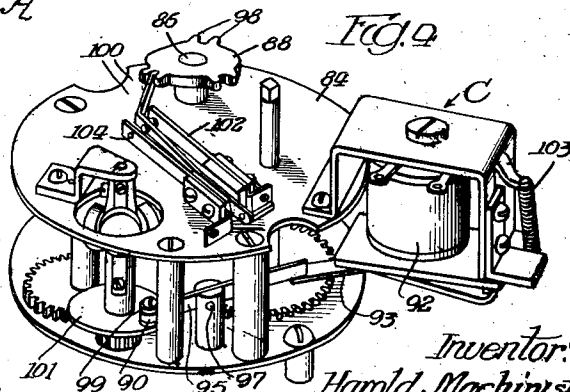
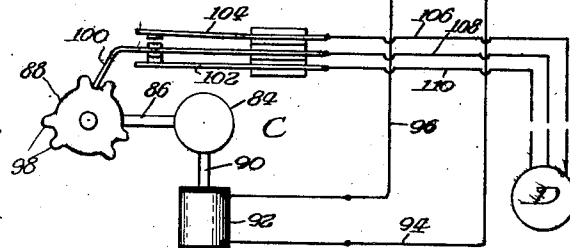
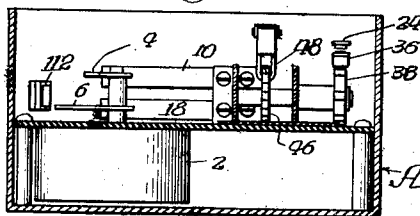
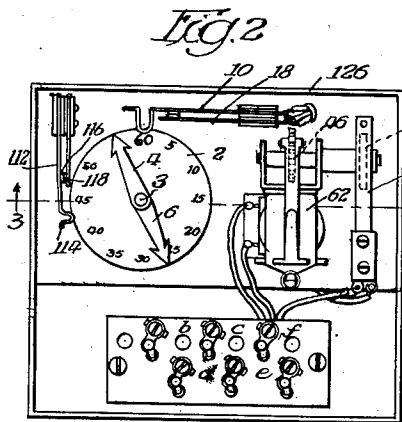
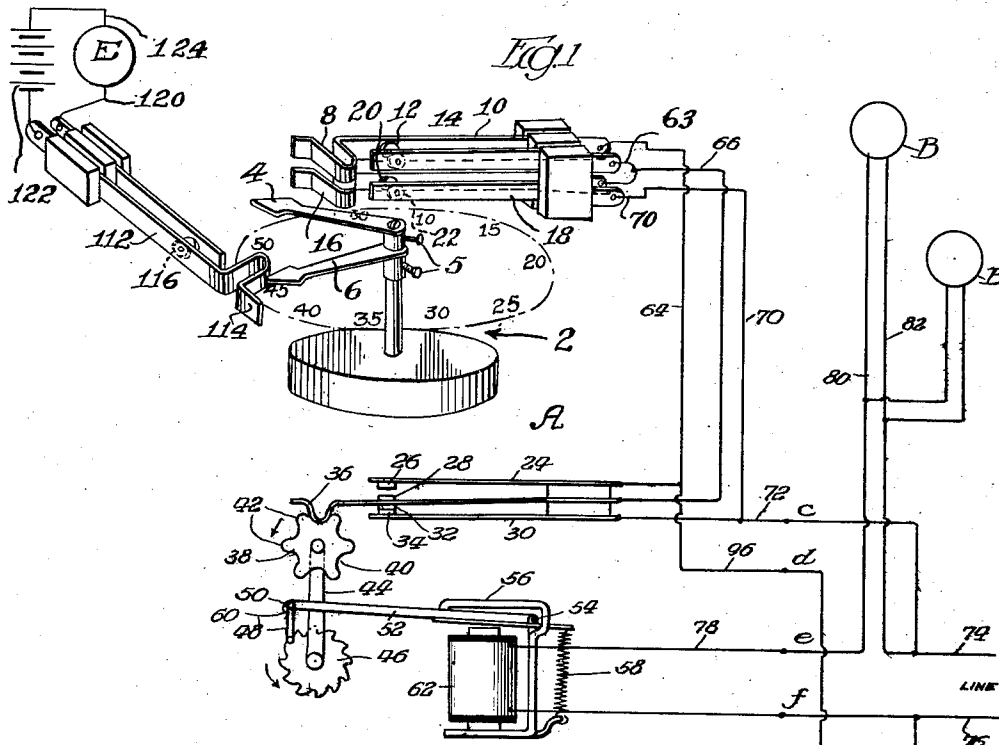


Aug. 29, 1944.

