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CODED ELECTRIC LOAD CONTROLLER

Filed Sept. 28, 1962

2 Sheets-Sheet 1

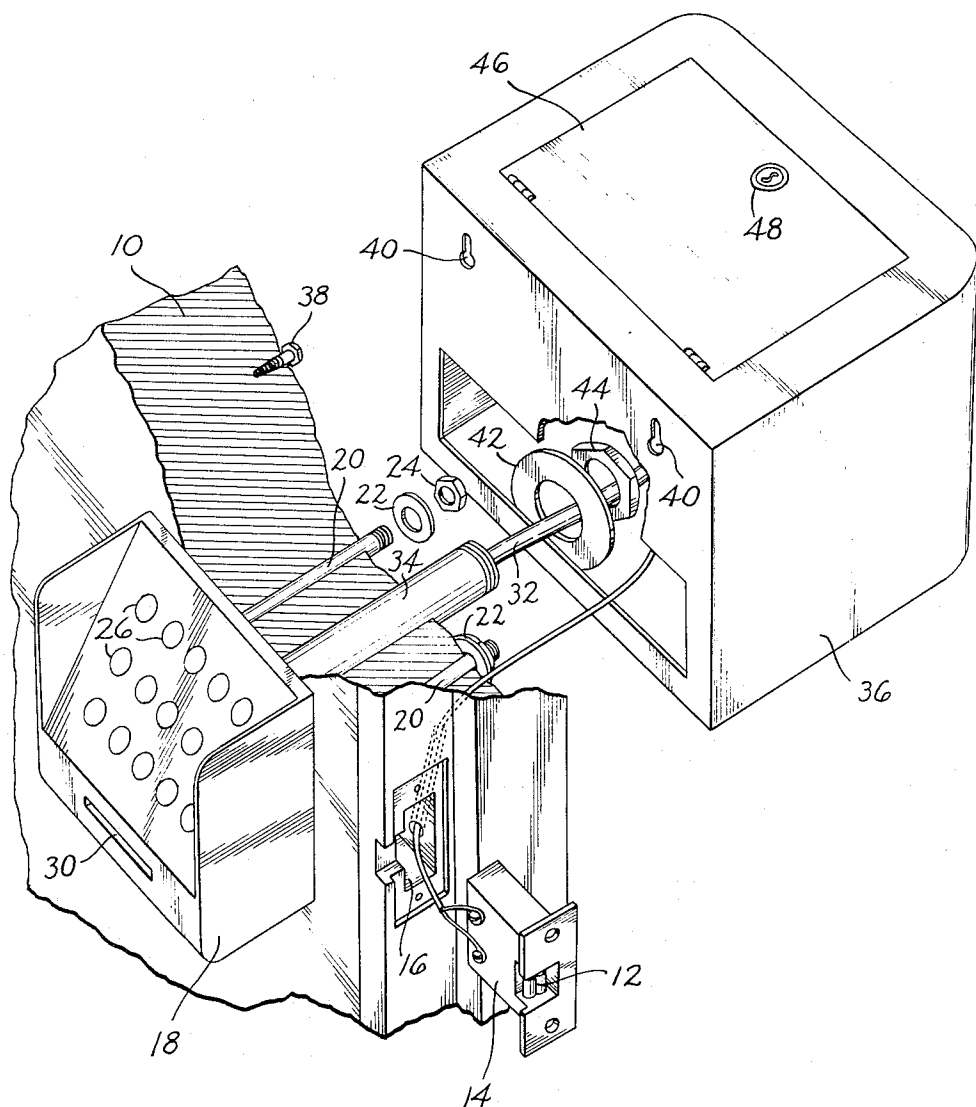


Fig. 1.

