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ELECTRICALLY OPERATED SIGNAL SYSTEM

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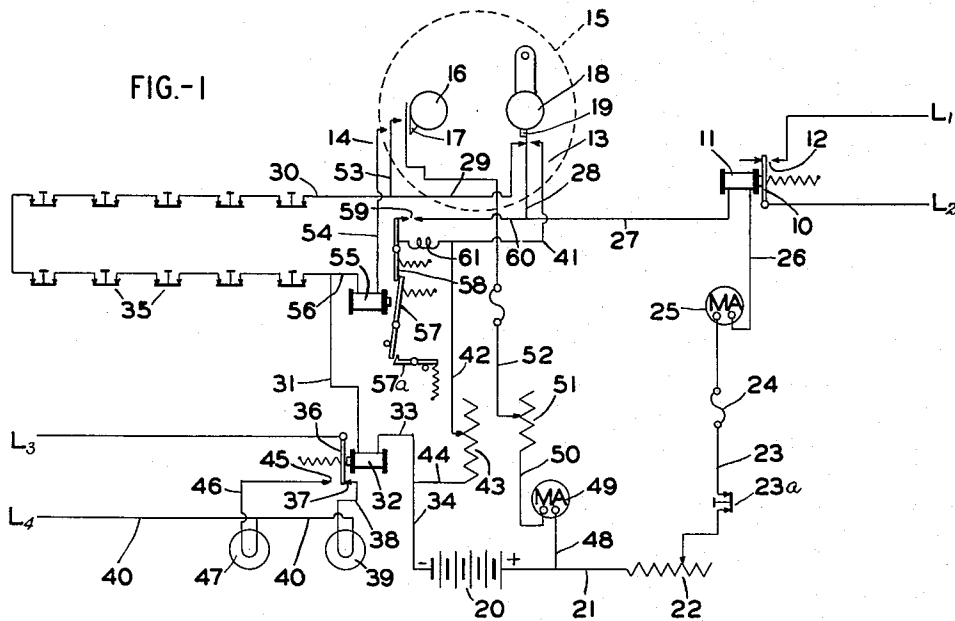


FIG.-2

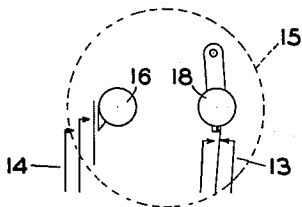


FIG.-3

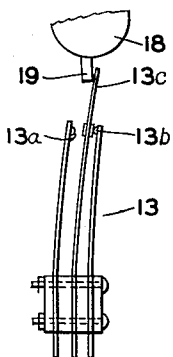
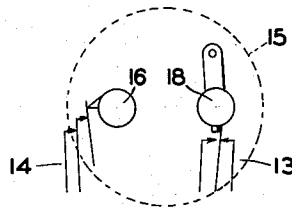


FIG.-4

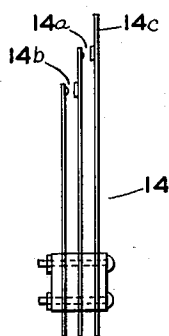


FIG.-5

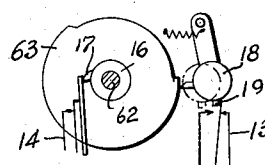


FIG.6

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ELECTRICALLY OPERATED SIGNAL
SYSTEM

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5 Claims. (Cl. 177—314)

This invention relates to improvements in electrically operated signal systems particularly adapted to bank burglary protective systems.

An object of the present invention is to provide a burglary protective system which will reduce the number of false alarms such as are often turned in because of the activities of workmen, charwomen, etc., working in the bank at other than banking hours. It will be understood that in the ordinary or usual bank protective system, buttons are placed in various positions about the bank accessible to tellers, officers and other employees in case of a hold-up. People working about the bank during the hours when cleaning and repairing is done often come in contact with such buttons, pushing them accidentally in an attempt to locate lights or during cleaning operations, or objects may be left lying upon buttons on desk tops and the like. Also during periods at the beginning of banking hours when the tellers are arranging things in their cages buttons in the cages may be accidentally engaged.

