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BURGLAR ALARM

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Fig. 1.

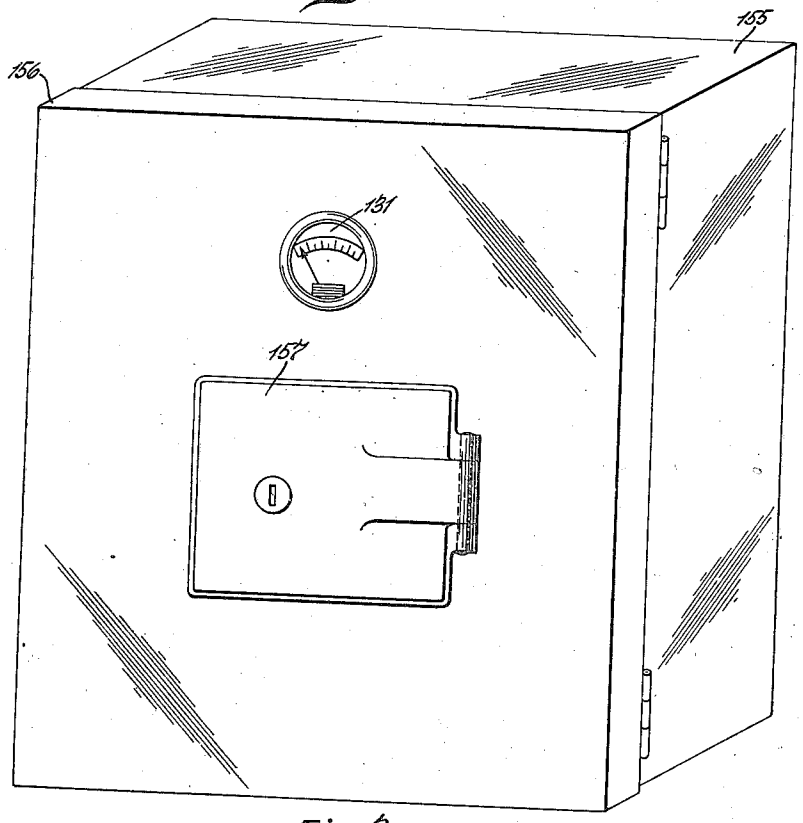

Fig. 2.