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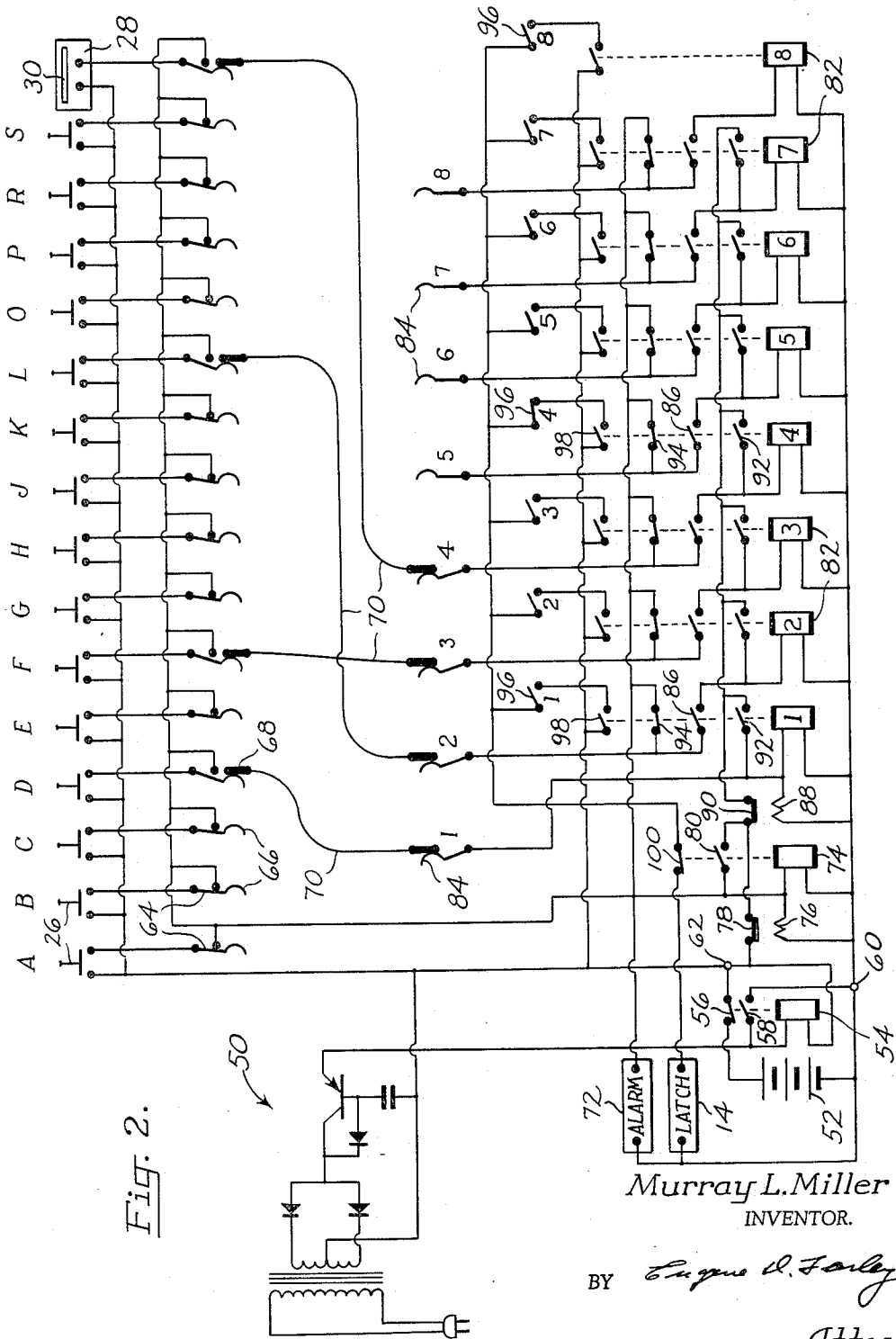


Fig. 2.

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CODED ELECTRIC LOAD CONTROLLER

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9 Claims. (Cl. 340-164)

This invention relates to electric switches for controlling the operation of electric devices, and more particularly to an electric load controller which is capable of operation only by the successful completion of a coding sequence.

Although the controller of the present invention may be utilized for a wide variety of purposes, it is particularly adaptable for use in controlling the operation of an electrically actuated latch for a door guarding a restricted area.