One of the objects of the present invention therefore is to cut out the circuit involving such buttons during other than banking hours. This in no way decreases the protective advantages of a system because at such hours all of the bank funds are locked up in the vault and not subject to hold-up liabilities.

Another object of the present invention is to provide an automatic check-up of a bank protective system each day at or near the beginning of banking hours so that there is positive assurance that the system is in proper operative condition in case it should be needed during that particular day. Most bank hold-ups occur between the hours of 10:00 a. m. and closing time in the afternoon. Therefore if a system is properly checked before 9:00 or 10:00 a. m. each morning the bank is assured that the system is in proper working condition.

Another object of the present invention therefore is to provide an automatic check-up independent of the bank employees which will indicate at a glance in the early morning banking hours whether or not the system is in proper operating condition.

In the drawing, Fig. 1 is a diagrammatic view of a circuit embodying my invention; Figs. 2 and 3 are views of the clock-operated switches of Fig. 1 in different positions; Figs. 4 and 5 are enlarged views of the clock-operated switches; while Fig. 6 is a somewhat diagrammatic view indicating a manner of operating the switches by clock mechanism.

I have shown my invention as used in connection with a signal circuit involving lines L_1 and L_2 which may represent the lines of an ordinary police circuit although it will be understood that my invention is useful for connection into any circuit where it is desired to throw a signal upon the actuation of a button in any emergency, such as in the case of a bank hold-up as outlined previously. In the circuit including lines L_1 and L_2 I have shown the type of circuit which is normally open, and in which a signal occurs when the circuit is closed as by means of the switch 10 which is closable by means of a solenoid or relay 11 when the latter is de-energized. Upon the actuation of the armature, contacts are closed at 12 so as to give a signal in the outside circuit L_1 , L_2 . It will be readily understood by those skilled in this art that by merely reversing the contacts at the point 12 the system will operate equally well in a normally closed circuit in which case the circuit will be opened by energization of the relay 11. The relay 11 might also represent the actuating member of an emergency alarm outside of the bank.

The automatic control switches are indicated generally at 13 and 14 in the various views. A more detailed view of switch 13 is shown in Fig. 4 and of switch 14 in Fig. 5. These switches are mounted adjacent a suitable clock mechanism generally indicated at 15. Any suitable clock mechanism may be used, many of which are well known, and preferably I use an electrically operated clock capable of running at least ten hours upon failure of its electrical circuit. A member 16 is indicated which is rotatable by the clock mechanism once every twenty-four hours. This member carries a contact closer 17 which may be adjustably arranged on the member 16 so that it may be set to operate at any chosen hour. An oscillatable clock-operated member is indicated at 18 which is arranged to be oscillated to the right or to the left at certain hours of the day. This member carries a contact closer 19 and the members 18, 19 also may be adjustable as to time if desired. The position of the clock-operated members 16 and 18 with their contact closers 17 and 19, respectively, at various times during the day is shown in Figs. 1 to 3. For instance in Fig. 1 a setting is indicated which might be used from bank opening time at 9:00 a. m. to bank closing time at 4:00 p. m. In Fig. 2 a setting is indicated for 4:00 p. m. to 8:00 a. m., and in Fig. 3 a setting from 8:00 a. m. to 9:00 a. m. It will be understood that any suitable time periods may be uti-

lized as the invention is not concerned with the setting of these periods.

Suitable clock mechanism is shown in Fig. 6 where shaft 62, which makes one revolution in twenty-four hours, carries with it the member 16 and the cam or contact closer 17 which is adapted to actuate the switch 14 from 8:00 a. m. to 9:00 a. m. Shaft 62 also rotates cam 63 whose raised periphery holds member 18 toward the right, as shown in Figs. 2 and 3 and in full lines in Fig. 6, from 4:00 p. m. to 9:00 a. m. and permits member 18 to move toward the left, as shown in Fig. 1 and in broken lines in Fig. 6, from 9:00 a. m. to 4:00 p. m.