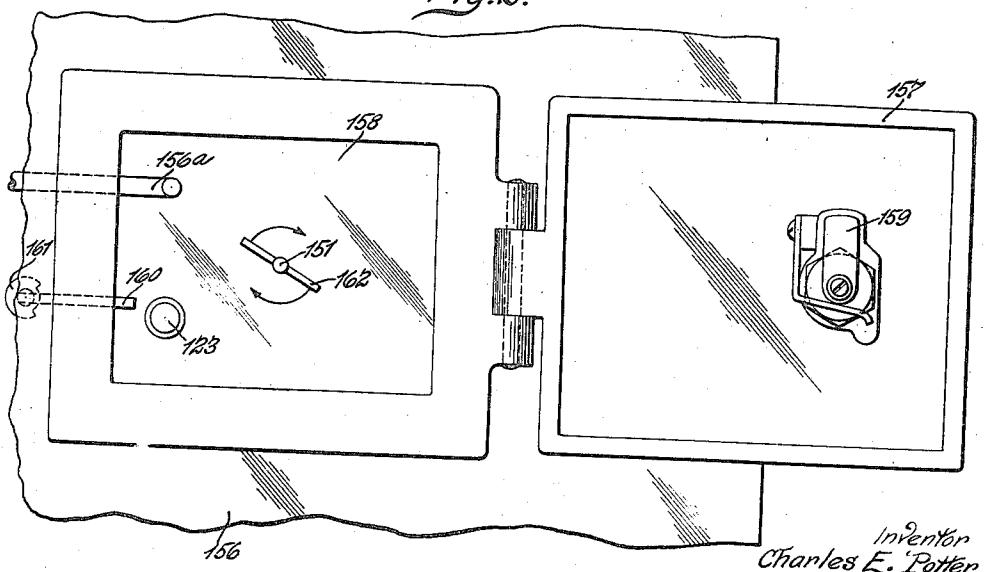

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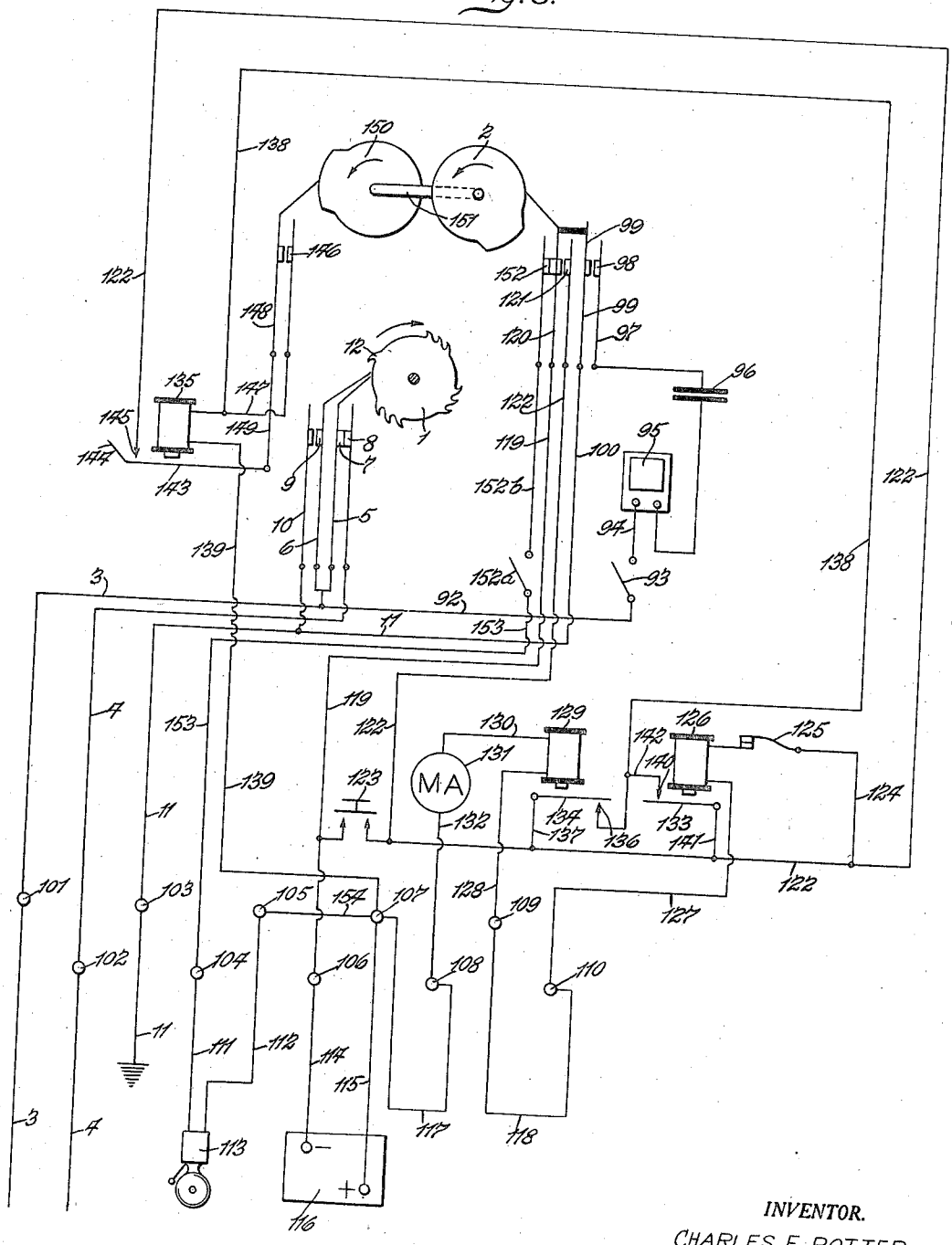
Fig. 3.



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BURGLAR ALARM

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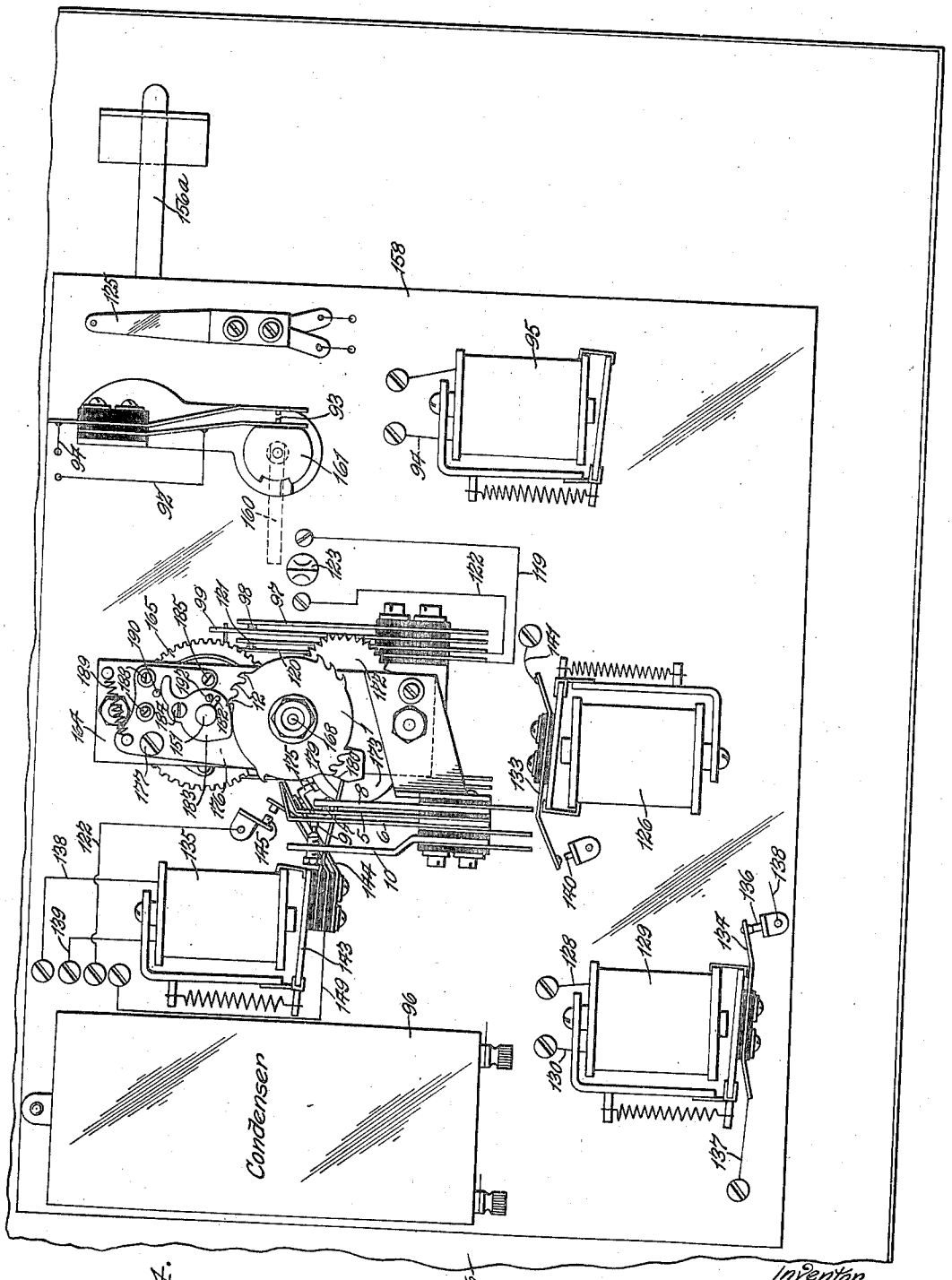

Fig. 4.