Accordingly, it is the principal object of the present invention to provide a coded electric controller for operating electrically actuated door latches and the like, which controller is completely pick-proof, is provided with a vast number of coding combinations, thus affording frequent change for maximum security, is readily portable for easy transfer and installation at various locations with speed and facility, is highly efficient in use, is of simplified construction for economical manufacture, and provides long and faithful operation with minimum maintenance and repair.

The foregoing and other objects and advantages of this invention will appear from the following detailed description, taken in connection with the accompanying drawings in which:

FIG. 1 is a fragmentary perspective view of a coded electric door latch controller embodying features of the present invention, the same being shown in a preliminary stage of mounting adjacent an access door; and

FIG. 2 is a schematic diagram of an electric circuit for the controller.

In the embodiment illustrated in FIG. 1 the wall 10 adjacent an access door is provided with a latch of the type in which the latch 12 is released by activation of an electric solenoid contained within the latch housing 14, the latter being fitted into a recess 16 in the edge of the wall. An operating panel 18 is mounted on the outer side of the wall, by means of the mounting bolts 20 which extend through the wall and receive the backing washers 22 and securing nuts 24 at the inner side of the wall.

The operating panel supports a plurality of electric push button selector switches 26 identified by the letters shown in FIG. 2. Also, the panel preferably supports an electric card key switch 28 (FIG. 2) which is operable upon insertion of a proper card key into the slot 30. A card key switch of preferred construction is disclosed in U.S. Letters Patent No. 2,769,873.

Electrical conductors extend from the push button switches and card key switch, preferably in the form of a multi-conductor cable 32, through a conduit 34 which extends through the wall to the inner side thereof, for connection to operating components contained within the control housing 36. The control housing is mounted on the inner side of the wall by means of the mounting screws 38 and associated openings 40 in the housing base, and by means of the washer 42 and securing nut 44 associated with the threaded end of the conduit 34. A hinged door 46 on the housing permits access to the latter, for purposes explained in detail hereinafter, and this door is provided with a lock 48 by which to prevent unauthorized entry to the housing.

Referring now to FIG. 2 of the drawings, the electrical system illustrated therein includes a main source of electric potential which comprises a transistorized power

supply 50 that furnishes a regulated direct current potential of, for example, six volts from a conventional source of alternating current of, for example, 115 volts. An auxiliary supply of direct current is provided by the battery 52 in the event of failure of the main supply. To this end the coil of a power switching relay 54 is connected across the main supply, as is the series arrangement of the normally closed relay contact 56, the battery 52 and the normally open relay contact 58. Thus, when the main supply is activated the power switching relay is energized and its contacts are switched from the positions illustrated to disconnect the battery from the system. For purposes of simplicity, the power relay contacts are shown in the position in which the main supply is inactive and the battery supply is in use. The output terminals 60 and 62 are common to both sources of electric supply.

Connected in parallel are a plurality of series circuits each including a normally open push-button selector switch 26 and a normally closed switch 64. The blade of each of the latter switches includes a patch cord connector 66 which effects opening of the switch when a patch cord plug 68 is attached to the connector. Thus, a patch cord 70 may be connected in series with the associated push-button switch.

In the preferred embodiment illustrated, the foregoing parallel assembly also includes the series circuit of at least one normally open card key switch 28 and normally closed patch cord switch 64.

A series circuit of the foregoing parallel assembly and an electric alarm 72 is connected across the common supply terminals 60, 62. The parallel combination of the coil of the alarm relay 74 and the alarm time delay heater element 76 is connected across the electric alarm. The series circuit of the alarm time delay breaker element 78 and the alarm relay contact 80 is connected in series with the alarm relay coil, and hence also in series with the electric alarm. The alarm relay contact 80 functions to hold the alarm relay coil and electric alarm activated until the circuits are broken by opening of the breaker element 78 of the alarm time delay device. This time delay device may be selected to provide for the sounding of the alarm for any desired interval of time, as will be apparent.