Referring to Fig. 4, switch 13 comprises contacts 13a and 13b on each side of an intermediate contact 13c which has an extending arm adapted to be engaged by the contact closer 19. It will be noted that these three contacts are carried on resilient arms so arranged that as contact 13c is carried from the position of Fig. 1 to the position of Fig. 2, the contact 13a follows and remains in contact with 13c until the latter has engaged 13b after which the contact at 13a is broken. In a similar manner in going from the position of Fig. 2 or 3 to that of Fig. 1, 13b remains in contact with 13c until the latter has made contact with 13a. The reason for this arrangement is that any breaking of the circuit would result in the de-energization of solenoid 11 with a resulting signal in the outside circuit L₁, L₂.

Referring to Fig. 5, switch 14 comprises three resilient bars adapted to make successive contact first at 14a and second at 14b as the resilient bar 14c is moved from the right to left by the contact closer 17.

For the energization of relay 11 any suitable source of electrical power may be utilized and I have shown a circuit in which a battery 20 is provided which may be connected in a trickle charger circuit such as is common but it will be understood that any other dependable source of electrical power would be suitable. One circuit from the positive side of the battery is through line 21, adjustable resistance 22, line 23 including fuse 24, test jack or ammeter 25, line 26, solenoid 11, lines 27 and 28, contacts 13c and 13a (with the parts in the position of Fig. 1), line 29, line 30, line 31, relay or solenoid 32 and lines 33 and 34 back to the negative side of the battery.

In this last named circuit are a plurality of buttons 35 represented diagrammatically which have normally closed contacts opened by pressure on the button. Thus whenever one of the buttons is operated the circuit is opened, deenergizing relay 11 and releasing the switch armature 10 thus closing the outside circuit L₁, L₂ to send a signal. The adjustable resistance 22 in the last named circuit is set for a flow of 100 milliamperes from the battery. The relay 32 is of a type which requires 100 milliamperes to pull (and more than 80 milliamperes to hold) its coacting switch armature 36 to operated position. This operated position is shown in Fig. 1 and connects through contact 37 an outside line L₃ through line 38 with "clear" lamp 39 and then by line 40 to L₄. The source of current L₄ is any suitable outside source for energizing the lamp 39. For instance it may be the usual 110 volt supply. Preferably the lamp 39 is green which indicates that the circuit above described is in suitable operating condition.

At the close of banking hours, say 4:00 p. m. the contact closer 19 moves under influence of the

clock mechanism as indicated in Fig. 2 to open the contact at 13a and to close the contact at 13b. This establishes a circuit from the battery 20 to contact 13c as previously described, then through contact 13b, lines 41 and 42, adjustable resistance 43 and lines 44 and 34 back to the battery. The adjustable resistance 43 is set for a flow of 80 milliamperes for a purpose which will presently appear. With the establishment of this last named circuit the buttons 35 are rendered inoperative, that is to say, they are on a dead portion of the circuit so that after banking hours are over and the money is safely in the vault, workers accidentally touching the buttons 35 will not send in false alarms. At this time the circuit through relay 32 is broken and the switch armature 36 is returned by its biasing spring to establish contact at 45 so as to send current through line 46, "warning" lamp 47 and line 40 to energize lamp 47 and deenergize lamp 39. Lamp 47 is preferably a red lamp and will indicate that the protective circuit including the buttons 35 is now inoperative.