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Fig.5.

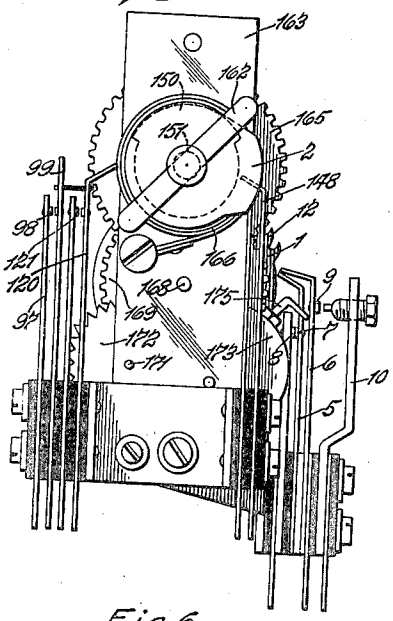

Fig.7.

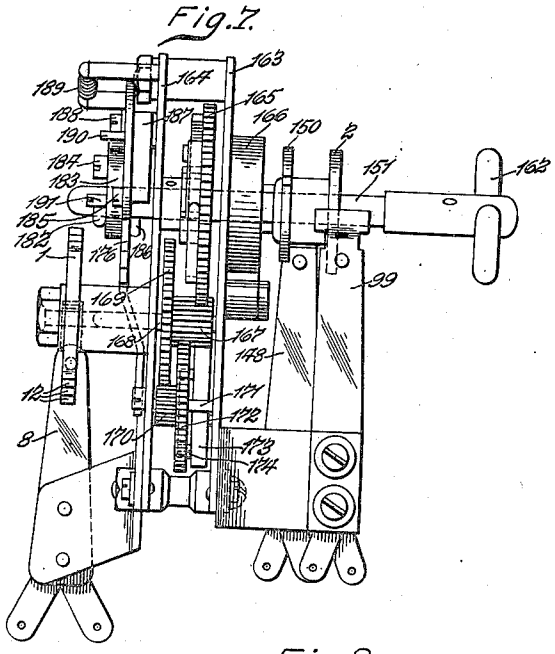

Fig.6.

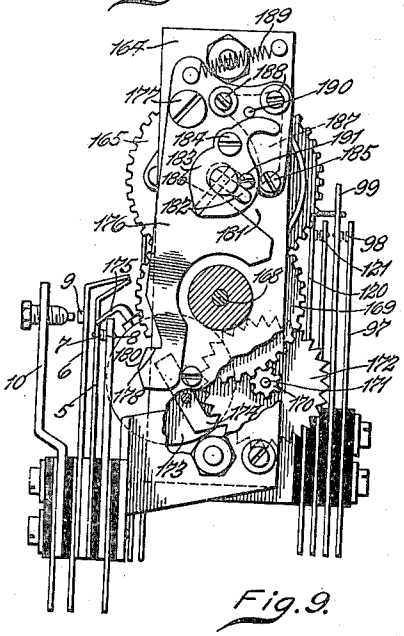

Fig.8.

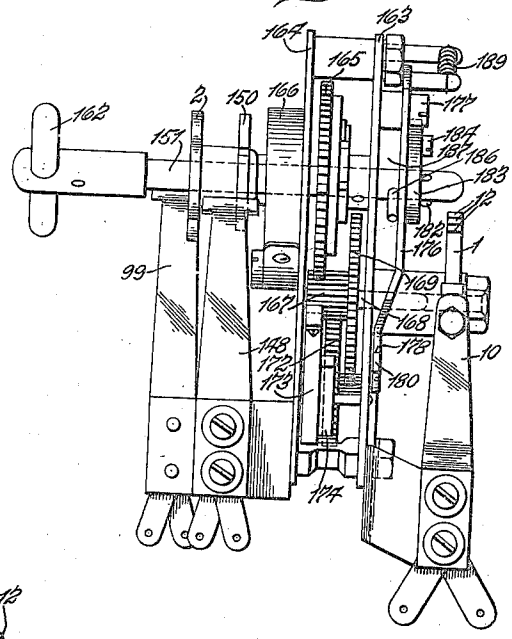

Fig.9.

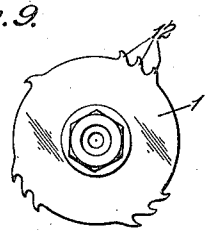

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Fig. 10.

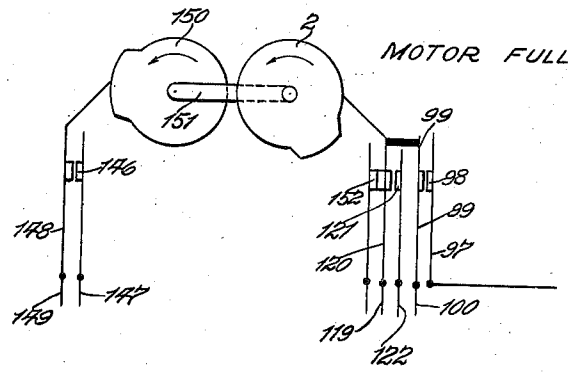


Fig. 11.

