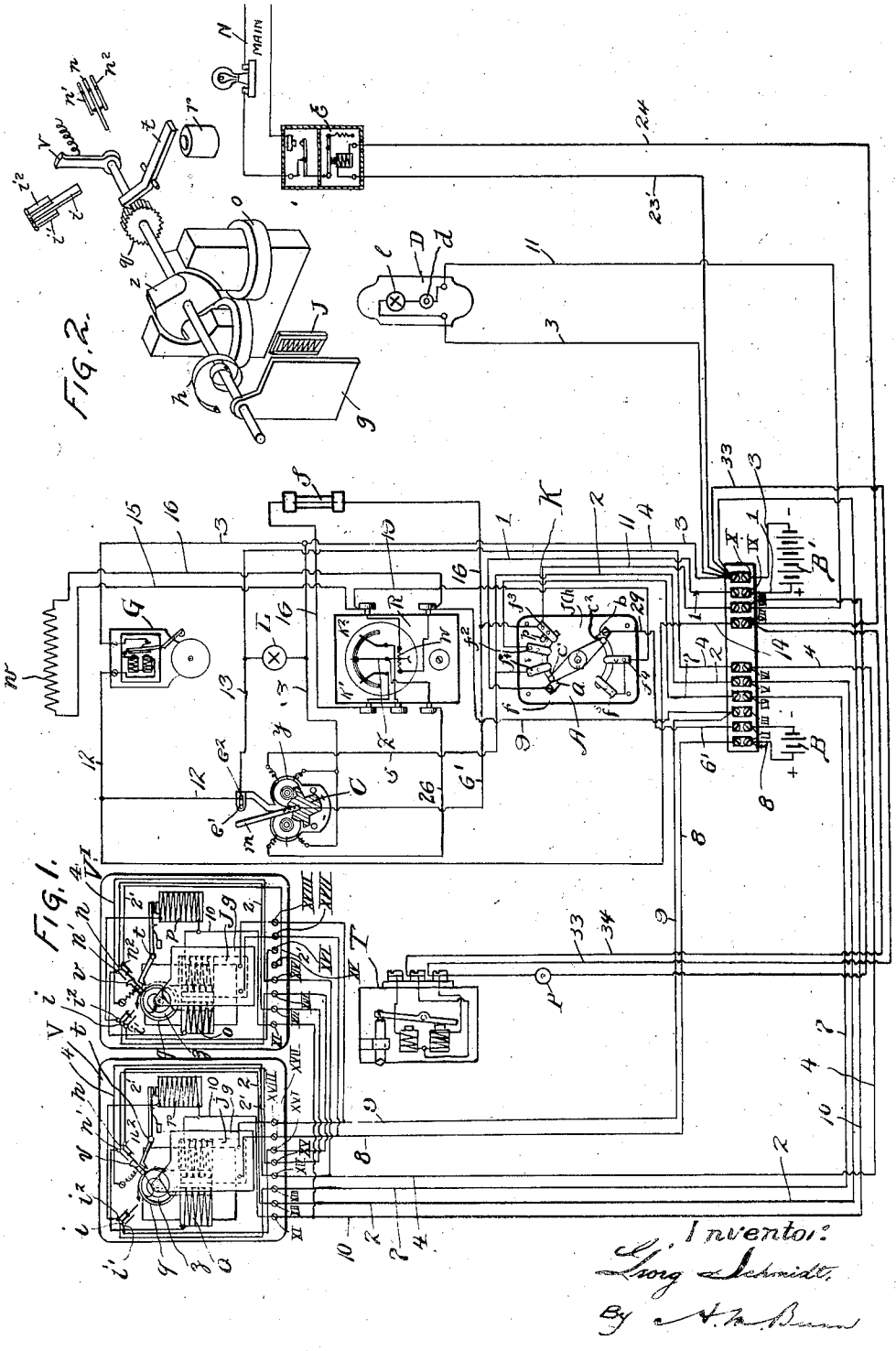
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G. SCHMIDT

BURGLAR AND FIRE ALARM

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BURGLAR AND FIRE ALARM.

