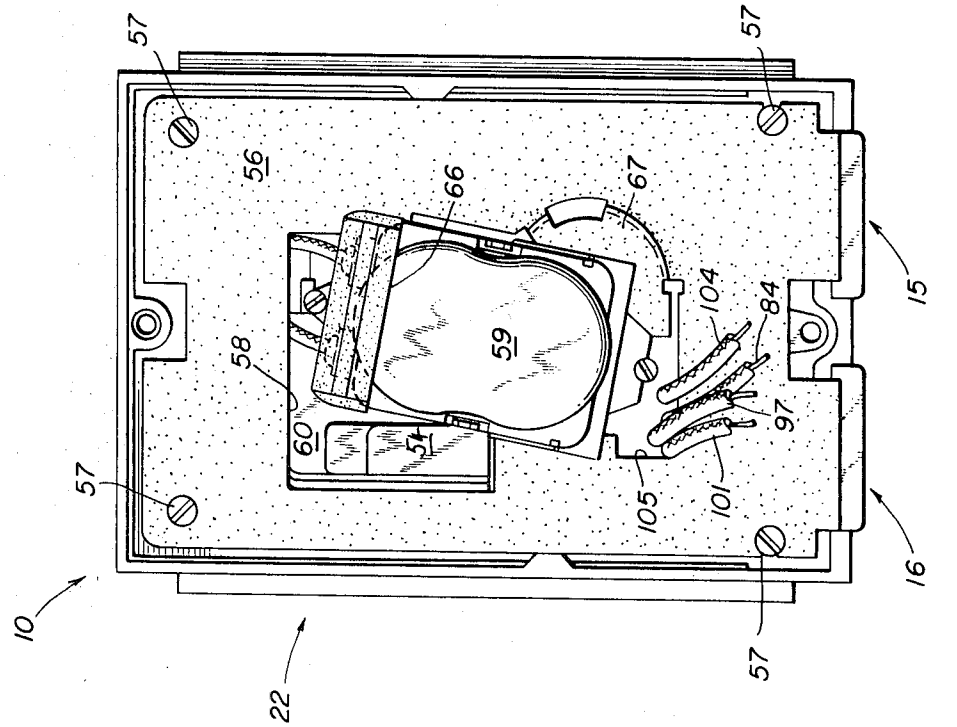

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FIG. 9

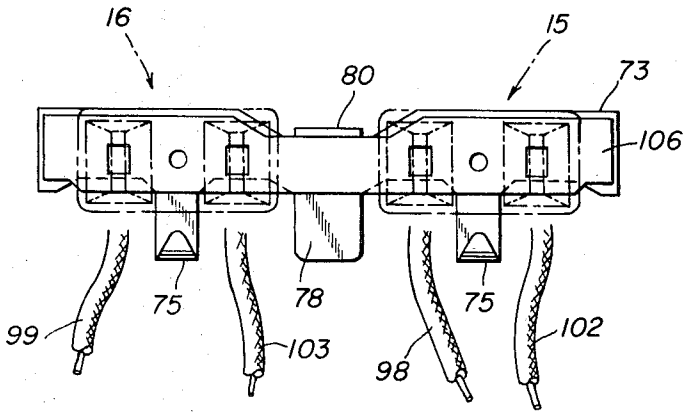


FIG. 10

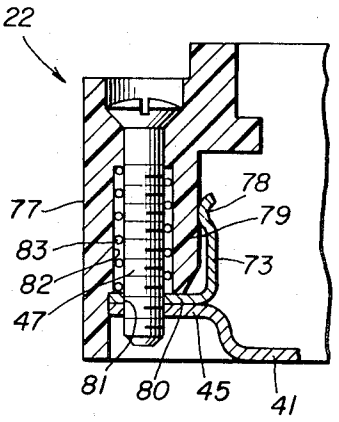
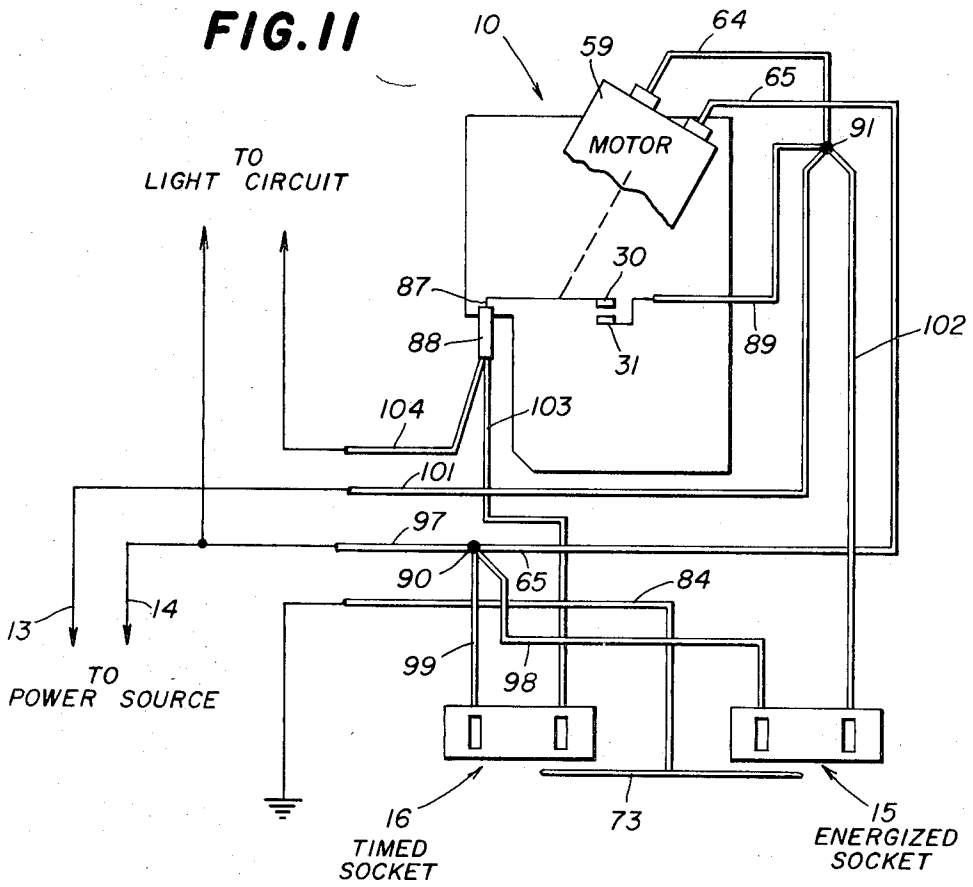


FIG. 11



TIME SWITCH FOR MOUNTING ON A WALL-MOUNTED OUTLET BOX

This invention is an improvement over the invention disclosed in Banathy et al. application Ser. No. 747,970, filed July 26, 1968 now U.S. Pat. No. 3,522,393 and the disclosure thereof is incorporated by reference herein.

Among the objects of this invention are: To provide for mounting a continuously operating time switch on a continuously energized wall-mounted outlet box; to mount the time switch mechanism in an insulating frame that is secured to the outlet box with the motor extending into the outlet box and the frame overlying the wall in which the outlet box is located; to mount the insulating frame and time switch mechanism on a metallic mounting plate which is secured to the outlet box; to interpose between the insulating frame and the metallic mounting plate an insulating plate having an aperture registering with an aperture in the mounting plate through which the motor extends into the outlet box; to mount a timed socket on the insulating frame for receiving a plug of an electrical device the energization of which is to be controlled and to connect the timed socket through the contacts of the time switch mechanism to energized conductors in the outlet box; to mount a continuously energized socket along side of the timed socket on the frame by a metallic receptacle bracket; to ground the metallic receptacle bracket to the outlet box; and to provide terminals rigidly mounted on the insulating frame to which conductors to the switch contacts, electric motor and sockets are connected by suitable insulated conductors.