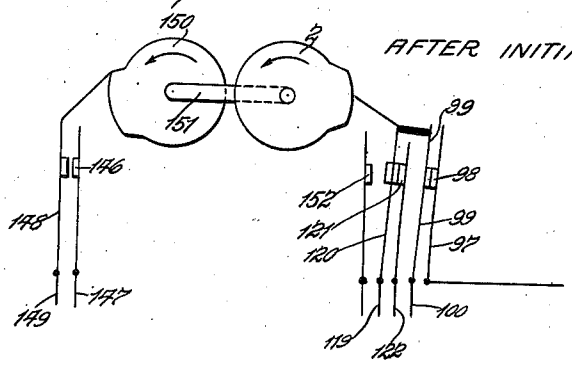
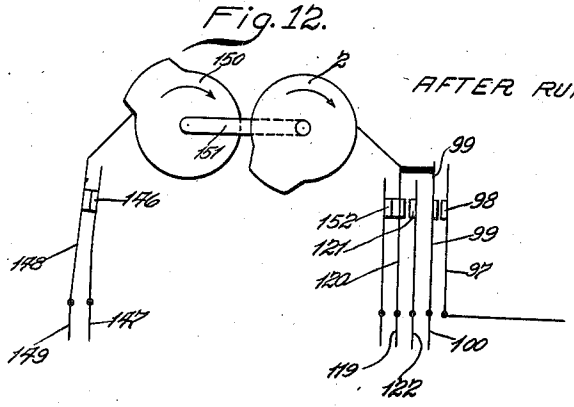


Fig. 12.



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Patented June 24, 1941 2,247,251

UNITED STATES PATENT OFFICE

2,247,251

BURGLAR ALARM

Charles E. Potter, Richmond Heights, Mo.

Application December 31, 1937, Serial No. 182,688

12 Claims. (Cl. 177—369)

This invention relates to burglar alarm systems and particularly to that type of system which has a central station and a transmitting station, and relates especially to the apparatus and circuits at the transmitting station.

An object of this invention is to provide apparatus and circuits which will be efficient in service for transmitting signals from a station to be protected to a central or observation station.

Other and specific objects of the invention will be apparent from the following detail description taken in connection with the accompanying drawings, while the invention comprises the parts and their combinations especially pointed out in the appended claims.

Fig. 1 is a perspective view of a cabinet enclosing apparatus hereinafter described and constituting a part of this invention;

Fig. 2 is a fragmentary view of the cabinet shown in Fig. 1 with a door open;

Fig. 3 is a diagram of the circuits at the transmitting station;

Fig. 4 is an elevation showing apparatus embodying the invention;

Fig. 5 is a rear elevation of a transmitting instrument;

Fig. 6 is a front elevation partly in section;

Fig. 7 is a side elevation;

Fig. 8 is a side elevation opposite that of Fig. 7;

Fig. 9 is a detail showing a code wheel, and Figs. 10, 11 and 12 are diagrams showing the position of certain cams and their switches during different phases of their cycle.

In systems of this character one or more loop circuits are provided for protecting the premises, with means so arranged that when one of such circuits is broken by unauthorized entry into the premises, the breaking of a loop circuit will cause the operation of the mechanism to rotate a code wheel 1 and thereby transmit a signal to the central station. Such a mechanism, as will be understood from the detail description hereinafter given, will include a rotating cam 2 which controls certain switches. The mechanism is propelled by a spring motor and the cam 2 assumes a position in accordance with the condition of the motor. A circuit 3, 4, is connected between the transmitting station and the control station. A code wheel 1 is arranged to intermittently break the circuit 3, 4 and also to intermittently ground the line 3. Means for breaking and grounding the circuit 3, 4 includes brushes 5 and 6 conductively connected with the wire 3. The brush 5 carries a point 7 normally in contact with a stationary member 8 connected to the line 4. The brush 6 carries a point 9 which may contact a member 10 connected to a ground wire 11. As the code wheel 1 is rotated its projections 12 will break the contact between the points 7 and 8, to open the circuit 3, 4 and to make contact between the points 9 and 10 to ground the line 3. It will be understood that means are provided at the central station for maintaining a constant current through the circuit 3, 4.

Means are also provided at the central station for supplying to the line 3, 4 an alternating current of audio frequency, while means are provided at the transmitting station for receiving a signal which is transmitted from the central station by means of the current of audio frequency. The circuit at the transmitting station to receive such a signal is as follows: From the line 3 through the wire 92, through a manually operable switch 93, through a wire 94 to a buzzer 95, to a condenser 96, through a conductor 97 to a contact 98, through a brush 99, through a wire 100 to the ground wire 11.

For the present it may be understood that when the spring motor, driving the cam 2, is not wound the brush 99 will lie away from the contact 98, but when the spring motor is wound and ready for operation, as will be described later in detail, the brush 99 will close on the contact 98. It may be understood that before such a contact is made the mechanism has caused the code wheel 1 to give a predetermined signal to the central station. Upon receiving such a signal the operator at the central station will connect the line 3 with the source of alternating current of audio frequency to operate the buzzer 95. From subsequent description it will be understood that when the mechanism is in such condition that the brush 99 touches the contact 98 the apparatus is in condition for operation by relays under control of the loop or protection circuits and therefore a receipt of a buzzer signal is proof at the transmitting station that the entire system is in proper order.

In my application Serial No. 182,687 filed on even date herewith, I have illustrated and described in detail, and claimed the circuits at the central station and in combination the signal receiving circuit at the transmitting station above described.

For convenience binding posts or terminals 101, 102, 103, 104, 105, 106, 107, 108, 109 and 110

are provided. Line 3 is connected to terminal 101, line 4 to 102; ground wire 4 to 103; an alarm circuit 111, 112 which includes a bell 113, to 104 and 105; a power circuit 114, 115, supplied by a battery 116, to 106 and 107; the end of a loop protection circuit 117 to 107 and 108; and the ends of a second loop protection circuit 118 to 109 and 110.

The alarm circuit 111, 112 may lead a considerable distance from the control apparatus so that the bell 113 may be placed at a point to give a public alarm.

The loop circuits 117 and 118 will be arranged about openings in a premises so that an unauthorized entry will cause one of the circuits to be broken, thereby causing operation of the mechanism, in a manner and by means hereinafter described, to rotate the code wheel for transmitting a signal to the central or observation station and also to energize the alarm circuit 111, 112 for giving a public alarm.

A feed circuit line for energizing the loop circuits and the relays is as follows: from the terminal 106 (connected to the battery 116 by the wire 114) through a wire 119, through a brush 120 (operated by the cam 2), and a contact 121, to a wire 122.

