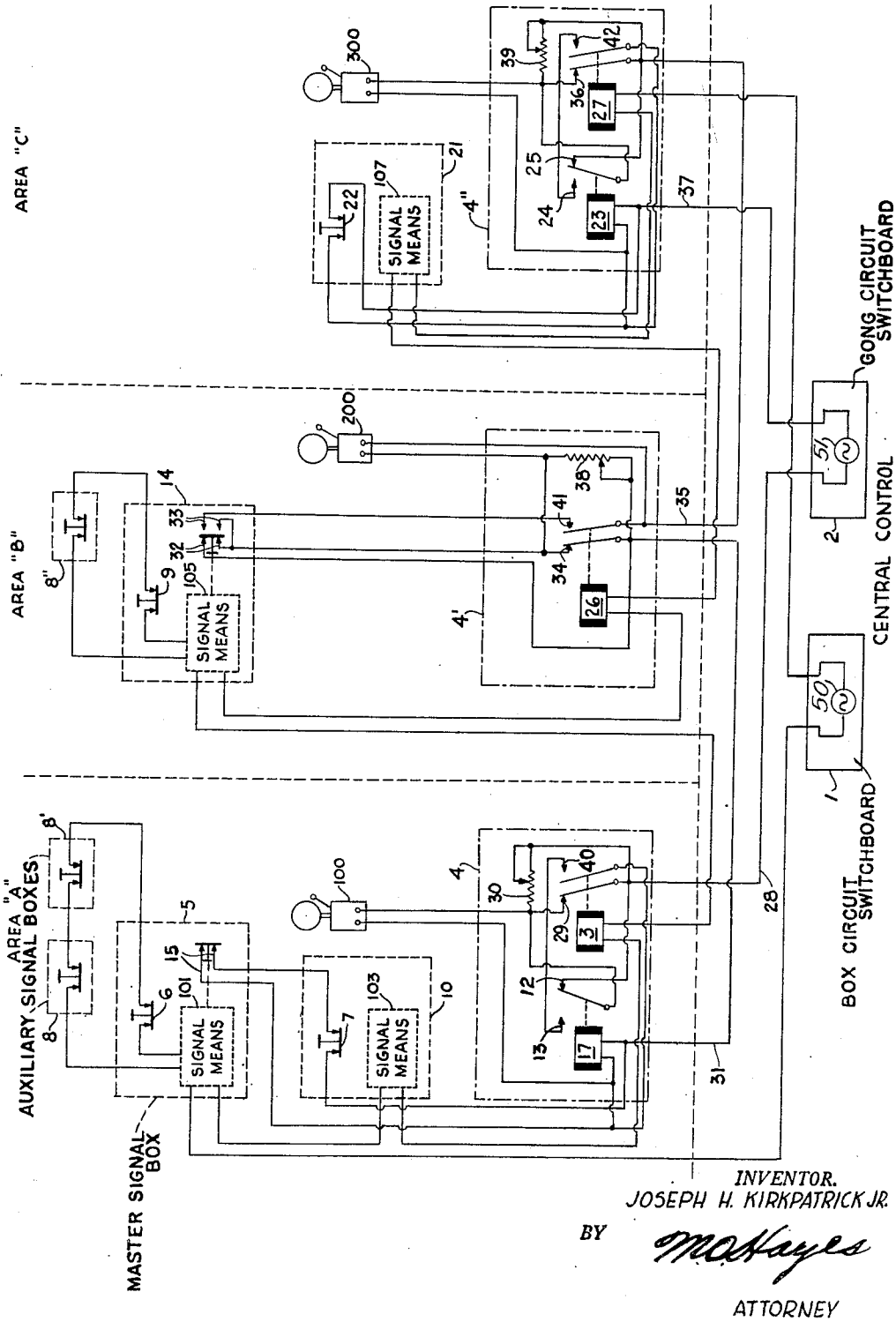
April 3, 1951 J. H. KIRKPATRICK, JR 2,547,016

LOCALIZED ALARM SYSTEM

Filed Aug. 7, 1946




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Patented Apr. 3, 1951

2,547,016

# UNITED STATES PATENT OFFICE

2,547,016

## LOCALIZED ALARM SYSTEM

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Application August 7, 1946, Serial No. 688,867

2 Claims. (Cl. 177—360)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention relates to improvements in fire alarm systems.