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To all whom it may concern:

Be it known that I, GEORG SCHMIDT, residing at No. 5 Hollanderstrasse, Berlin-Reinickendorf, Germany, have invented certain new and useful Improvements in Burglar and Fire Alarms, of which the following is a specification.

The invention relates to a burglar and fire alarm system in which a burglar or fire detecting device or devices are placed in the room or rooms to be protected and a signal or signals are transmitted by these devices to a supervising or attendant station. In this invention the known principle is used of causing a detector which is sensitive to light (such as a selenium cell which changes its electrical resistance when exposed to light) to give rise to the actuation of an electric relay, which in turn closes an electric alarm circuit.

The invention consists in a form of casing in which a selenium cell is enclosed, in an alarm mechanism, and a kind of switch that enables all of the required circuit combinations to be established. This switch may be moved from its initial or zero position into four other positions in each of which its contact arms prepare or close the necessary circuits. In the first position a supervisory lamp is switched on, this lamp then indicating that the shutter of the selenium detector casing, is properly closed. In the second position a connection is established between the selenium cell and the relay which is caused to be actuated by it, and for purposes of adjustment a circuit is temporarily closed by hand during the existence of which an adjustable contact of the relay may be set so that its movable pointer or circuit closer is swung into touch with the adjustable contact in response to a certain change of condition of the selenium cell.

In the third position of the switch the shutter of the casing in which the selenium cell is enclosed is opened and the cell exposed, and this position of the shutter is verified by the previously mentioned supervisory lamp.

And finally, in the fourth position of the multi-way switch an electromagnetically actuated switch and the selenium cell are connected to the relay and the batteries so that, if the selenium cell is now exposed to light, or if the circuit of the selenium cell is opened, the said movable pointer will come into touch with its corresponding adjustable contact and this will cause the alarm circuit to be closed by the said electromagnetically controlled switch.

When the multi-way switch is turned back into its initial position the alarm bell, lamp, electromagnetically controlled switch and selenium cell are switched off in the opposite order and the light is again shut out from the cell.

The invention is diagrammatically illustrated in the drawing.

In the detector casing V, which is placed in the room that is to be protected, a selenium cell J is enclosed, this cell being generally guarded against exposure to light by a pivoted shutter g which is arranged to be mechanically locked in its closed position. The casing also contains a pair of magnet coils o which, with the aid of the armature z, serve to return the shutter g to its closed position. The rotary armature z is pivoted between the pole faces of the electro magnet o and as it is Z-shaped it can be turned by the magnetic field through an angle of 90°. Mounted upon the shaft of the armature is a detent wheel q, which engages with a detent attached to an armature t and locks the shutter in its closed position. A coiled spring h attached to the armature z tends to turn this armature z, and the shutter coupled therewith, so as to expose the selenium cell but is prevented from doing so by a detent attached to the armature t of the electromagnet r. When the rotary armature z and shutter g are in the position shown in the drawing the spring h is tensioned so that the lifting of the armature detent t from the detent wheel q results in a rotary movement being imparted to the armature z and the shutter g.

Also mounted upon the shaft of the rotary armature is a contact arm v, which governs the circuits through which current is supplied to the coils of the detecting device and to the supervisory lamp L. The arrangement of the sets of contact springs i and n is such as to enable any number of detector boxes with different windings to be electrically controlled from the supervisor's device or alarm station. The means provided for the purpose comprises the two terminals XV and XVI, from which wires are run in well-known manner to another