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ELECTRIC CONTROL DEVICE

2,357,122

Filed Aug. 24, 1940



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UNITED STATES PATENT OFFICE

2,357,122

ELECTRIC CONTROL DEVICE

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Application August 24, 1940, Serial No. 354,046

5 Claims. (Cl. 161—20)

This invention relates to an electrical control device and more particularly to a control device for alarm and watchman systems. It further relates to a new and improved type of time controlled electric switch mechanism for governing electrical circuits.

One of the objects of this invention is to provide a new and simplified type of time controlled electric switch mechanism for controlling electrical circuits.

Another object is to provide a new and improved type of alarm and watchman system which is much simpler than previously proposed systems.

Still another object is to provide a new and improved watchman control system which provides for a local signal to warn the watchman when it is time to begin his rounds and another signal operative at a remote station in the event that the watchman does not arrive at his station at a pre-determined time.

An additional object of the invention is to provide devices for accomplishing the previous objects which are small and relatively simple in construction.

Other objects and features of the invention will be apparent by reference to the following description in conjunction with the accompanying drawing, in which:

Figure 1 represents diagrammatically an electrical system as provided in accordance with the present invention for the supervision of watchmen;

Figure 2 is a plan view of a time controlled electrical mechanism employed in conjunction with the system shown in Figure 1;

Figure 3 is a side view taken along the line 3—3 of the device shown in Figure 2;

Figure 4 is a perspective view of an auxiliary device which may or may not be employed in conjunction with the system shown in Figure 1 for the purpose of giving code signals.

To illustrate my invention, I have shown on the drawing a watchman supervisory system comprising an alarm device under the control of a circuit containing control switches, some of which are time actuated to set the alarm device in operation, and others of which comprise watchman operable switches adapted to be actuated by a watchman in making a watching tour. These watchman operable switches are associated with the time actuated switches to nullify the circuit actuating effect thereof, provided that such watchman operable switches are duly thrown at the proper time by the act of the watchman

in making a watching tour. If, however, the watchman fails to operate such switches, the time actuated switches cause the alarm to be set in operation.

In the illustrated embodiment, there are a pair of time actuated switches connected together in series relationship in the circuit which controls the alarm device, a watchman operable switch being connected in parallel with each of the time actuated switches, so that by operating one or other of the watchman operable switches, the effect of the operation of the time actuated switch with which it is connected in parallel may be nullified. For manufacturing convenience, the time actuated and watchman operable switches are placed in a common container or switch box and electrically interconnected, the container also housing clock mechanism for throwing the time actuated switches and relay means for enabling the watchman operable switches to be thrown as a result of the act of the watchman at a remotely located relay actuating station accessible to the watchman in the performance of a watching tour. The switch box also may be provided with a terminal board to facilitate the connection of the switches in the control circuit of the alarm device, the connection of the relay with watchman operable switch actuating devices, and the connection of the switches, the relay, and the switch actuating clock mechanism, with a suitable external source of electrical power.

Referring to Figure 1, the system illustrated comprises the following principal elements. First, a time controlled switch mechanism generally shown at A and shown in detail in Figure 2; second, a watchman operated circuit control device located at a transmitting station situated remotely from switch mechanism A and shown diagrammatically at B; third, a code signalling device generally indicated at C which is shown in more detail in Figure 4 and which is optional; and, fourth, a remote signal which may be at a police station or a central station, as diagrammatically indicated at D. The fifth part of the system, which is also optional, is a local signal generally illustrated at E to warn the watchman when it is time to begin his rounds.

The general idea of providing a watchman signalling system wherein a signal is given at a central station if the watchman does not reach a given watchman station at a predetermined time is well known. In general, however, the means for accomplishing this have been relatively complex and more expensive than might be desired.

