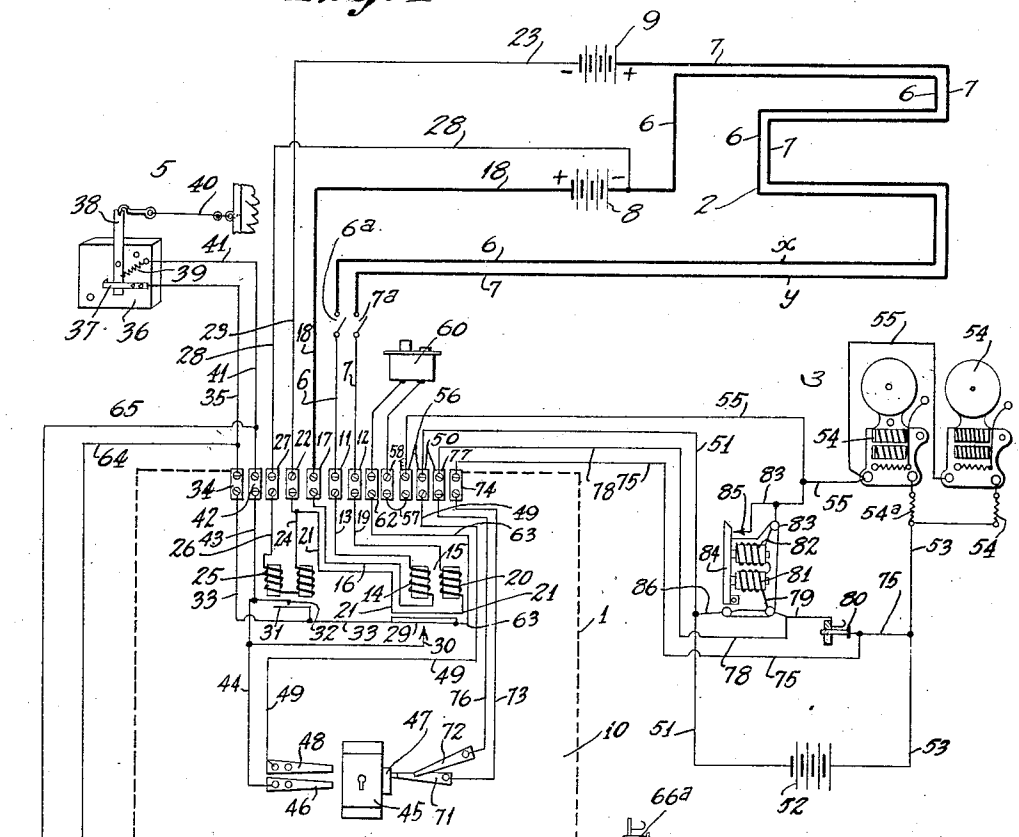
June 24, 1930. J. J. GILLIGAN 1,766,500

FOUR-WIRE BURGLAR ALARM SYSTEM

Filed May 15, 1923

Fig. 1



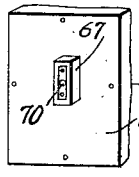


Fig. 4

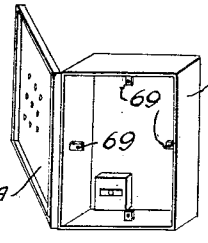


Fig. 2

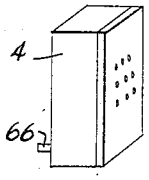


Fig. 3

INVENTOR.
James J. Gilligan
BY
O. Alley Edwards
ATTORNEY

Patented June 24, 1930 1,766,500

UNITED STATES PATENT OFFICE

JAMES J. GILLIGAN, OF NEW YORK, N. Y., ASSIGNOR TO HENRY K. KING, OF NEW YORK, N. Y.

FOUR-WIRE BURGLAR-ALARM SYSTEM

Application filed May 15, 1923. Serial No. 639,039.