like device, and so forth; each box therefore serves to exclude itself, and permit supervision of the succeeding box. When the detector box V is actuated by means of the supervisor's switch A the contact arm v cuts a coil, which has performed its function, out of circuit and simultaneously cuts in and prepares for operation another coil. A rearrangement of the circuits extending to the next detector box is also brought about by which, on the conclusion of the operation of the next detector box, this latter may cut the succeeding box in and out of circuit in a similar manner. The circuit from terminal XI of the first device V by wire 10, electromagnet p, contacts i^2 i to terminal XIII is interrupted at i^2 i; and a new circuit is formed from the terminal XI of the second device, which has identical parts with the first, through wire 10, electromagnet p, contacts i^2 i to terminal XIII of the second device, thence to terminal XVI of the first device, contacts i^1 i, and thus back to the terminal XIII of the first device. Also a circuit which formerly ran from terminal XI of the first device by wire 10, electromagnet q, contacts n^1 n, wire 2, and terminal XII is interrupted at n^1 n; and a new circuit established from terminal XI of the second device V^1 through its wire 10, electromagnet q, contacts n^1 n, wire 2, to its terminal XII, thence to terminal XV of the first device, contacts n^2 n, wire 2, to its terminal XII. The selenium cell circuits of all devices are in parallel, for obvious reasons. B^1 is a central battery which supplies current for energizing the magnet coils that open and close the shutter g, the electromagnetic switch C, the bell G, the lamp L, the electric supply-main switch E, the electric door lock T, and the tell-tale lamp D. B^2 is a closed-circuit battery for energizing a moving coil relay R and the selenium cell J. An open-circuit-contact H and a distant control thermometer F may also be connected to the closed circuit battery B^2.

The supervisor's or attendant's device K contains an alarm bell G and a lamp L which serves as a signal for indicating the position of the shutter g on the distant detector box. The device K also comprises an electromagnetic switch C which, by means of its switching arm m and the contact springs e^1, e^2 establishes direct connections between the battery B^1 and the bell G and lamp L and also effects other circuit combinations. The switch C also establishes direct connections between the battery B^1 and the door lock T and supply-main switch E. It is arranged to be actuated by comparatively feeble currents which are switched on and off by the moving coil relay R. The electromagnetic switch C thus relieves the sensitive contacts of the moving coil relay of the necessity of switching on and off the comparatively strong currents required for the lamp L, the bell G, etc. The function assigned to the door lock T is to lock the door of the room containing the detector box the moment an alarm proceeds from this room and the electric supply-main switch E is provided for the purpose of simultaneously switching on the electric light, for which reason it is connected as indicated to the electric supply main N. The electric door lock T can be unlocked from any desired point by means of a push button contact p.

The circuits extending between the selenium cell J and the supervisor's device K are controlled by a two-arm switch A which may be brought into five positions, in four of which circuit combinations are established. The one arm of the switch A controls the circuits for actuating the shutter g and the electromagnetic switch C, which circuits include the contacts of the moving coil relay R, and the other arm establishes circuits including the selenium cell J and the windings of the moving coil relay R.

The switch A comprises a base and contact strips a, b springs f^1, f^2, f^3, f^4, f^5, and a pivoted spring switching member Sch mounted thereon. The switching member carries two insulated contact closers c^1, c^2 which are adapted to establish electrical connections between the contact strips a, b and the springs f^1, f^2, f^3, f^4 and f^5. The springs f^1, f^2, f^3 are connected by the contact closer c^1 to the central battery B^1 and the springs f^4 and f^5 are connected by the contact closer c^2 to the closed circuit battery B^2. Connected to the closed circuit battery B^2 is the moving coil relay R, which is of a known type and whose movable contact z co-operates with two adjustable contacts k^1, k^2.

As long as the installation is switched off no current flows in any of the circuits and the switching member Sch of the switch A is in the position shewn in the drawing.

To prepare the installation for operation the switch A is turned in a clockwise direction so that the contact closer c^1 makes contact with the spring f^1. A circuit is then closed which may be traced as follows:

From the positive pole of the central battery B^1 through the wire 1 to the terminal IX, thence through the next wire 1, the contact strip a and the contact closer c^1 to the spring f^1. At the spring f^1 the current divides, one part flowing through the wire 2, terminal V, next wire 2 to the spring n and thence partly through the spring n^2 through the wire 2' to the terminal XV, and partly through the contact arm v, wire 4, terminal XIV, next wire 4, terminal VI, wire 4, lamp l, and thence through the wire 3 and terminal x to the next wire 3 back to the negative pole of the battery B^1. The

other part of the current that divides at spring f^1 flows from this spring through the wire 5, coil y, wire 3, back to the negative pole of the battery B^1.