When the mechanism is in condition to operate responsive to the loop circuits the brush 120 will be closed on the contact 121; otherwise the circuit will be open at this point. In order to test the loop circuits before the mechanism is wound, a push button switch 123 is provided across the lines 119 and 122, and in parallel with the cam operated switch 120, 121.

The protection circuit, including the loops 117 and 118, is as follows: from the wire 122, which is connected through a feed line as above described to one side of the battery 116, through a wire 124, a tamper switch 125, a low-ohmic relay (e. g. 85 ohms) 126, a wire 127 to the terminal 110, through the loop 118 to the terminal 109, through a wire 128 to a high-ohmic relay (e. g. 1,000 ohms) 129, through a wire 130 to a milliammeter 131, through a wire 132 to the terminal 108, through the loop 117 to the terminal 107 and then through the wire 115, completing the circuit to the battery 116.

The relays 126 and 129 have their armatures 133 and 134 so arranged as to complete a circuit to an operating relay 135, to trip and permit the operation of the spring motor for rotating the code wheel 1, either by the relay 126 pulling up its armature 133 or the relay 126 dropping its armature 134. Therefore, if there is a break in either of the loops 117, 118, or if the tamper switch 125 opens, or if there is a shunt between the loops 117 and 118, the relay 129 will be deenergized permitting its armature to drop, contacting a point 136 to complete a circuit as follows: from wire 122 (connected by a feed line above described to one side of the battery 116) through a wire 137, through the armature 134 to point 136, through a wire 138 to the relay 135, through a wire 139 to the terminal 107 and then through the wire 115, completing the circuit to the battery 116.

In the event of a shunt in the system, which may be insufficient to operate the relay 129, the increased flow through the relay 126 will cause it to draw up its armature 133 to make contact with a point 140, closing a circuit between the wire 122 and the wire 138; the wire 122 being connected by a wire 141 to the armature 133, and the point 140 being connected by a wire 142 to the wire 138.

The relay 135 includes an armature 143 which has a projection or detent 144, adapted when down to engage and stop the mechanism or spring motor, and when up to release the mechanism, permitting it to operate the code wheel 1 to transmit a signal. It is arranged also to contact a point 145 to complete a holding circuit for the relay. The circuit has a cam operated switch which includes a contact 146, connected by a wire 147 to the relay 135, and a brush 148, connected by a wire 149 to the armature 143. The brush 148 is operated by a cam 150 on the same shaft 151 as the cam 2. The cam switch is required to avoid completing the circuit during the initial operation of the code wheel. It is so arranged as to close at the time the detent 144 drops to stop the mechanism at the close of the initial operation of the code wheel. Therefore the cam switch 146, 148 is closed when the mechanism is properly set for its protective operation, and the holding circuit will be closed when the relay draws up. The holding circuit is as follows: from the point 145 on the feed line 122, through the armature 143, wire 149, brush 148, contact 146 and wire 147, to the relay 135, and thence through the wire 139 to the battery as previously described.

While a mechanical latch for the detent 144 has been provided, the latch is slow acting, and the holding circuit for the relay 135 prevents the armature from dropping if the loop circuits are broken only momentarily.

The alarm or bell circuit 111, 112 is connected by a switch operated by the cam 2 and including the brush 120 and a contact 152. The arrangement is such that the brush 120 closes on the contact as soon as the high surface on the cam rotates away from the brush and the circuit remains closed until opened by a manually operable switch 152a. The complete alarm circuit is as follows: from one terminal of the battery 116, through the wire 114 to the terminal 106, through wire 119, brush 120, contact 152, wire 152b, switch 153b, wire 153 to terminal 104, thence through bell circuit 111, 113, 112, to terminal 105, through wire 154 to terminal 107 and through wire 115 to the opposite pole of the battery 116.

Use of the alarm circuit is optional and it may be included or omitted without affecting the operation of the remaining parts. Hence, it is shown only on the diagram Fig. 2 and not on the remaining figures. It will be understood, however, that the switch 152a may be located conveniently and safely on the panel 158 where it is operable only upon opening the door 157.

The terminals 101 to 110, the circuits, mechanism and the devices shown in Fig. 3 above the terminals, the battery 116 and its connecting circuit 114, 115 are enclosed within a cabinet 155 (Figs. 1 and 2) which has a main door or cover 156 and a panel door 157. The door 157 provides access to a panel 158 upon which is mounted the transmitting mechanism, relays and other parts, as best shown in Fig. 4. The door 157 is secured by a dog 159 which when overthrown contacts and moves a lever 160 to turn a cam 161 closing the switch 93. The shaft 151 of the spring motor and transmitting mechanism extends through the panel 158 and carries a crosshead or key 162 for winding the motor. The door 156 is secured by a bolt 156a, reached through the opening of the panel door 157.

When the system is to be placed in operation preparatory to closing for the night, the door 157 is opened, the mechanism is wound by the key 162, the door is closed and the dog 159 is overthrown to depress the lever 160. Thereby the spring motor is caused to operate in such a manner as to turn the code wheel 1 a single revolution, giving the central station a signal that the premises are about to be closed. The switch 93 is set by depressing the lever 160 so that the signal receiving circuit, including the buzzer 95 is placed in condition for receiving a signal. The milliammeter 131, visible through a window in the door 156, of the cabinet, will indicate that current is flowing through the loop circuits and upon sounding of the buzzer 95 the person in charge of the premises will know that the entire system is in working condition. Then a door key, by which the dog 159 is depressed, will be released and the switch 93 will be opened.

The signal transmitting mechanism is mounted on the panel 158 and includes a pair of frame plates 163, 164 upon which the parts are mounted or journalled. The mechanism comprises in part a spring motor which includes a main shaft 151 to which is connected cams 2 and 150 and upon which is mounted a gear 165, which has a pawl and ratchet connection with a shaft whereby it will be turned when the shaft is operated by a spring 166 but will remain stationary when the shaft 151 is turned for winding.