In the present invention, on the other hand, the electrical system for supervising the watchman is relatively simple. As generally illustrated at A in Figure 1, a clock mechanism 2 is provided. This clock mechanism includes a driven shaft 3 carrying switch operating arms 4 and 6, the relative angularity of which, on the shaft 3, may be adjusted by set screws 5 in order to provide for any desired elapsed time interval between the operation of the switch actuated by the arm 4 and the operation of the switch actuated by the arm 6. The arm carrying the shaft 3 may be driven by means of a gear train or by other suitable means connected to the clock mechanism. As the arm 4 rotates, it cams against a switch element 8 of a time actuated switch 10 provided with contacts 12 and 14. In a like manner after a time interval following the operation of switch 10 by arm 4, such interval being determined by the relative angular setting of the arms 4 and 6 on the shaft 3, the arm 6 cams against a switch element 16 of a time actuated switch 18 provided with contacts 20 and 22.

The time actuated switches 10 and 18, as shown, are normally closed. Each switch is made of spring metal. Thus, when the arm 4 cams against the switch member 8 it causes contacts 12 and 14 to separate, thereby opening the switch. As soon as the arm 4 passes beyond switch member 8, the latter springs back into position, closing contacts 12 and 14. In a similar manner switch 18 is opened and closed by the arm 6 camming against the switch member 16.

Also forming a part of the mechanism is a watchman operable switch mechanism comprising a switch 24 provided with contacts 26 and 28 and a switch 30 provided with contacts 32 and 34. These switches 24 and 30 conveniently may comprise a single pole double throw switch operated automatically through switch member 36. Switch member 36 is made of spring metal and normally tends to press downwardly against a star wheel 38, which is provided with a plurality of recesses 40 and a corresponding number of projections 42, there being in the particular star wheel illustrated in the drawing six of such recesses and six intermediate projections. When the switch member 36 is in one of the recesses 40, as shown, switch contacts 26 and 28 are open and switch contacts 32 and 34 are closed, while when the said member 36 is on one of the projections 42, switch contacts 26 and 28 are closed and switch contacts 32 and 34 are open. Hence, one of the switches 24 and 30 is always open when the other is closed, and vice versa. The star wheel 38 is fixed on an axle or spindle 44 to which is fixed a toothed wheel 46 so that any movement of the wheel 46 imparts a like movement through axle 44 to star wheel 38. The toothed wheel 46 is provided with twice as many teeth as the star wheel 38.

Movement is imparted to toothed wheel 46 from a link member 48 connected through a loose connection 50 to a bar 52. Bar member 52 is normally urged upward against a stop 56 by means of a spring 58 which may be a coil spring or any other suitable type of spring. Link member 48 is normally urged inwardly against the teeth of wheel 46 by means of another spring 60, as, for example, a small leaf spring. An electromagnet or solenoid 62 is provided which when energized will cause bar 52 to be pulled downwardly thereby also pulling downwardly link member 48 and causing wheel 46 to rotate in a counterclockwise direction. A simi-

lar rotation will thus be imparted to star wheel 38. The rotation is in the nature of a step-by-step movement, each stepwise movement occurring whenever the electromagnet 62 is energized.

The electromagnet comprising the solenoid 62 and the bar 52 thus comprises a relay for alternately operating the switches 24 and 30, and suitable circuit means is provided for energizing the relay 62 as a result of the act of a watchman performed at the remote stations B, B₁.

The time actuated switches 10 and 18 are interconnected in series by a conductor 68 which electrically connects one blade of the switch 10 with a blade of switch 18. The watchman operable switches 24 and 30 are, respectively, connected in parallel with the switch 10 and the switch 18 by the conductors 64, 66 and 70, the conductor 66 electrically connecting the interconnected blades of the time operated switches with the common blade 36 of the watchman operable switches 24 and 30, the other blade of the switch 24 being connected by the conductor 64 with a blade of the switch 10, and the other blade of the switch 30 being connected by the conductor 70 with a blade of the switch 18. The switching mechanism, comprising the interconnected time actuated and watchman operable switches, is connected in a circuit to control the alarm device D, the conductor 70 of the switch mechanism being connected by the conductor 72 with one side 74 of a suitable source of electrical power, and the conductor 64 of the switch mechanism being connected, by means of the conductor 96, with the control solenoid 92 of the alarm device, said solenoid being connected, by means of the conductor 94, with the other side 75 of the power source. It will thus be seen that the time control switches 10 and 18 are interposed in series in the actuating circuit of the solenoid 92, and that the watchman operable switches 24 and 30, respectively, are connected in said circuit in parallel relationship with respect to the switches 10 and 18.