At some suitable hour in the morning, such as 8:00 a. m., the contact closer 17 is moved by the clock mechanism to the position shown in Fig. 3 while the contact closer 19 remains in the same position as it occupied in Fig. 2. As the contact closer 17 moves from the position of Fig. 2 toward the position of Fig. 3 its first effect is to move the arm 14c into engagement with the contact 14a while the contact 14b remains open. A circuit is thus established from the battery 20 through line 48, test jack or ammeter 49, line 50, adjustable resistance 51, line 52, arm 14c, contact 14a, lines 53, 30 and 31, relay 32 and lines 33 and 34 back to the battery. The adjustable resistance 51 is set for a flow of 80 milliamperes so that insufficient current is supplied to relay 32 to pull the same into operative position. Therefore red lamp 47 remains energized. As contact closer 17 continues to rotate in a clockwise direction it closes within perhaps a five minute period the contact at 14b. This establishes a circuit from the battery to contact arm 14c as just described above, then through contacts 14a and 14b, line 54, relay 55, lines 56 and 31, relay 32 and lines 33 and 34 back to the battery. This connection 54, 55, 56 is a shunt across the connection 53, 30 and in the claims is called a "shunt circuit." The purpose of the double contacts 14a and 14b is to first establish the flow through the circuit 53, 30 which (if that circuit is in perfect condition) will utilize so much of the current flow that upon establishment of the shunt circuit through 54, 55, 56 there is insufficient current to trip the relay armature 57 by means of the relay 55 because this last named relay requires at least 50 milliamperes to trip. The relationship between current flow in line 30, in the shunt circuit 54, 55, 56, and in the flow necessary to trip 57 is always so arranged that the described results must follow. However if there is an "open" condition in the circuit 30, the full flow of approximately 80 milliamperes will pass through relay 55 tripping the armature 57. The relay 55, 57 is of the type in which the armature remains latched as by latch 57a in actuated position until manually released. The armature 57 acting through lever 58 closes contacts at 59 establishing a circuit from battery 20 through line 21, resistance 22, lines 23 and 26, relay 11, lines 27 and 30, contact 59, lever 58, flexible lead 61, line 42, resistance 43, lines 44 and 34 back to the battery.

In the claims I have called this a "by-pass circuit."

The circuits just described are the test circuits and they may remain on as long as desired. At the end of the test period, which may be at 9:00 a. m. or the beginning of the banking hours, the clock mechanism moves the member 18 and the contact closer 19 again toward the left returning the switch 13 to the position of Fig. 1. At the same time the contact closer 17 passes beyond the end of arm 14c permitting the switch 14 to return to the position of Fig. 1. At this point the test of the button circuit is recorded at the warning signal. If there is an "open" condition in the button circuit then the contacts at 59 will have been closed, and there is insufficient current flowing through relay 32 to pull the armature 36 to operative position but instead the contact at 45 remains closed and the red lamp 47 remains lighted. If the lamps 47 and 39 are visible to the person having oversight of the system, the red signal indicates at this time that there is something wrong with the system involving the buttons 35 and that repairs are necessary to again put it in operating condition. When repairs have been completed on the button circuit so that it is again operative it is necessary to manually reset the relay 55, 57 so as to return the relay armature 57 to its inoperative position and open the contacts at 59. Preferably the relay 55, 57 will be in a closed box accessible only to the repair man which will insure that the manipulation of the contact closers 17 and 19 and the relay armature 57 during the repair period is such that the circuit is not broken through relay 11 and no false alarm is sent through the outside circuit L1, L2.

When the system is again established in proper condition with the contact closers in the position of Fig. 1 there will again be a flow of 100 milliamperes through relay 32 closing the contact at 37 and lighting the green lamp 39.

I have thus provided a protective system wherein the possibility of sending in false alarms is reduced to a minimum by means of cutting out the circuit including the various control buttons in the teller's cages and the like during those hours of the day and night when they are not necessary for the protection of bank funds. At the same time I have provided a means for automatically checking the operative condition of the bank protective circuit regularly and preferably at the beginning of the banking hours of each day.

If there are signal sending contacts in places requiring twenty-four hour service, as for instance in the bank vault, such contacts, buttons or the like will be placed in that portion of the circuit controlling relay 11 which is always in operation. For instance, they might be either in lines 23, 26 or 27, as represented by the switch shown at 23a.

I do not desire to be limited in the application of my invention solely to bank protective systems as other uses are possible. For instance the buttons 35 might be part of a community alarm system either for mutual protection in case of hold-ups anywhere in a small community during the day or for a general alarm in case of a fire in smaller communities where no alarm is considered necessary during the daytime when the buildings are occupied but alarms are used at night to call together a volunteer fire department, in which case the circuits I have disclosed might

be used to reduce the number of false alarms during such hours as the system, including the buttons 35, was not intended to be in operation and also for the purpose of checking the system each day to insure that the circuits were in operative condition.