It is thus seen that in this position of the switch A the lamp L is closed if the shutter g closes the detector box so as prevent the penetration of light to the solenium cell. This is important because the detector box V with the selenium cell J and the supervisory or alarm device are installed in different places or rooms and the signal lamp at the supervisory station affords a means of checking the position of the distant shutter g. The coil y of the electromagnetic switch C is also energized so that the armature that is fixed to the contact arm m is attracted and pulled away from the springs e^1, e^2 which are insulated from each other.

The second position of the switch A is the adjusting position, and it is when the switch is turned into this position that the device is adjusted so as to be capable of responding to the changes effected in the selenium cells when these are exposed to a feebie or strong light. The switch A is brought into its second position by shifting its contact closer c^2 into contact with the spring f^4. In addition to this a temporary electrical connection is made with the aid of a strip of metal p between the contact strip a and the spring f^3. In the accompanying drawings this strip is shown as pivoted to the stationary spring f^3, and adapted to be swung into and out of a position between f^3 and a.

A current will now flow from the positive pole of the battery B^2 through the wire 8 to the terminal I, and thence through the next wire 8 through the terminal XVII, selenium cell J, terminal XVIII, wire 9, to terminal III and through the winding w of the relay R', thence through wire 19, spring f^4, contact closer c^2, contact strip b wire 29, terminal II back to the negative pole of the battery B^2. By the current flowing in this circuit the movable contact Z of the relay R will be deflected to a certain degree corresponding to the current that is allowed to flow by the resistance of the unexposed selenium cell. Besides the current in the selenium cell circuit another circuit is established which may be traced from the positive pole of the central battery B^1 through the wire 1, terminal IX, next wire 1, contact strip a, temporary connecting strip p, spring f^3, wire 16, safety fuse S, next wire 16, and thence to the contacts k^1, k^2 of the relay R. If the adjustable contact k^2 of the relay R is now brought into contact with the movable contact Z, the current path will be continued from k^1 or k^2 to the contact Z and thence through the next wire 26, magnet coil x of the electromagnetic switch C, wire 3, terminal X, next wire 3 and back to the negative pole of the battery B^1. By the circuit thus established through the moving coil relay the armature to which the contact arm m is fixed is attracted by the coil x of the electromagnetic switch, and the arm m brought into contact with the springs e^1, e^2 so that current will now flow directly from the battery through the wires 12, 13 and 14 to the alarm signals. This current may be traced from the positive pole of the battery B^1 through the wire 1 to the terminal IX and thence through the next wire 1 through the contact strip a, spring f^3, wire 6', contact arm m, to the springs e^1, e^2. Here the current divides, one part flowing through the wire 12 to the bell G, a second part through the wire 13 to the lamp L, a third part through the wire 14 to the terminal VII and by wire 34 through the door lock T and by wire 24 the supply-main switch E, and these branch currents return through the wires 3, 23', 33 and terminal X back to the negative pole of the battery B^1. To effect the proper adjustment of the moving coil relay so as to make it properly responsive to the changes of resistance of the selenium cell, the adjustable contact k^2 is shifted a slight distance away from the movable contact Z, and the contact arm m is moved away by hand from the springs e^1, e^2 so as to deprive the bell G and lamp L of current. When the system has been nicely adjusted by these manipulations the temporary metallic connection p between the spring f^3 and the contact strip a is removed.