According to this invention a synchronous motor-driven time switch mechanism is mounted on an insulating frame that is adapted to be mounted on a conventional metallic wall mounted outlet box. The motor continuously drives a time dial carrying manually adjustable "ON" and "OFF" switch operating members that close and open contacts for energizing a permanently connected electrical device, such as a lamp, and for energizing a timed socket arranged to receive a plug connected to an electrical device, such as a radio, electrical appliance and the like. The time dial and switch-operating members are accessible from the front of the frame and the motor is mounted on the rear and extends into the outlet box through registering openings in a metallic mounting plate attached to the outlet box and an insulating plate between the metallic mounting plate and the insulating frame. A continuously energized socket is mounted along side of the timed socket and both sockets are secured to a metallic receptacle bracket that is secured to the insulating frame and metallic mounting plate and is connected by a conductor to the outlet box which is grounded.

In the drawings:

FIG. 1 is an elevational view of a typical installation of the time switch of the present invention mounted on an outlet box in a wall;

FIG. 2 is a view, at full scale, of the front of the time switch adapted for mounting on a conventional wall mounted outlet box;

FIG. 3 is a bottom plan view of the time switch shown in FIG. 2;

FIG. 4 is a view, in side elevation, of the time switch shown in FIG. 2, the outlet box also being shown;

FIG. 5 is a view, in rear elevation, of the construction shown in FIGS. 2, 3 and 4;

FIG. 6 is an elevational view taken generally along the line 6–6 of FIG. 4 to show only the outlet box and the metallic mounting plate;

FIG. 7 is a view, in rear elevation, of the time switch, motor and insulating plate;

FIG. 8 is a view, similar to FIG. 7, with the insulating plate removed;

FIG. 9 is a bottom plan view taken generally along the line 9–9 of FIG. 8;

FIG. 10 is a sectional view at an enlarged scale taken generally along the line 10–10 of FIG. 8; and

FIG. 11 is a wiring diagram of the time switch.

In FIG. 1 there is shown, generally, at 10 a time switch the internal details of construction of which are shown and described in the application above referred to. Accordingly, there will not be repeated except insofar as is necessary to disclose the features of the present invention. The time switch 10 is arranged for mounting on a wall 11 and for illustrative purposes it is shown as being located near a door jam 12. It will be understood that the time switch 10 can be located in other positions. Also, it can be located upside down from the position shown or horizontally as may be desired. Continuously energized conductors 13 and 14 are illustrated. They may be energized from a 115 volt 60 Hz. circuit. It will be understood that normally the conductors 13 and 14 are located within metallic conduit or form a part of an armored cable. Associated with the time switch 10 is a continuously energized socket 15, i.e., it is connected for energization directly to the conductors 13 and 14. Along side of the socket 15 is a timed socket 16 which is arranged to receive a plug 17 of double conductor cord 18 that is connected to a timed device 19, such as a radio, toaster and the like. If the plug 17 were inserted in the socket 15, the device 19 would be energized immediately. When the plug 17 is inserted in the timed socket 16, the device 19 is energized only during the period in a 24-hour day according to the setting of the time switch 10.

In FIGS. 2—5 it will be noted that the time switch 10 has a rectangular insulating frame 22 that is arranged to overlie the wall 11 at its sides and ends. Within the rectangular insulating frame 22 is a rectangular insulating housing 23 which has a centrally located circular opening 24 in which a time dial 25 is rotatably mounted. The hours in a 24-hour day are indicated along the periphery of the time dial 25. It has a central knob 26 for adjusting the time dial 25 to the correct time which is indicated by its position relative to index 27 on the face of the housing 23. Associated with the time dial 25 are an "ON" switch-operating member 28 and an "OFF" switch-operating member 29. These operating members 28 and 29 are movable with and adjustable with respect to the time dial 25 for the purpose of setting the times at which the timed socket 16 is to be energized and deenergized in turn to effect the closing and opening of contacts 30 and 31, FIG. 11. The contacts 30—31 can be manually closed and opened by a manually operable dial 32 which is located in the upper right corner of the housing 23 and projects therethrough in a rectangular opening 33. Indicia 34, FIG. 3, on opposite sides of the dial 32 show whether the position of the dial 32 corresponds to the closed or open position of the contacts 30—31. Indexes 35 and 36, FIG. 2, make it readily apparent what the position of the contacts 30—31 is. The indexes 35 and 36 are positioned on opposite sides of the dial 32 since the time switch 10 may be located in an upside down position from that shown in FIG. 2 or may be located at right angles to the position there shown. An arrow 37 indicates the direction in which the dial 32 should be rotated for effecting the closing or opening of the contacts 30—31.