The watchman operable switches 24 and 30 are actuated by the relay 62 in response to the action of a watchman at the remote stations B, B₁, the solenoid 62 being connected in circuit with the power source and watchman operated switches at the remote stations B, B₁. For operating the relay, electrical energy passes through electromagnet 62 from one side 75 of the power source and thence through conductor 78 to conductor 80 connected to circuit control device B which preferably comprises circuit closing means such as a key switch or another suitable circuit closing means, as is well known in the art, whereby the watchman, upon arriving at the remotely located control device, turns a key and closes the circuit. Conductor 82 connects the control device B to the other side 74 of the power source. It will be recognized that unless a key or other circuit closing instrumentality is operated at control device B, the circuit through electromagnet 62 will not be closed and the magnet 62 will not be energized. However, if the circuit is closed say, by the watchman at control device B, then magnet 62 will be energized causing bar 52 to be drawn downwardly thereby causing link 48 to turn ratchet wheel 46. As ratchet wheel 46 turns it also turns shaft 44 and the latter causes the star wheel 38 to turn. In the position shown in Figure 1, this actuation of the star wheel 38 will cause spring member 36 to be cammed upwardly thereby closing contacts 26 and 28 of

switch member 24 and opening contacts 32 and 34 of switch member 30.

The purpose of this arrangement is as follows. If the watchman arrives at control device B in time to cause an impulse to be transmitted to electromagnet 62 thereby opening switch 30 and closing switch 24 in the manner just described, no remote alarm signal will be given at D. However, if the watchman fails to arrive at the control device B before the arm 4 has contacted spring member 8, then a signal will be given at remote signal station D.

The code signalling device diagrammatically shown at C in Figure 1 comprises a clock mechanism 84 connected through shaft 86 to a code wheel 88. The clock mechanism 84 is normally prevented from operating by a catch or detent mechanism 90 controlled by electromagnet 92. Electromagnet 92 is normally energized and hence, normally holds the detent or catch against one of the operating members of clock mechanism 84. The electromagnet 92 is connected by a conductor 94 to one side of the line 76. The other side of the line 74 connects to electromagnet 92 through a circuit comprising a conductor 96 connected to a conductor 64 which in turn connects to one side of switch 10, passes through normally closed contacts 12 and 14 of switch 10, thence through conductor 63, through conductor 66 to the common switch element of switches 24 and 30, thence through contacts 32 and 34 of switch 30 to conductor 72 and finally to line 74. From conductor 63 the circuit may also be traced through contacts 20 and 22 of switch 18 and thence through conductor 70 to conductor 72 and line 74.

The teeth 98 of the code wheel 88 operate against a spring switch member 100 serving to successively open and close switches 102 and 104. These switches are connected through conductors 106, 108 and 110 to a source of electrical energy, not shown, and to a signal device at a remote signal station generally shown at D. Any desired type of signal may be employed such as a siren, light or other well known signal device. A series of lights may be employed such as green lights and red lights, the signal being green as long as there is no alarm and changing to red when the signal system is actuated, or alternating red and green. The alternations or fluctuations of the signal may be determined by the size and number of teeth 98 on the code wheel 88. Different types of wheels may be used for different codes.