The gear 165 drives a pinion 167 secured to a shaft 168 on the outer end of which is mounted the code wheel 1. A gear 169 is secured to the shaft 168 and drives a pinion 170 on a shaft 171, to which is secured an escapement wheel 172. An escapement balance 173 has a point 174 adapted to mesh with teeth on the escapement wheel 172 and has a hook or abutment member 175 positioned to contact the detent 144, carried on the outer end of the armature 143, by which the mechanism is blocked when the armature is down and is tripped for operation when the armature is raised.

A latch plate 176 is pivotally mounted on the front plate 164 by a pin 177 and carries at its lower end, best shown in Fig. 6, an arm with a notch 178 for receiving and holding an outwardly extending projection or arm 179 of the armature 143. The latch plate 176 has at its lower end, just below the notch 178, a bevelled edge 180 for engagement with the end of the arm 179 by which it may be lifted up into position in the notch 178 to mechanically raise the armature 143. The latch plate 176 has an open slot 181 through which projects the shaft 151, carrying on its outer end a cross pin 182.

Means are provided for positively moving the latch plate 176 outwardly to raise and hold the armature 143 when the spring 166 is fully wound in order to give an initial revolution to the wheel 1, and thereby transmit a signal to the central or observation station. This means includes a cam member 183 journalled on the outer end of the shaft 151 between the cross pin 182 and the latch plate 176. The cam 183 has an outwardly extending pin 184 for engagement by the cross pin 182 when the spring is wound by turning the shaft 151 in a clockwise direction (Figs. 4 and 6), and the latch plate 176 has an outwardly extending pin 185 for engagement by a hook surface of the cam 133 when the spring is wound. Thus when the shaft 151 is turned in a clockwise direction, Figs. 4 and 6, to wind the spring, at the end of the operation the cross pin 182 on the shaft 151 will engage the pin 184 on the cam 183 to turn the cam for engagement with the pin 185 on the latch plate, thereby swinging the latch plate to the left (Figs. 4 and 6) so that the bevelled surface 180 at the bottom of the latch will engage the end of the arm 179 on the armature 143 forcing it upwardly and into engagement with the notch 178.

Therefore, as soon as the spring is wound, the detent 144 will be raised tripping the mechanism and permitting it to operate under influence of the motor to turn the code wheel 1 a single revolution. Means are provided for releasing the latch at the end of the initial operation of the code wheel and these means include a cross pin 186 and a cam plate 187 fastened by screws 188 to the underside of the latch plate 176. Now as the shaft 151 rotates in a counter-clockwise direction (Figs. 4 and 6) and after it is moved sufficiently to cause rotation of the code wheel 1 a single revolution, the pin 186 will engage the lower point of the cam plate 187 to swing the latch plate 176 outwardly to release the arm 184, permitting the armature 143 to fall and bringing the detent 144 into engagement with the abutment 175 on the escapement balance to stop the operation of the mechanism. Then the mechanism or spring motor will not operate the code wheel until the armature 143 has been lifted by the relay 135.

But as soon as the shaft 151 has been further operated but slightly in a counter-clockwise direction (Figs. 4 and 6) the pin 186 will move out of engagement with the point of the cam plate 187 permitting the latch plate to move to the left under the influence of a light spring 189. Therefore, after the mechanism has been tripped by operation of the relay 135 and the detent 144 has been moved upwardly to trip the mechanism the latch plate 176 will move outwardly to latch the armature 143 in up position.

Means are provided for mechanically unlatching the mechanism at the end of the cycle and this means includes a pin 190 on the latch plate 176, positioned for engagement by an appropriate surface on the cam 183, and a pin 191 on the cam 183 for engagement by the cross pin 182, as clearly shown in Figs. 4 and 6. Thus, at the end of the proper number of revolutions of the code wheel 1 the latch plate 176 will be positively moved to the right to unlatch the detent, thus giving a signal by a predetermined number of revolutions of the code wheel.

The cam 2 is secured on and rotates with the shaft 151. It is so constructed and arranged that the brushes 99 and 120, which are mechanically connected together, are permitted to move to the left and out of engagement with the contacts 98 and 121 when the spring motor is unwound. In that condition of the mechanism the cam 2, as well as the cam 150, will assume the position as shown in Fig. 3. Therefore, when the apparatus is unwound, following the giving of a warning signal, or following the authorized opening of the premises, the supply line or circuit will be disconnected preventing unnecessary use of electricity. Then upon the initial operation of the motor to give the initial closing signal, the cam 2 and the cam 150 will operate in a counter-clockwise direction (Fig. 3) and the high surface on the cam 2 will close the brushes 99 and 120 against the contacts 98 and 121 respectively, thereby closing the feed circuit and placing the signal circuit in condition to receive a signal. At the end of such initial operation the

cam 150 will move so that the brush 148 will close against the contact 146. After the commencement of the subsequent operation of the mechanism the cam 2 will move so as to release the brushes 99 and 120, but not until the latch 176 has engaged the supporting arm 144 of the armature 143. But upon release of the brush 120 by the cam 2 it will engage the contact 150 to close the alarm circuit, which will continue closed until the switch 152a is opened.

A recapitulation of the operation of the device will assist in understanding its construction and operation as hereinabove given in detail.

The operation or cycle of the device includes in sequence

(a) An initial testing of the loop circuits;

(b) Winding the motor, which

(c) Releases the motor mechanism causing it to turn the code wheel 1 one revolution, to give a predetermined signal to the central or observation station through the lines 3, 4, and

(d) To turn the cam 2 to a position to close the loop circuits at 120, 121 and the test circuit at 98, 99;

(e) Closing the manual switch 93 in the test circuit;

(f) Receipt of a test signal on the buzzer 95 from the central station;

(g) Release of the motor through the stick relay 135 by a defect in the loop circuits either,

(h) By a shunt, causing the relay 126 to close 133, 140, or

(i) By a break, causing relay 129 to close 134, 136;

(j) Accompanied by a rotation of the cam 150, to close immediately the holding circuit at 146, 148 for the relay 135, and followed by

(k) A mechanical latching of the detent 144 in release position.