FIGS. 3—6 show the manner in which the time switch 10 is mounted on a metallic outlet box as indicated, generally, at 38. The outlet box 38 is of conventional construction such as is ordinarily used for a wall switch mounting or for mounting wall outlet sockets or receptacles. It includes outstanding wall mounting brackets 39 that are arranged to be secured by screws (not shown) to the wall 11. Other conventional means can be employed for securing the metallic outlet box 38 in position. A conventional fitting 40 is secured to one wall of the outlet box 38 for receiving the energized conductors 13 and 14. As pointed out above, using conventional practice, the conductors 13 and 14 are located in a metallic conduit or form a part of an armored cable one end of which is clamped by the fitting 40.

In order to adapt the metallic outlet box 38 for receiving the time switch 10, a metallic mounting plate 41, FIG. 6, is employed. As shown in FIG. 5 it fits within the confines of the rectangular insulating frame 22 on the rear side and has slots 42 through which screws 43 extend to hold it securely in posi-

tion on the outlet box 38. The screws 43 are threaded into outstanding ears 44, FIG. 5, that are integral with the end walls of the outlet box 38. Threaded tabs 45 extend from the upper and lower end of the metallic mounting plate 41 and are arranged to be positioned forwardly of the plane thereof, as indicated in FIG. 10, for receiving mounting screws 46 and 47 which extend through the upper and lower ends of the rectangular insulating frame 22 to hold it and thereby the time switch 10 securely in position on the metallic mounting plate 41. A rectangular opening 48 is formed centrally of the metallic mounting plate 41 and it conforms generally to the opening into the metallic outlet box 38. Along one side there is a cutaway section 49 in the metallic mounting plate 41 to clear a protrusion 54, FIG. 7, on the rear side of an insulating housing 60. A ground clip 50 is secured to the adjacent sidewall 51 of the metallic outlet box 38. Notches 52 are formed along opposite sides of the metallic mounting plate 41 for registering with bosses 53 that are molded integrally with the rectangular insulating frame 22, FIG. 5, for properly locating it with respect to the metallic mounting plate 41.

As illustrated in FIG. 7 an insulating plate 56, formed of fish paper or the like, overlies the rear side of the rectangular insulating frame 22 and is interposed between the mechanism therein and the metallic mounting plate 41. Screws 57 secure the insulating plate 56 in position on the rear side of the rectangular insulating frame 22. A generally rectangular opening 58 is provided in the insulating plate 56 for registering with the rectangular opening 48 in the metallic mounting plate 41. The purpose of these registering openings 48 and 58 is to permit the insertion of a synchronous motor 59 into the metallic outlet box 38, the motor 59 being mounted on an insulating housing 60 which encloses the operating mechanism of the time switch 10 including the contacts 30—31. The insulating housing 60 is held in position within the frame 22 by screws 61, FIG. 8, which are threaded into bosses 61*a*, *b*, *c* that are molded integrally with the rectangular insulating frame 22. The synchronous motor 59 has motor terminals 62 and 63 to which insulated conductors 64 and 65 are connected. It will be understood that the motor 10 is arranged to be continuously energized as long as the conductors 13 and 14 remain energized. An insulating cover 66 overlies the terminals 62 and 63 of the motor 59 as shown in FIG. 7. A raised portion 67 of the insulating plate 56 overlies a gear 68 which is driven by a pinion (not shown) which constitutes a slow speed output of the synchronous motor 59. Screws 69, extending into the rear side of the insulating mounting plate 60, serve to hold the motor 59 in position.