Inasmuch as watchmen are often required to perform other duties quite apart from their watchman duties, it is often desirable to have a local alarm which will be actuated at a predetermined time interval before the watchman is to make his rounds. As shown diagrammatically in Figure 1, such an alarm may be actuated by means of a switch 112 containing a spring cam member 114 which is adapted to be moved by arms 4 and 6. In this way the contacts 116 and 118 are opened and closed. Switch 112 connects through conductor 120 to a local alarm generally shown at E, which may be a bell or other signal and thence through a source of electrical energy 122 to the other side of the switch through conductor 124. The arm 4 is adapted to strike against switch member 114 thereby causing the switch to open and an alarm to sound. In this type of alarm circuit the alarm does not sound until the circuit is broken. However, any other type of alarm circuit may be employed, as, for example, one in which the alarm sounds when

the circuit is made. In this event the switch 112 would be normally open and would be so arranged that arm 4 pressing against member 114 would close contacts 116 and 118.

One of the features of the present invention resides in the fact that the time controlled switch mechanism and the circuits are of such simple construction that the entire mechanism generally illustrated at A in Figure 1 may be placed in a box or other suitable receptacle which may be, for example, 5 to 6 inches square and about 2 to 3 inches high, or even smaller. As shown in Figure 2, box 126 carries the clock mechanism 2, the switches 10 and 18, the electromagnet 62, the gear wheel 46, the star wheel 38 and the necessary conductors such as previously described in connection with Figure 1. For convenience, terminals may be provided as indicated by a, b, c, d, e, and f, corresponding to similar terminals illustrated on the diagrammatic drawing of Figure 1. The terminals a and b are provided for the clock mechanism 2 where an electric clock is employed. Another view of the unitary structure is shown in Figure 3.

The illustration in Figure 4 represents in perspective a suitable type of code signalling device generally shown diagrammatically at C in Figure 1. This device may be placed in the same box as the time delay mechanism of Figures 2 and 3, or it may be made as a separate device. As previously indicated, its use in the system is optional. As shown in Figure 4, it consists of a clock mechanism 84, which may be mechanical or electrical, an electromagnet 92, a latch mechanism 90, a pair of spring switches 102 and 104 and a code wheel 88 provided with teeth 98. The switch elements are actuated by a pair of cam members 100 which contact teeth 98 of code wheel 88. Electromagnet 92 is normally energized thereby causing the bar member 93 to be held against a catch lever 95 pivoted at point 97. This serves to hold the stop member 99 against wheel 101 as long as magnet 92 is energized. When the circuit through magnet 92 is broken, bar member 93 is released thereby releasing stop member 99 and permitting the clock mechanism 84 to operate. This in turn causes the rotation of shaft 86 and of code wheel 88 so that a code signal is given at the remote signal station D. As soon as the circuit is re-established through magnet 92, bar member 93 is drawn against the magnet and against the tension of spring member 103 thereby causing stop member 99 to be lowered against wheel 101 and causing clock mechanism 84 to cease to rotate.

A specific example illustrating the operation of the mechanism in a watchman supervision system may be given as follows. The arms 4 and 6 and the clock mechanism 2 are so adjusted that there are half hour intervals between the time that arm 4 strikes against switch member 8 and the time that arm 6 strikes against switch member 16. The switch 112 is so positioned that the arm 4 will strike against it approximately 5 minutes in advance of the time that the same arm strikes against switch member 8. As the arms rotate arm 4 strikes against switch member 114 thereby opening contacts 116 and 118 and causing a local alarm to be given at station E. The watchman hears the alarm and immediately starts his rounds so as to be at control device B before arm 4 strikes against switch member 8. If we assume that the watchman reaches control device B before the time mentioned and turns a key to close the circuit thereby sending an im-

pulse through electromagnet 62, causing bar 52 to be pulled downwardly, then link member 48 imparts a single step movement to gear member 46, thereby turning shaft 44 and likewise rotating star wheel 38. The single step rotation of star wheel 38 closes switch elements 26 and 28 and opens switch elements 32 and 34. Then when arm 4 reaches switch member 8 contacts 12 and 14 of switch 10 will be broken. No signal will be given, however, as long as the circuit through electromagnet 92 is not broken. It will be observed that a circuit can be traced through electromagnet 92 even though contacts 12 and 14 are broken. This circuit extends from line 74 through conductor 72, through conductor 70, through contacts 20 and 22, through conductor 66, through contacts 26 and 28, through conductor 96, through magnet 92 and conductor 94 to the other side of the line 76.