The following details are given in the same sequence and with the identifying letters as used above.

(a) In preparing the transmission station for operation at the close of business in the evening the first step is an initial testing of the loop circuits. At that time the spring motor will be unwound because of a break of the protection loop when the premises are opened in the morning. The position of the cams 2 and 150 will be as shown specifically in Fig. 12. The feed line 119 from the battery 116 to the line 122 for the loop circuits 117 and 118 will be disconnected by the brush 120 standing away from the contact 121, also as shown in Fig. 3, which may be followed in tracing the circuits in this description of the preliminary condition of the system. The person in charge of the premises will first press the button 123, to connect the loop circuits with the battery, and if the loops 117 and 118 are unbroken and in proper condition current will flow through these loops and will be read on the milliammeter 131. If the milliammeter 131 does not register or registers excessively, the operator will know that the system is defective and will proceed to make the necessary correction, until upon pressing the button 123 proper current will flow through and is registered on the instrument.

(b) After such a preliminary test shows the protection loops are in proper condition, the spring motor is wound by turning the key 162 with its shaft 151 in a clockwise direction (Figs. 3, 4, 6, 10, 11 and 12) as shown by the arrow in Fig. 12.

(c) Winding of the motor causes a release mechanically of detent mechanism, so that when the hand is removed from the key 162, the mechanism will turn the code wheel 1 one revolution to give ae predetermined signal to the central or observation station through the lines 3, 4. Fully winding the motor causes the shaft 151, through connections presently described, to turn the latch plate 176 (Figs. 4 and 6) to the left so that its bevel edge 180 engages the end of the arm 179, by which the arm is lifted up into position in the notch 178 of the latch plate, thereby releasing the detent 144, on the armature 143, from the abutment member 175. To secure this result the cross pin 182, on the end of the shaft 151, when the motor is fully wound, engages the pin 184 on the cam 183 to turn the cam until its hook surface engages the pin 184 on the latch plate 176. Thus when the motor is fully rewound it automatically and mechanically causes a release of the detent mechanism leaving the motor free to turn the code wheel 1. Then as the motor turns under the influence of its spring in a counterclockwise direction (Figs. 3, 4, 5, 10, 11 and 12) the cross pin 182 on the shaft 151 will back away from the pin 184 on the cam 183 while the pin 186 on the shaft 151 (Figs. 6 and 7) will engage the lower point of the cam plate 187 attached to the latch plate 176 to swing the latch plate outwardly to release the arm 184, permitting the armature 143 to fall and bringing the detent 144 into engagement with the abutment 175 on the escapement balance to stop the operation of the mechanism. Thus the motor is stopped mechanically after it has turned the code wheel one revolution to give an initial signal.

(d) As the spring motor unwinds to give the preliminary signal, the cams 2 and 150 are turned to the position shown in Fig. 11. This operation causes the high surface of the cam 2 to engage its brush, closing the contacts 120, 121, to connect the feed line to the loop circuits and to close the contacts 98, 99 in the test circuit. During the whole of the initial movement of the shaft 151, under the influence of the spring, the high surface of the cam 150 has held the contacts 146 and 148 apart. This has prevented the setting up of a self-holding circuit, which otherwise would have occurred and prevented the armature 143 with its detent arm 144 from dropping to stop the motor. If this circuit had not been held open by means of the cam 150, the motor would not have stopped until completely unwound.

(e) Immediately after the operator has wound the spring motor and has taken his hand from the key 162, he closes the door 157 (Figs. 1 and 2) and the dog 159 is overthrown to depress the lever 160, thereby closing the manual switch 93 (Figs. 2 and 4).

(f) In the meantime an observer at the central station has received the signal transmitted by the code wheel 1 and has impressed upon the line 4 a potential of audio frequency which sounds the buzzer 95. The receipt of this signal indicates that the entire system is in proper working condition to respond for protection purposes.

(g) The spring motor may now be released through the relay 135, which in lifting its armature 143, lifts the detent 144 out of the path of the abutment member 175 on the escapement balance 173. When the brush 120 has been closed on the contact 121, as it will be after the preliminary operation of the mechanism (Fig. 11), current will flow from the battery through the

lines 119 and 122, through the relay 126, the loop 118, the relay 129 and the loop 117 back to the battery to complete the circuit; the arrangement being such that the current is sufficient to lift the armature 134 of the relay 129 but insufficient to lift the armature 133 of the relay 126.

(*h*) Two circumstances will cause the relay 135 to be energized. One of these circumstances is a shunt in the protection circuit, which may occur from a tampering with the system. Such a shunt may be sufficient to cause the relay 126 to lift its armature 133 to make contact with the point 140.

(*i*) Another circumstance which will cause the relay 135 to lift its armature and thereby release the spring motor is a break in the protection or loop circuits. Such a break will cause the relay 129 to drop its armature 134 on the point 136, thereby closing a circuit to the armature 135.

(*j*) Immediately upon action of the relay 135 in lifting its armature, a holding circuit is set up. As shown in Fig. 11, after the initial signal the brush 148 is on the edge of the high surface of the cam 150, whereby further movement causes the brush to move to the low surface of the cam 150, thereby closing contacts 146, 148. This arrangement prevents anyone from quickly breaking the circuit and then closing it again before the mechanical latch, described in the next paragraph, becomes effective.

(*k*) The mechanism is arranged to latch itself open during the second operation of the motor. The latch plate 176 is released to move inwardly under the influence of its spring 189 to catch the end of the arm 179 in the notch 178. This occurs before the high surface of the cam 2 moves away to release the brush 120. Thus, the motor after it is once released by the relay 135, is kept released, first by the holding circuit and then by the mechanical latch, until its spring spends itself. As soon as the brush 120 is released it meets the contact 152 closing the alarm circuit and causing the bell 113 to ring until that circuit is disconnected by the switch 152*a*.