The object of my invention is to provide a system of this class which may be used anywhere desired, as in commercial establishments, stores, banks and factories where it is desired that the premises be protected in such a way that if improperly entered, after entered by a person an alarm will be sounded which can not be stopped by any such person but which can be stopped by someone who knows the combination of the system and who first uses a key so as to open a lock and later opens a concealed closed circuit spring. This and other objects are accomplished by my invention, one embodiment of which is hereinafter more particularly set forth.

For a more detailed description of my invention, reference is to be had to the accompanying drawings, forming a part hereof, in which

Figure 1 is a diagrammatic view of one embodiment of my invention.

Figure 2 is a perspective view of bell housing opened with parts removed. This housing is placed on the exterior of a building or inside the protected premises.

Figure 3 is a perspective view of this housing when closed.

Figure 4 shows a panel used in this box, and

Figure 5 is a perspective view of the same.

Throughout the various views of the drawings, similar reference characters designate similar parts.

My improved four wire burglar alarm system 1 has a protective circuit 2 and an alarm circuit 3 with an alarm placed in an alarm housing 4 which may be put on the outside of a building or anywhere else, as desired. In addition to this, my system may be provided with a cross trap circuit 5 which is used for protecting purposes.

The protective circuit 2 is composed of two parallel wires 6 and 7 which run to different batteries, the wire 6 running to the negative pole of a battery 8 and the wire 7 running to the positive pole of a battery 9. The other ends of these wires run to an instrument box 10 where they are secured to terminals, the wire 6 being secured to the terminal 11 and the wire 7 to the terminal 12. In the preferred embodiment of my invention, the wire 6 has a switch 6^a and the wire 7 has a switch 7^a so that these switches may be opened or closed for testing purposes at the desire of the subscriber operating the apparatus. Under normal conditions they are closed. The terminal 11 has a wire 13 which runs to a magnet 14 of a relay 15 and this magnet has another wire 16 which runs to a terminal 17 which has an exterior wire 18 that runs to the positive pole of the battery 8.

The terminal 12 also has an internal wire 19 that runs to a coil 20 of the relay 15 and is connected by another wire 21 with a terminal 22 which has an external wire 23 that runs to the negative pole of the battery 9. The wire 21 also has a wire 24 connected therewith which runs to the magnets of a relay 25 and these magnets are also connected to a wire 26 which runs to a terminal 27 which has an exterior wire 28 which runs to the negative pole of the battery 8.

The purpose of these connections in the protective circuit with these batteries is to provide a system in which the breaking of one wire will not sound an alarm, but the breaking of two wires will sound an alarm or the short circuiting of two wires will sound an alarm, and a further object is to enable the subscriber to set his alarm in the event that there is a break in one of the circuits so that the system will work pending repairs. If, for example, a break should be made in the wire 6 at the point x it would be obvious that the magnet 14 of the relay 15 will be deenergized, but the strength of the magnet 20 will be sufficient to keep the armature 29 of the relay 15 in its raised position. If there should be a corresponding break at y in the wire 7 while the wire 6 remains in contact, the strength of the magnet 14 would be sufficient to keep this armature 29 in its raised position. If, however, both of the wires 6 and 7 were broken at the same time both of the magnets 14 and 20 of the relay 15 would be deenergized and then the armature 29 would fall on its contact 30. If the two wires 6 and 7 were

short circuited, as between the points x and y, the two magnets 14 and 20 of the relay 15 continue to be energized, but the magnets 25 of the cross relay would then be energized and raise their armature 31 so that it engages a fixed contact 32. When these armatures connect their respective contacts, or either of them so functions, an alarm is sounded in a manner which will now be described.