If for any reason the watchman does not arrive at the control device B in time to turn the transmitting switch and close the circuit through electromagnet 62, then contacts 12 and 14 will be opened when arm 4 strikes against spring member 8. The circuit through magnet 92 will be broken at switch 24 because contacts 26 and 28 will also be open since there has been no movement of star wheel 38. Thereupon, referring to Figure 4, the bar 93 will drop downwardly due to the tension of spring 103 and will release pivoted member 95, causing stop member 99 to be withdrawn from wheel 101, permitting the clock mechanism 84 to operate and thereby causing the shaft 82 to rotate, moving code wheel 88 and causing teeth 98 to press against spring members 100 at intervals. Spring members 100 in turn open and close switches 102 and 104 which are in circuit with a remote alarm at station D. Hence, the opening and closing of these switches will cause an interrupted signal to be given, usually known as a code signal. Due to the normally closed circuit through magnet 92, any tampering such as cutting of the wires to magnet 92 will cause a similar signal to be given. The same is true if the wires to magnet 62 are cut. In this latter event a signal would be given even though the watchman had reached his control device in time.

A second watchman operated remote control device is illustrated at B₁. When the watchman reaches the place or station where the device B₁ is located, he turns a key or other means to again close a circuit through magnet 62, thereby energizing said magnet and actuating bar 52. In the manner previously described, one of the switches 24 and 30 is thereupon closed while the other is opened. If it is assumed that the watchman has previously arrived at and operated the device B on time, thus transmitting an impulse to magnet 62 whereby to close contacts 26 and 28 and to open contacts 32 and 34, then the transmission of an impulse by actuation of device B₁ will cause contacts 26 and 28 to be opened while contacts 32 and 34 are closed. If this occurs before arm 6 reaches switch member 16, no signal will be given at remote signal station D. If the watchman fails to reach and operate device B₁ by the time arm 6 opens switch 18, then the signal circuit will be broken de-energizing magnet 92 and causing a code signal to be given at D in the manner already described. No circuit can be traced from line 76 through conductor 94, magnet 92 and conductor 96 to the other side of the line 74 when switches 18 and 30 are both open. However, if switch 30 is closed, the opening of switch

18 by arm 6 will not break the signal circuit through magnet 92.

The foregoing system may be employed with any number of remotely located watchman operated control devices. It is usually preferable to have the same code device C for a pair of watchman operated devices located in the same general area so that the alarm given will point to the source of the trouble within a defined location. In some cases a single time delay mechanism A and a single code signalling device C with several remote control devices will be sufficient for a whole floor of a building.

Where there are a series of time delay devices A, the local alarm may be omitted from all except the first in the series.

A typical supervision system may contain, for example, four watchman operated devices B, two time delay mechanisms A and two code signalling devices C with one local alarm E and one remote alarm D. Another typical system may contain eight watchman operated devices B, four time delay mechanisms A and four code signalling devices C with one local alarm E and one remote alarm D.

It will be understood that certain variations may be made in the electrical circuits, utilizing relays or other electrical devices without departing from the invention. As previously indicated, the alarm circuits are preferably of the type which are continuously energized and in which a signal is given by breaking the circuit. This is the preferred type of alarm circuit because tampering with the wires, as, for instance, by cutting them, also causes a signal to be given. The watchman operated devices B, B₁, etc. may be of a well known type, preferably such that only one impulse can be sent at a given time, although it will be understood that for some purposes it might be desirable to employ devices from which more than one impulse can be sent at a given time.

The time delay mechanism, generally shown at A, has the advantage of simplicity. It is easily constructed and the entire mechanism may be placed in a single small box. It is believed that the simple construction and arrangement of the time delay mechanism is a novel and useful contribution to the art. While this mechanism is particularly useful in a watchman supervision or control system, as previously described, it may also be employed for other electrical controlled purposes, as, for instance, in the controlling of two electric circuits adapted to operate electrical devices at pre-determined successive periods of time.