When the switch A is moved into the third position, in which the contact closer c^1 establishes connection with the spring f^2, a current flows from the positive pole of the battery B^1 through the wire 1, terminal IX, next wire 1 to the contact strip a and thence through the contact closer c^1 through spring f^2, wire 7, terminal IV, wire 7, terminal XIII, spring i, spring i^2, magnet coil r, wire 10, terminal XI, next wire 10, terminal X and back to the negative pole of the battery B^1. This current energizes the magnet coil r causing it to attract the armature t and release the detent wheel q and thus allowing the tensioned spring h to turn the armature z and the shutter g through an angle of 90° so as to expose the selenium cell to light from without the detector box. The turning of the armature also results in the contact arm v being moved into contact with the spring i and in this spring being separated from i^2 and pressed against i^1. By the separation of the springs i and i^2 the coil r is cut out of circuit and by the contact established between the contact arm v and the spring i a circuit is closed which is identical with the circuit last traced up to the spring i where a branch circuit commences which may be traced from i to v

through wire 4, terminal XIV, wire 4, terminal VI, next wire 4, lamp L. The lighting of this lamp is thus an indication that the shutter has been opened and the selenium cell exposed.

By the contact established between the spring i^1 and the terminal XVI a circuit is extended to the next detector box.

When the contact arm v leaves the spring n this spring bends back against the spring n^1 and thus establishes a connection with the magnet coil o and prepares a circuit for the closing of the shutter by the coil o and armature z.

At the same time a current flows from the positive pole of the battery B^2 through the wire 8, terminal I, next wire 8 to the terminal XVII and thence through the selenium cell to the terminal XVIII and through wire 9, terminal III, next wire 9', moving coil w of the relay R through the wire 9, spring f^4, contact closer c^2, contact strip b, wire 29, terminal II, back to the negative pole of the battery B^2.

When the switch A is turned into its fourth position a circuit is prepared which may be traced from the battery B^1 through the wire 1 to the terminal IX, thence through the next wire 1 to the contact strip a, the contact closer c^1, to the spring f^3. At the spring f^3 the circuit divides, one part passing through the wire 16, the safety fuse S next wire 16 to the contacts k^1, k^2 of the relay R, and the other part extending through the wire 6' to the contact arm m. From the negative pole of the battery B^1 the prepared circuit, which is as yet unclosed, may be traced through the wire 3, terminal X, next wire 3 through the bell G, lamp L through 12 and 13 respectively to the contacts e^1 and e^2. A branch of the prepared circuit extends from the negative pole of B^1 and the terminal X by wire 33 through the door lock T and by wire 23' the supply-main switch E and back through the terminal VII, wire 14, 12 to the contact e^1. The supervisory current from the battery B^2 to the selenium cell flows as described in connection with the second position of the switch A. The system is now prepared to give an alarm.

Before the alarm system is switched on, the protected room in which the burglar or fire detector containing the selenium cell is installed is preferably made dark by letting down the blinds or in any other suitable way. If a burglar now switches on an electric pocket lamp or lights a match, or if a spark proceeds from an incipient fire, the sensitive selenium cell J will be illumined causing a change of its electrical resistance. This change of resistance affects the highly sensitive moving coil relay R causing its movable contact or pointer Z to move up against the adjustable contact k^2, and thus establishing a connection between the two wires 16, 26 joined to the top and bottom left hand terminals of the relay R. The circuit thus affected may be traced as follows: from the positive pole of the battery B^1 through the wire 1 to terminal IX, next wire 1, contact strip a, and thence through the contact closer c^1 to spring f^3. At this spring the current divides, one part flowing through the wire 16, safety fuse S, wire 16, adjustable contact k^2, movable contact Z, wire 26, magnet coil x, wire 3, terminal X, next wire 3, to the negative pole of the battery B^1; and the other part of the said current flowing from the spring f^3 through the wire 6', contact arm m, springs e^1, e^2. At the springs e^1, e^2 another division of the current takes place, one part flowing through wire 13 to the lamp L, a second part passing through the wire 12 to the bell G, and a third part flowing through the wire 14 to the door-lock and the electric supply-main switch E. After passing through all of the apparatus mentioned the various branch currents unite again in the wires 3 and the terminal X and return to the battery B^1. By employing the contacts e^1, e^2 of the electromagnetic switch to close the circuits including the lamp L, bell G, lock T and automatic switch E, the delicate contacts of the moving coil are relieved of the necessity of carrying these relatively strong currents.