FIG. 8 shows how the sockets 15 and 16 are located in the lower end of the rectangular insulating frame 22. Screws 72 serve to hold the sockets 15 and 16 securely to an elongated metallic receptacle bracket 73 that is formed of good conducting material such as copper alloy. The ends of the receptacle bracket 73 extend in overlying relation to bosses 74 that are molded integrally with the insulating frame 22 and are arranged also to receive the lower two screws 57 which serve to hold the insulating plate 56 in place. Tongues 75, FIGS. 3 and 9, extend from one side of the receptacle bracket 73 into slots 76 that are formed in the lower end wall 77 of the insulating frame 22. This arrangement provides for grounding the ground pin of a three-wire conductor cord. A tongue 78, FIGS. 9 and 10, extends laterally from one side of the receptacle bracket 73 for overlying a rib 79 that is molded integrally with the insulating frame 22 to assist in locating the sockets 15 and 16 in position.

As shown in FIGS. 8—10 a tab 80 extends from the side of the receptacle bracket 73 opposite the side from which the tongues 75 extend. The tab 80 has an aperture 81 and is arranged, FIG. 10, to overlie the juxtaposed threaded tab 45 of the metallic mounting plate 41. The screw 47, which is one of the screws holding the insulating frame 22 in position, is threaded into the threaded tab 45 and, when tightened, serves to draw it into close contact engagement with the tab 80 that extends from the metallic receptacle bracket 73. It is desirable that a satisfactory ground connection be provided for the receptacle bracket 73 and for the metallic mounting plate 41. For this purpose a counter bore 82 is formed in the end wall 77 of the insulating frame 22 through which the screw 47 extends. A copper alloy spring 83 tightly surrounds the screw 47 and bears against the upper side of the integral tab 80. A grounding conductor 84, FIG. 8, is connected by one of the screws 72 to the receptacle bracket 73. The other end of grounding conductor 84 is connected, FIG. 6, to the ground clip 50 which has good contact engagement with the sidewall 51 of the metallic outlet box 38.

As shown in FIGS. 8 and 11, a terminal lug 87 extends from the insulating mounting plate 60 and is connected to the contact 30. The terminal lug 87 is rigidly mounted and is arranged to receive a contact clip 88. An insulated conductor 89 extends from the other contact 31 and from one side of the insulating mounting plate 60. In addition to the rigidly mounted terminal lug 87 terminal studs 90 and 91 are secured in bosses 92 and 93 that are molded integrally with the insulating frame 22. The purpose of this construction is to afford rigid connections for various insulated conductors. For example, insulated conductors 97, 98 and 99 are connected to the terminal stud 90 as is conductor 65 which is connected to the motor terminal 63. As shown in FIG. 11 conductor 97 is arranged to be connected to energized conductor 14 and to one side of a light circuit which includes a lamp that is arranged to be energized along with the energization of the timed socket 16. Conductors 98 and 99 are connected, respectively, to one side of the sockets 15 and 16. The conductor 64 is connected to terminal stud 91 as is conductor 89. In addition conductors 101 and 102 are connected to the terminal stud 91. Conductor 101 is connected to energized conductor 13 while conductor 102 is connected to the energized socket 15. In effect, then, terminal studs 90 and 91 are connected to opposite sides of the power source represented by energized conductors 13 and 14.

Conductors 103 and 104 are connected by the clip 88 to the terminal lug 87 which extends from the insulating mounting plate 60. Conductor 103 is connected to timed socket 16 while conductor 104 is connected to the light circuit which is energized concurrently with energization of the timed socket 16.

In operation, assuming that the conductors 13 and 14 are energized from a suitable current source, the time dial 25 is adjusted to indicate with respect to the index 27 the correct time. "ON" switch operating member 28 is adjusted to the position corresponding to the time along the time dial 25 that it is desired to have the timed socket 16 energized or to have the light circuit, FIG. 11, energized. "OFF" switch-operating member 29 is similarly adjusted with respect to the time dial 25 to the time that the time socket 16 is to be deenergized or the light circuit is to be deenergized. The continued energization of the time switch 10 with no further change in the setting of the operating members 28 and 29 causes the time socket 16 to be energized and deenergized repeatedly.

In FIG. 7 it will be observed that a lower portion 105 of the opening 58 in the insulating plate 56 accommodates the insulated conductors 84, 97, 101 and 104. They are connected as shown in FIG. 11.