Auxiliary mechanisms may be employed without departing from the invention. One such mechanism which is contemplated in accordance with the invention, although not specifically described herein, is an automatic mechanism for starting and stopping the supervision system. This mechanism involves the use of a second clock mechanism in conjunction with clock mechanism 2. It may be assumed, for example, that arms 4 and 6 and clock mechanism 2 will be set to make a complete revolution every hour. The watchman supervision system, however, may be in operation only 8 hours out of 24, and hence, it is desirable to provide some means for automatically starting and stopping the system. This may be accomplished if clock mechanism 2 is an electric clock by providing a second clock which runs continuously and is provided with means at pre-determined intervals for dis-

connecting the circuit to clock mechanism 2 and then re-connecting it when the supervision system is to be put into operation again. The clock mechanism 2 is a spring wound clock. A second clock may be used to start and stop it through an intermediate means such as the detent mechanism used in connection with code signalling device C.

Other types of code signalling devices may be employed. In some cases it may not be necessary or desirable to use a code signalling device.

The remote alarm signal may be placed at a police station or other central supervising station. If desired, several remote alarms may be placed at several remote stations. Other changes and variations may be made without departing from the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A watchman supervisory system comprising an alarm device, electrical means for controlling the operation of said alarm device, and a control circuit for controlling said electrical means, switch means in said circuit comprising a pair of timer actuated switches connected in series in said circuit and control switches in said circuit, there being a control switch in parallel relationship with respect to each of said timer actuated switches, biasing means normally urging each of said timer actuated switches toward a normal switch position, timer actuated means for throwing said timer actuated switches each to an abnormal switch position at successive intervals during a predetermined time cycle, said control switch means being operative when actuated during said predetermined time cycle to control said electrical means independently of its respective parallel timer actuated switch to prevent the ringing of said alarm device, and said timer actuated switch being operative to control said electrical means during said predetermined time cycle to cause the ringing of said alarm device when its parallel control switch is not actuated during said time cycle, and means operable by a watchman for alternately actuating said control switches to cause alternate opening and closing thereof during successive time cycles including means for closing one of said control switches when the other is opened and vice versa.

2. A watchman supervisory system as set forth in claim 1, wherein said watchman operable means comprises a solenoid, means drivingly connected with said control switches and oper-

ated by said solenoid for throwing the said control switches, and circuit means including a watchman actuated switch for controlling the delivery of electrical energy to said solenoid.

3. A watchman supervisory system as set forth in claim 1, including warning signal means and switch means operated by said timer means in advance of the operation of one of said timer actuated switches for operating said signal means.

4. A watchman supervisory system as set forth in claim 1, wherein the alarm device comprises normally inoperative alarm signalling means, motive means for actuating the alarm signalling means, a latch normally blocking operation of the motive means and held in blocking position by said electromotive means when energized by said circuit means, and yielding means normally biasing the latch away from blocking position to release the motive means for operation when said electromotive means is de-energized by interruption of said circuit means through the operation of said timer actuated switches.

5. A watchman's supervisory system comprising an alarm device, normally energized electrical means for causing the operation of said alarm device when de-energized, a normally closed control circuit to a source of electrical energy for keeping said electrical means energized, switch means in said circuit comprising a pair of timer actuated switches in series with each other, biasing means for normally biasing said switch means to a closed position to maintain said circuit energized, timer means for throwing said timer switches each to an open position against the action of said biasing means at successive intervals during a predetermined time cycle, control switch means in said circuit comprising a pair of electrically connected switches each shunted across one of said timer switches and each adapted to be closed when the other is open and vice versa, control means actuatable by a watchman for closing one of said control switches when the other is open and vice versa during each of said predetermined time cycles, whereby when said control means is actuated by a watchman during one of said predetermined time cycles said circuit remains energized independently of the opening of said timer actuated switch by said timer means but becomes de-energized and thereby causes an alarm to be given in the event that said watchman fails to actuate said control means to cause said control switch to be closed during said predetermined time cycle.

HAROLD MACHINIST.

CERTIFICATE OF CORRECTION.

Patent No. 2,357,122.

August 29, 1944.

HAROLD MACHINIST.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: In the drawing, Figure 1, for the numeral "63" designating a conductor read --68--; in the printed specification, page 3, first column, lines 29 and 33, for "conductor 63" read --conductor 68--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of December, A. D. 1944.

Leslie Frazer

(Seal)

Acting Commissioner of Patents.