A high resistance W which is connected in parallel to the coil w of the relay R by wires 15, 16 is provided for the purpose of effecting the correct balance between the responsiveness of the relay R and the changeableness of the resistance of the selenium cell in cases where the rooms in which the selenium cell is placed cannot be made quite dark.

A special supervisory device D, which is equipped with a lamp L and a press button d, serves as a tell-tale for secretly checking the attendant of the alarm system from any distant spot. If the system is properly switched on the following circuit will be closed on pressing the push button d; positive pole of the battery B^1, wire 1, terminal IX, next wire 1, contact strip a, contact closer c^1, spring f^3, wire 11, terminal VIII, next wire 11, push button d, lamp L, wire 23, terminal x, next wire 3, negative pole of the battery B^1. The lamp L will thus be lighted and indicate that the attendant has done his duty.

The selenium cell J may be arranged in any suitable manner in a box or unconspicuously installed behind a transparent mirror.

I claim:

1. An electric alarm system comprising an alarm signal, controlling relays, a light detecting device, a cover member, electro-responsive means for operating said mem-

ber to cover the said light detecting device, means for removing the cover member from the light detecting device, means for actuating the alarm signal with the aid of the controlling relays when light beams impinge upon the light detecting device, and a switch and associated circuits for selectively controlling said means and said alarm signal.

2. An alarm system comprising an alarm circuit, a controlling circuit including a controlling relay for closing the alarm circuit, a selenium cell and a battery, a casing containing the selenium cell, a shutter on the said casing for exposing and covering the said selenium cell, a multiple-blade switch having contacts for opening and closing said alarm and controlling circuits and contacts and associated circuits for checking the correct exposure and covering the said cell.

3. An alarm system comprising an alarm signal, a controlling relay, a selenium cell and a circuit from said selenium cell to said relay, a casing containing the selenium cell, a shutter on the said casing with a cell-obscuring and a cell-exposing position, a primary checking circuit closed by the shutter when in its cell-obscuring position, a secondary checking circuit closed by the shutter in its cell-exposing position, a signaling means and a switch selecting between said primary, said secondary and said selenium cell circuits and connecting said primary and secondary circuit to said signalling means and said selenium cell circuit to said relay.

4. In an alarm system, an attendant's switch, a casing distant from said switch, a selenium cell in the said casing, a shutter with a cell-obscuring and a cell-exposing position on the said casing, a plurality of circuit closing means cooperating with said shutter, signalling means at the attendant's station including circuits leading to said closing means for checking the positions of the said shutter, an alarm circuit closing relay operated from said selenium cell, said attendant's switch selectively controlling said checking and said alarm circuits.

5. In an alarm system, a casing, a shutter on the said casing, a spring tending to open the said shutter, a detent retaining the shutter in its closed position, an electromagnet for actuating the detent to allow the said shutter to open under the action of said spring, a closing electromagnet for closing the said shutter and tensioning the said spring, selecting means including circuits to energize said electromagnets, electrical means including circuits for checking the operation of the said shutter, and circuits including a switch for selectively controlling said selecting means and said checking means.

6. An alarm system comprising a casing, a selenium cell in the said casing, a shutter with cell-obscuring and cell-exposing positions on the said casing, a plurality of circuit closing means cooperating with said shutter, a checking lamp, primary checking circuits including one of said closing means for checking the cell-obscuring position of the said shutter and including the said lamp, a relay with an actuating coil and a movable and an adjustable contact, adjusting circuits including the said actuating coil, the selenium cell, the movable and the adjustable contacts and the said lamp, secondary checking circuits including another of said closing means for checking the cell-exposing position of the said shutter, a bell, alarm circuits including the bell, the selenium cell and the said relay, and a switch for closing the said primary checking circuits, adjusting circuits, secondary checking circuits and the alarm circuits in succession.

In testimony whereof I have signed this specification in the presence of two witnesses.

GEORG SCHMIDT.

Witnesses:
MAX JABLOWSKI,
GERTRUD KRUCZKOWSKI.