As shown in FIG. 9, an insulating strip 106 underlies the elongated metallic receptacle bracket 73 to provide additional insulation between it and the sockets 15 and 16. The insulating strip 106 extends nearly to the ends of the bracket 73.

It will be understood that the time switch 10 can be constructed differently from the construction referred to specifically in the above identified application to which reference is made for illustrative purposes.

We claim:

1. In an electric power distribution system having an energized metallic electric outlet box adapted for wall mounting and the like and adapted to be grounded, electrically operated time switch means for mounting on said outlet box and characterized by:

an insulating frame adapted to be secured to said outlet box;

an insulating switch housing within said insulating frame having switch contacts therein;

a time dial rotatably mounted on the front of said switch housing;

an electric motor mounted on the rear of said switch housing for driving said time dial;

"ON" and "OFF" switch-operating members adjustably mounted on said time dial and rotatable therewith for closing and opening said switch contacts;

a metallic mounting plate for overlying the wall in which said outlet box is mounted and to be secured to said outlet box;

means securing said insulating frame to said metallic mounting plate;

a timed socket mounted on said insulating frame to receive a plug connected to an electrical device the energization of which is to be controlled by said time switch means;

conductor means interconnecting said switch contacts and said socket;

a metallic receptacle bracket secured to said insulating frame and to said socket;

conductor means for interconnecting said metallic receptacle bracket and said grounded outlet box;

said metallic receptacle bracket having an apertured tab overlying a threaded tab on said mounting plate;

a screw extending through said insulating frame and said apertured tab into said threaded tab; and

a spring surrounding said screw and interconnecting it and said apertured tab.

2. In an electric power distribution system having an energized metallic electric outlet box adapted for wall mounting and the like and adapted to be grounded, electrically operated time switch means for mounting on said outlet box and characterized by:

an insulating frame adapted to be secured to said outlet box;

an insulating switch housing within said insulating frame having switch contacts therein;

a time dial rotatably mounted on the front of said switch housing;

an electric motor mounted on the rear of said switch housing for driving said time dial;

"ON" and "OFF" switch-operating members adjustably mounted on said time dial and rotatable therewith for closing and opening said switch contacts;

a metallic mounting plate for overlying the wall in which said outlet box is mounted and to be secured to said outlet box;

means securing said insulating frame to said metallic mounting plate;

a timed socket mounted on said insulating frame to receive a plug connected to an electrical device the energization of which is to be controlled by said time switch means;

conductor means interconnecting said switch contacts and said timed socket;

a metallic receptacle bracket secured to said insulating frame and to said timed socket;

conductor means for interconnecting said metallic receptacle bracket and said grounded outlet box;

a normally energized socket mounted on said insulating frame in alignment with said time socket;

said metallic receptacle bracket extending over and being secured to said normally energized socket; and

an insulating strip interposed between said metallic receptacle bracket and said sockets.

3. In an electric power distribution system having an energized metallic electric outlet box adapted for wall mounting and the like and adapted to be grounded, electrically operated time switch means for mounting on said outlet box and characterized by:

an insulating frame adapted to be secured to said outlet box;

an insulating switch housing within said insulating frame having switch contacts therein;

a time dial rotatably mounted on the front of said switch housing;

an electric motor mounted on the rear of said switch housing for driving said time dial;

"ON" and "OFF" switch-operating members adjustably mounted on said time dial and rotatable therewith for closing and opening said switch contacts;

a metallic mounting plate for overlying the wall in which said outlet box is mounted and to be secured to said outlet box;

means securing said insulating frame to said metallic mounting plate;

a timed socket is mounted on said insulating frame to receive a plug connected to an electrical device the energization of which is to be controlled by said time switch means;

conductor means interconnecting said switch contacts and said timed socket;

a metallic receptacle bracket secured to said insulating frame and to said timed socket;

conductor means for interconnecting said metallic receptacle bracket and said grounded outlet box;

terminals carried by said insulating frame to which are connected conductors to said switch contacts, to said electric motor, and to said timed socket; and

energized conductors in said outlet box adapted to be connected to a pair of said terminals.