The armature 29, in its raised position when under the influence of the magnets 14 and 20, is off the contact 30 and is connected to a wire 33 which runs to the armature 31 so that at all times these two armatures are connected and this wire 33 is not only connected to the armature 31, but it runs to a terminal 34 in the instrument box 10. This terminal 34 has an external wire 35 which runs to a floor trap or ceiling trap 36 with its spring contacts 37 and trap lever 38 adapted to engage the same in the conventional way. This trap lever 38 is controlled by a spring 39 and a cord 40 secured in the conventional manner. The spring 39 is connected to a wire 41 that runs to a terminal 42 which also is connected to an internal wire 43 that runs to a wire 44 which is connected to the contact 32. This wire 44 is extended to the closing side of a lock 45 in the instrument box so that when the lock 45 is locked, a circuit will be closed through a contact spring 46, the bolt 47 of the lock 45, a contact spring 48 and wire 49 that runs to a terminal 50. This terminal 50 has an exterior wire 51 that runs to a battery 52 which has another wire 53 that runs to an audible alarm 54, as two bells in parallel and each bell has a resistance 54" in series therewith so that one bell can not be short circuited and so make the other inoperative and these bells are connected by a wire 55 which run to a terminal 56 in the instrument box 10. This terminal 56 has an internal wire 57 that runs to a terminal 58 which has an exterior wire 59 that runs to a door switch 60, the operation of which will be described below, and this switch has another wire 61 that runs to a terminal 62 of the box 10 and this terminal 62 of the box 10 is connected by a wire 63 with the armatures 29 and 31 so that when the system is to be used for protecting purposes, the person setting the apparatus first goes to the door switch 60 and opens same and leaves the door open and then goes to the instrument box 10 and throws the bolt 47 of the lock 45 to the position where it contacts with the springs 46 and 48 and thereafter he closes the door upon leaving and thereby automaticaly closes the switch 60 and then the apparatus is set.

The wires 35 and 41 are normally open circuit wires and so any number of circuit closing devices may be connected parallel therewith, as desired. In the present embodiment of my invention, three additional such devices are shown which are connected to wires 64 and 65, the wire 64 running to the wire 35 and the wire 65 to the wire 41. These wires are connected at one place at a cross spring 66 which is adapted to be inserted in the bell housing 4 and function so as to close a circuit whenever this housing is removed from its position where it normally rests or is in any way tampered with and another cross spring 66" serves the same purpose for the instrument box and a cross spring 67 is employed in the box on a plate 68 which is secured to lugs 69 and the cross spring 67 has a projection 70 which engages the door 71" which is hinged to the box so that when the door is opened, the spring pressed plunger 70 shifts so as to close the cross spring 67 and this will close the circuit by connecting the wires 65 and 64. If anyone should cut a hole in the door 71" so as to get at the bell back of the partition 68, the plunger 70 would spring forward under the influence of its spring and close the circuit so that in any event, the alarm bell 54 will sound if the box 4 be tampered with.

When the bolt 47 of the lock 45 is thrown into its open position, it presses on a spring 71 and thereby opens a circuit between this and another leaf spring 72. The spring 71 is connected to a wire 73 which runs to a terminal 74 and this terminal has an external wire 75 that runs to the wire 53. The spring 72 is connected to a wire 76 that runs to a terminal 77 which is connected to an external wire 78 that runs to a wire 79 which is connected to the wire 75 by means of a concealed closed circuit stop button or switch 80 which may be pressed so as to break the circuit between the wires 79 and 75.

The wire 79 runs to the coils 81 of a constant ringing relay 82 which has another lead wire 83 that runs to the wire 55 and the armature 84 of this relay 82 is adapted to engage a contact 85 which is connected to the wire 83 and this armature is also connected by a wire 86 to the wire 51 so that when once the alarm 54 is sounded, the magnets 81 are energized and then there is a closed local circuit from the battery 52 through the wire 53, bell 54, wire 55, wire 83, contact 85, armature 84, wire 86 and wire 51 so that as long as this circuit remains closed, the alarm will be sounded and the circuit will continue to be closed until the bolt 47 of the lock 45 is placed on the spring 71 so as to separate it from the spring 72 and the button 80 is pressed so as to open the circuit through the magnets of the relay 81 and permit the armature 84 to separate from the contact 85 and thereby stop the alarm.