A plurality of sequence relays 82, there being eight in the embodiment illustrated, each has one of its coil terminals connected to one terminal 60 of the electric supply. These relays are arranged in a sequence, as indicated by the identifying numerals 1-8, inclusive. The other terminal of the coil of the No. 1 sequence relay is connected to the corresponding No. 1 sequence patch cord connector 84. The other terminal of the coil of each succeeding sequence relay is connected through the normally open contact 86 associated with the next preceding sequence relay to its corresponding sequence patch cord connector 84.

The heater element 88 of a coding time delay device is connected across the coil of the No. 1 sequence relay. Its breaker element 90 is included in a holding circuit for each sequence relay coil, which holding circuit also includes the series arrangement of the alarm time delay breaker element 78 and the contact 92 associated with each sequence relay coil. Thus, in the event the operator fails to complete the coding sequence within a predetermined time established by the coding time delay device, opening of the breaker contact 90 deenergizes all of the previously activated sequence relays 82 and thus destroys the coding operation.

Each sequence patch cord connector 84 succeeding No. 1 is connected through the normally closed contact 94 of the next preceding sequence relay to the electric alarm 72. Thus, if a wrong selector switch 26 is closed even momentarily, the electric circuit of the alarm will be completed.

Also provided are a plurality of manually operable, normally open sequence terminator switches 96, each of which is associated with one of the sequence relays 82. Each terminator switch is connected across the supply terminals 60, 62 in series with the normally open contact 98 of its associated sequence relay, the normally closed contact 100 of the alarm relay, and the electric load 14 which, in the embodiment illustrated, is the electric solenoid actuator for the latch 12.

The operation of the controller system described hereinbefore is as follows: First, let it be assumed that a code has to be set into the controller and that the selected code consists of the push button selector switches 26 lettered D, F and L, and the card key switch 28, and that the sequence of selection is to be D, L, F, and then the card key switch. This code and sequence is established by the use of four patch cords 70, the first interconnecting the No. 1 patch cord connector 84 and the selector switch D, the second interconnecting the No. 2 patch cord connector and the selector switch L, the third interconnecting the No. 3 patch cord connector and the selector switch F, and the fourth interconnecting the No. 4 patch cord connector and the card key switch.

Since the code involves four sequential manipulations, the No. 4 manually operable sequence terminator switch 96 is closed, as illustrated.

Assuming the party desiring access to the restricted area is so authorized and therefore is apprised of the proper code and possesses the proper card key, he first depresses the push button of selector switch D. This completes the electric circuit of the coil of the No. 1 sequence relay 82 and also the heater element 88 of the coding time delay device. These are held activated by the holding contact 92 of the associated relay. The party then depresses the push button of selector switch L, thereby completing the electric circuit of the coil of the No. 2 sequence relay through the now closed contact 86 of the No. 1 sequence relay. The coil of the No. 2 sequence relay is maintained energized through its holding contact 92. The party then closes the selector switch F to complete the circuit of the coil of the No. 3 sequence relay, through the now closed contact 86 of the No. 2 sequence relay. Finally, the party inserts the card key into the switch 28 to close the latter and complete the electric circuit of the coil of the No. 4 sequence relay through the now closed contact 86 of the No. 3 sequence relay.

Upon activation of the coil of the No. 4 sequence relay (which is maintained energized through its holding contact 92), the associated contact 98 closes to complete the electric circuit of the latch solenoid 14. Accordingly, the latch 12 is released, permitting the party to open the door to the restricted area.

Let it now be assumed that an unauthorized party attempts to gain access to the restricted area, without knowledge of the proper code. If the party should depress any of the push buttons of selector switches 26 except the one lettered D, the electric circuit of the alarm 72 and its holding relay 74 will be completed. Moreover, upon activation of the alarm relay 74 its associated normally closed contact 100 in the electric circuit of the latch actuator 14 will be opened, thereby maintaining the latch in locking position.