Of course the loop circuit will be broken normally by the authorized opening of the premises in the morning. Thus the cycle is completed, either by accident or by tampering, or by the usual opening of the premises at the usual hour, through shunting or breaking of the loop circuit.

It will be apparent that various changes may be made in the details of construction, within the scope of the appended claims, without departing from the spirit of this invention, and that parts of the invention may be used to advantage without the whole.

I claim:

1. In a burglar alarm system having a transmitting station and a transmitting circuit from said station the improvement comprising a code wheel for initiating a signal through the circuit, a spring motor for operating said wheel, a cam on said motor automatically positioned according to the condition of the motor, a motor controlling path at the transmitting station, a signal receiving test circuit path at the transmitting station, and switches in said control and signal receiving circuits respectively operable simultaneously by the cam, the cam being so constructed and arranged as to close said switches when the motor is wound and in condition for operating said wheel.

2. In a burglar alarm system, a control circuit, a settable spring operated code transmitter responsive to said control circuit, a power supply for said circuit, an automatic switch in said circuit connected and arranged to close the control circuit and connect it with said power supply upon the setting of the transmitter, a manually operable test switch in parallel with said automatic switch arranged and adapted to connect said circuit with its power supply while said automatic switch is open, and an ammeter in said circuit.

3. In a burglar alarm system, a control circuit, a code wheel, a spring motor for operating said wheel and adapted when wound to initially operate said wheel and remain in condition for subsequent operation responsive to the control circuit, an alarm circuit, a switch in the alarm circuit, and a cam associated with the motor and adapted to maintain the switch open during a period commencing during the initial operation and ending after the start of said subsequent operation and to close the switch during the remaining portion of a cycle of the motor.

4. In a burglar alarm system, a control circuit, a code wheel, a settable spring motor responsive to the control circuit for operating said code wheel, an alarm circuit, an automatic switch in the control circuit, an automatic switch in the alarm circuit, and a cam associated with said motor and adapted to open one automatic switch and close the other simultaneously and vice versa.

5. In a burglar alarm system, a control circuit, a code wheel, a settable spring motor responsive to the control circuit for operating the code wheel, an alarm circuit, an automatic switch in the control circuit, an automatic switch in the alarm circuit, and a cam associated with said mechanism and adapted to open one automatic switch and close the other simultaneously and vice versa, the switch in the control circuit being closed and the switch in the alarm circuit being opened after the commencement of an initial operation of the code wheel and reversed after the commencement of a subsequent operation of the code wheel.

6. In a burglar alarm system, signalling mechanism comprising a spring operated code transmitter, a relay having an armature arranged and adapted as a detent for the mechanism releasing the mechanism when the relay is energized, an energizing circuit for the relay, a holding circuit for the relay, an automatic switch in the holding circuit, and a cam associated with the mechanism for operating the switch.

7. In a burglar alarm system, signalling mechanism comprising a spring operated code transmitter, a relay having an armature arranged and adapted as a detent for the mechanism, to release the mechanism when in up position and to be drawn up when the relay is energized, an energizing circuit for the relay, a holding circuit for the relay, an automatic switch in the holding circuit, a cam associated with the mechanism and operating the switch, a feed line for the energizing circuit and the holding circuit, an automatic switch in the feed line, and a cam associated with the mechanism and operating the last mentioned switch, the cams being constructed and arranged to first close the holding circuit after an operation of the mechanism following a release thereof by the armature and then to open the feed line during said operation.

8. In a burglar alarm system, a code wheel, a settable spring motor for operating said wheel, adapted upon being wound to initially operate the wheel and remain in condition for subsequent operation, a relay arranged and adapted to trip the motor, a feed circuit, a control circuit supplied by the feed circuit, a relay in the control

circuit, an energizing circuit for the first mentioned relay controlled by the second mentioned relay and supplied by the feed circuit, an automatic switch in the feed circuit, and a cam associated with the motor and adapted to close said switch after the commencement of an initial operation of the code wheel and to maintain the switch closed until the beginning of a subsequent operation of the wheel.

9. In a burglar alarm system, a code wheel, a spring motor for operating the wheel, a detent for the motor, a latch for securing the detent in non-holding position, means to move the latch to operative position upon winding the motor, means to move the latch to inoperative position after a predetermined operation of the motor and to release the latch after the commencement of a subsequent operation, and a relay having an armature connected with the detent for movement thereof, whereby the detent will release the motor for operation responsive to the relay and the detent will then be latched in released position.

10. In a burglar alarm system, a code wheel, a spring motor for operating the wheel, a detent for the motor, a latch for securing the detent in non-holding position, a relay to move the detent, means responsive to the operation of the motor to release the latch to holding condition, a feed circuit for the relay, a switch in the circuit, and a cam associated with the motor for operating the switch, whereby upon operation of the relay, the motor is released by the detent responsive to the relay and the detent is latched in non-holding position prior to operation of the cam switch to open the relay feed circuit.

11. In a burglar alarm system having a transmitting station and a transmitting circuit from said station, the improvement comprising a code wheel for initiating a signal through the circuit, a spring motor for operating said wheel, a path for a circuit controlling the motor, a signal receiving test circuit path at the transmitting station, switches in said control and signal receiving circuit paths respectively, and means connected to and operated by the motor for closing said switches simultaneously when the motor is wound and in condition to operate the code wheel.

12. In a burglar alarm, a code wheel, a spring motor adapted when wound to initially operate the wheel and remain in condition for subsequent operation, a transmitting circuit interrupted by said code wheel, a circuit controlling the motor, a signal receiving test circuit, switches in said circuits respectively, and means connected to and operated by the motor for closing said switches simultaneously when the motor has initially operated the wheel and is in condition for subsequent operation as aforesaid.

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