In view of the foregoing, the operation of

my improved system will be readily understood. When the system is inoperative the bolt 47 presses the spring 71, as above described, and the other parts are normal. When the customer operating the apparatus wishes to set it so that an alarm will be sounded, he goes to the switch 60 and opens the same and opens the door which closes this switch 60 and then throws the bolt 47 the position shown to the opposite position so that a contact is made between the springs 46 and 48 and then upon leaving the premises he closes the door and thereby automatically closes the door switch 60 and then the apparatus is set. The subscriber upon returning, opens the entrance door which is connected, so as to open two breaks in the wires 6 and 7 and thereby causes the magnets 14 and 20 to be deenergized and their armature 29 to fall, whereby a circuit is closed through the alarm circuit and the alarm is sounded and will continue to be sounded until he first throws the bolt 47 of the lock 45 so as to separate the springs 71 and 72 and presses the concealed stop button 80 so as to stop the ringing of the alarm.

If the subscriber wishes to test the alarm, he closes the premises so that the circuits are closed through both the wires 6 and 7 and then he turns the key so that the bolt 47 connects the springs 46 and 48 and then if the alarm remains silent he knows that the system is in an operative condition on wires 6 or 7 and that no short circuit exists between these wires. To find out whether or not wires 6 and 7 are broken, he opens the switches 6^a and 7^a, first one and then the other, and if the alarm still remains silent he knows that the circuits are correct and in operative condition. If he opens the switch 6^a and the alarm sounds, he knows that the wire 7 is broken and if he opens the switch 7^a and the alarm sounds he knows that the wire 6 is broken. In the event of a break on one of the circuits 6 or 7 the alarm still remains in an operative condition on the other one of these wires.

If the apparatus should be set against a burglar and he should attempt to enter the premises protected by the system or tamper with the apparatus, he will sound an alarm in one of several ways. For example, if he should break the cord 40 or pull it, the trap lever 38 would swing one way or the other so as to close a circuit between the wires 41 and 35 an alarm would be sounded, as above described, and the same thing would happen if the bell housing were tampered with as by removing so that the switch 66 would close a contact between the wires 64 and 65, or if he opened the door 71^a of the bell housing the switch 67 would close a circuit between these wires and thereby sound an alarm, or if he should open a door or other protected units protected by the wires 6 and 7, the circuits through these wires will be opened and then the alarm will be sounded, as above described, it being understood that these wires are connected in the conventional manner through screens or otherwise to protect the premises, or if the two wires 6 and 7 should be short-circuited by running a tool or other metallic object across them, or by them or on them, an alarm will be sounded, as above set forth. In any event, the tampering with the protecting system will cause the alarm to be sounded, or any tampering with the bell housing, wiring, etc., will produce the same result.

While I have shown and described one embodiment of my invention, it is obvious that it is not restricted thereto, but that it is broad enough to cover all structures that come within the scope of the annexed claims.

Having thus described my invention, what I claim is:

In a burglar alarm system, a first source of electrical energy and a second source of electrical energy located in a central station, a normally closed electric circuit for each of said sources of energy, including a magnet at the central station, and a portion which extends out to a premise to be protected, said portions being adjacent, an electrical connection including a third electro-magnet connected at its ends adjacent to like terminals of said electrical sources, an armature common to the electromagnets first mentioned and a cooperating stationary contact, an armature and a cooperating contact for the electromagnet in said connection, a circuit including a relay, a third source of electrical energy, and said first armature and cooperating contact, an electrical connection from said first armature to said second armature and an electrical connection from the cooperating contact of said second armature to the cooperating contact of the first armature, the armature of the first electromagnets being spaced from the cooperating contact when the cooperating electromagnets are energized, while the armature for the electromagnet in said connection is spaced from its cooperating contact when the cooperating electromagnet is deenergized, like poles of the first and second batteries being connected to opposite terminals of said first named magnets and an alarm controlled by said relay.

In testimony whereof, I have hereunto set my hand this 10th day of April, 1923.

JAMES J. GILLIGAN.