Let it now be assumed that the unauthorized party has unwittingly but properly selected the first switch D, but then next selected the switch F. The electric circuit through switch F cannot be completed through the No. 3 sequence relay 82 because sequence relay No. 2 has not been activated to close its contact 86. However, the electric circuit through selector switch F and the normally closed contact 94 of sequence relay No. 2 will effect actuation of the alarm 72 and its holding relay 74.

From the foregoing it will be apparent that the present invention provides effective means by which to insure positive control of restricted areas. A vast number of code combinations are available, and they may be changed

with speed and facility simply by rearranging the connections of a few patch cords. The numbers of components in a code combination also may be varied by the use of an appropriate number of patch cords, thereby substantially simplifying the electric circuitry. The simplified assembly reduces the size of the housing structures to a minimum, thereby facilitating transport and installation and permitting normal use of the controlled door.

It will be apparent to those skilled in the art that various changes may be made in the details of construction and in the number and arrangement of parts described hereinbefore, without departing from the spirit of this invention and the scope of the appended claims.

I claim:

1. A coded electric load controller, comprising, in combination, an electric circuit for the load, a plurality of manually operable sequence terminator switches in the load circuit and operable selectively to establish the number of code digits, a plurality of sequence switches in the load circuit one associated with each sequence terminator switch, a plurality of electric sequence switch actuator means each having an electric circuit and each associated with one of the sequence switches, the plurality of actuator means being arranged in a sequence, switch means in each actuator circuit succeeding the first and arranged for operation by the next preceding actuator means, a plurality of selector switches, and connector means adapted to connect desired ones of the selector switches each into a different actuator circuit sequentially from the first actuator means to the actuator means associated with the selected sequence terminator switch.

2. The controller of claim 1 including a holding circuit for each actuator means and including a time delay switch operable to establish a maximum time for completing the sequential operation of the selector switches.

3. The controller of claim 1 including an electric alarm having an electric circuit, and means connecting the unconnected selector switches into said alarm circuit.

4. The controller of claim 3 including an alarm relay connected across the alarm and having a switch arranged in the circuit of the electric load for deactivating the latter during activation of the alarm.

5. The controller of claim 3 including a holding circuit for the alarm, the holding circuit including a time delay switch for deactivating the alarm after a predetermined time of actuation.

6. The controller of claim 5 including an alarm relay connected across the alarm and having a switch in said holding circuit.

7. The controller of claim 1 wherein the connector means comprises a plurality of patch cords.

8. The controller of claim 1 wherein the electric load comprises an electric actuator for a door latch, the selector switches are mounted on the outer side of a door supporting wall, the remaining operative structure is mounted on the inner side of the wall, and the wall is provided with an opening therethrough for the passage of interconnecting electric conductors.

9. In combination with a wall supporting a door guarding a restricted area and having a latch and an electric actuator therefor, a coded electric controller for the latch actuator, comprising an electric circuit for the latch actuator, a plurality of sequence terminator switches in the latch actuator circuit, a plurality of sequence switches in the latch actuator circuit one associated with each sequence terminator switch, a plurality of electric sequence switch actuator means each having an electric circuit and each associated with one of the sequence switches, the plurality of actuator means being arranged in a sequence, switch means in each actuator circuit succeeding the first and arranged for operation by the next preceding actuator means, a plurality of selector switches, connector means adapted to connect desired ones of the selector switches each into a different actuator circuit sequentially from the first actuator means, a holding

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circuit for each actuator means and including a time delay switch operable to establish a maximum time for completing the sequential operation of the selector switches, an electric alarm having an electric circuit, means connecting the unconnected selector switches into said alarm circuit, a holding circuit for the alarm and including a time delay switch for deactivating the alarm after a predetermined time of actuation, an alarm relay connected across the alarm and having a switch arranged in the circuit of the latch actuator for deactivating the latter during activation of the alarm, panel means mounting the selector switches on the outer side of the door supporting wall, and housing means mounting the remaining operative structure on the inner side of the wall,

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the wall being provided with an opening therethrough for a passage of interconnecting electric conductors.

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NEIL C. READ, *Primary Examiner*.