What I claim is:

1. In an electrical protective system having a circuit controlling electrical device operable when said device is de-energized, means for controlling said device including an electrical circuit, there being a normally closed signal switch in said circuit, means limiting the operating current in said circuit to a predetermined amount, indicating means having a "warning" position, said indicating means being biased toward "warning" position, an electric relay in said switch containing portion of said circuit and adapted when energized by at least said operating current to move said indicating means out of "warning" position, clock-operated means for connecting said switch containing portion of said circuit in the circuit at a predetermined time, and means including clock-operated means acting prior to said predetermined time for causing the establishment of a by-pass circuit in parallel with said switch containing portion of said first-named circuit conditioned upon an electrical break in said portion of said first-named circuit, whereby when such a break occurs less than operating current will flow through said relay and the indicating means will remain in "warning" position.

2. A protective system as in claim 1 wherein said second named clock-operated means comprises two switches acting successively, the first-acting of said switches having electrical connections for sending a testing current of predetermined amount through said switch containing portion of said first named circuit, means limiting said testing current to an amount less than said operating current, a normally open switch in said by-pass circuit, a relay for closing said last named switch, the second-acting of said switches having electrical connections for establishing a shunt circuit in parallel with said switch containing portion of said first named circuit, said shunt circuit including the energizing coil of said last named relay, and the current required to operate said last named relay being greater than said predetermined testing current less the current flowing through said switch containing circuit portion when the latter is closed.

3. In a protective system having an emergency circuit controlling device, means for controlling said device including an electrical circuit, said circuit having a portion including a plurality of normally closed signal switches, means for supplying currents of greater and lesser intensities respectively, signal means in said circuit portion having a "warning" position and requiring more than said current of lesser intensity to cause it to move out of "warning" position, control means for sending said current of lesser intensity through said portion of said circuit, a normally open by-pass circuit in parallel with said portion of said circuit, a relay for closing said by-pass circuit, said relay requiring a major portion of said current of lesser intensity for its operation, a normally open shunt circuit across said portion of said first named circuit and adapted to energize said relay, said control means being arranged for closing said shunt circuit after operation of said second named means, and said control means being adapted to disconnect said current of lesser

intensity and to send said current of greater intensity through said portion of said first named circuit.

4. In a protective system having an emergency circuit controlling device, means for controlling said device including an electrical circuit, said circuit including a plurality of normally closed signal switches, means for supplying currents of greater and lesser intensities respectively, means for sending said current of greater intensity through said switch containing portion of said circuit, clock-operated means for sending said current of lesser intensity through said switch containing portion of said circuit, signal means having a "warning" position, means normally tending to move said signal means to "warning" position, a relay in said portion of said circuit adapted only when energized by more than said current of lesser intensity to move said signal means out of "warning" position, a normally open by-pass circuit in parallel with said switch containing portion of said first named circuit, a relay for closing said by-pass circuit, a normally open shunt circuit across said switch containing portion of said circuit and adapted to energize said second named relay, said clock-operated means including a switch for closing said shunt circuit, and said second named relay requiring for its operation an electrical break in said portion of said first named circuit.

5. In a bank protective system having an emer-

gency circuit controlling device, means for controlling said device including an electrical circuit, means for supplying currents of greater and lesser intensities respectively, said circuit having a continuously operative portion in communication with said current of greater intensity and including a normally closed signal switch, said circuit also having a second portion effectively operative only during banking hours and having a normally closed signal switch in it, clock-operated switch means for placing said second portion of said circuit in and out of electrical communication with said first named portion during predetermined hours, clock-operated means for sending said current of lesser intensity through said second portion of said circuit during the time when said second portion of said circuit is out of communication with said first portion, signal means having a "warning" position, means normally tending to move said signal means to "warning" position, a relay in said second portion of said circuit adapted only when energized by more than said current of lesser intensity to move said signal means out of "warning" position, and means for establishing a by-pass circuit in parallel with said second portion of said circuit conditioned upon the occurrence of an electrical break in said second portion of said circuit when said testing current is passed through it.

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