Presently known fire alarm systems, as installed in large buildings and industrial plants commonly provide a general alarm that is audible throughout the area covered. Fires, however, usually originate in and are confined to but one building. In a large shipyard for instance, there may be hundreds of buildings and thousands of employees, and every day there may be one or more fire alarms either for actual fires or only for fire-drill purposes. Thus, each time the alarm sounds all employees are required to stop what they may be doing to count the signal in case it is intended for their particular department or building. This cessation of work may only take a few minutes but, multiplied by thousands of employees, the loss of productive time is a serious matter. By confining the alarm to the building zone or area where the fire actually breaks out and to the local fire station, only the personnel in these places are alerted. Then, if the fire spreads, the next nearest alarm box can be pulled and sounded, and so on. This system, as provided by the present invention, overcomes the above-described defect of the system hitherto described, and is, therefore, very conducive to efficiency.

A principal object of this invention is to provide an alarm system that is so arranged that the alarm given is localized in any given section of a building, institution or industrial plant so that it operates only in the section desired and not throughout the whole area.

Another object is to simplify the loop circuits of the alarm signalling system so that only the required portion of the alarms in any given loop is deenergized, thereby to render the latter operative.

Still another object is the provision, in the gong or signal, of switches, relays, resistances such that any given gong or signal section may be made operative or inoperative as desired, regardless of the operation of gongs or signals in any other section of the same series circuit.

To describe more fully the operation of the circuits employed in this invention as to the operation of the silencing device used to discontinue certain gong or signal circuits or any portion of them, reference is made to the drawing, the single figure of which is a wiring diagram of a complete fire alarm system arranged according to the present invention.

An alarm system constructed in accordance with the principles of the present invention

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comprises two main circuits, one of which is hereinafter referred to as the box circuit since it contains electric-signal-producing boxes, or briefly, signal boxes. The other of the main circuits is referred to, in the present description, as the gong or alarm circuit since this circuit contains the gong and/or other alarm-producing apparatus.

In the drawing, numerals 1 and 2 designate supervising switchboards located at a central control point and including conventional control means and visual and/or aural indicating devices (not shown), which may be connected to any suitable conventional regulated current sources 50, 51 for providing and maintaining a constant current of any suitable magnitude in the box and gong circuits, respectively. It will be understood that the box and gong circuits are of the type that are normally closed so that a constant current flows therein, and, in such condition, the alarms are short-circuited, as will appear, so that no alarm is sounded. On opening the normally closed circuits, the short-circuit is removed causing the sounding of an alarm.

The box circuit connected to switchboard 1 extends over any desired number of areas or localities sought to be serviced, here shown as three in number and designated areas A, B and C. The gong or signal circuit, connected to switchboard 2, extends over the same areas as those covered by the box circuit.

Two somewhat different type signal boxes 5 and 10 are located in area A, and wired to control a local alarm which may be a gong 100 suitably located in this area in the event that either box 5 or 10 is pulled. Each of the boxes 5 and 10 is provided with separate code-signalling means 101, 102 of the lever and code wheel type for producing and transmitting coded electric signals characteristic of the respective boxes. Such code signalling means are well-known in the art and may be arranged in any conventional manner to initiate and transmit a complete signal consisting of any number of rounds of a code carried on a wheel. A description of the structure and operation of a convenient type of code signalling means can be found in the United States patent to N. H. Suren, No. 1,132,449, patented March 16, 1915, to which reference may be made for fuller disclosure.

Also located in area A is a plurality of auxiliary signal boxes 8, 8', here shown as two in number, although any desired number of similar auxiliary boxes may be employed. Each of the boxes 8, 8' may be of any suitable conventional type of sig-

nal box, as for example, the pull-to-open type of switch, commonly operated by the opening of the doors of the boxes 8, 8'.

Signal box 5 is the master unit having a trip contact 15, which is actuated through the signal means 131 when the auxiliary boxes 8, 8' are pulled. If box 5 should be pulled manually rather than from an auxiliary station 8, contact 15 normally does not trip open. Accordingly, contact 6 is installed in the box cabinet 5 so as to be mechanically actuated when box 5 is manually tripped. To this end, contact 6 is wired in series with the auxiliary stations 8 thus ensuring the opening of contact 15 in all cases of operation.

Signal box 10 is a standard type box which does not have any switch means similar to the trip contact 15 of signal box 5 inasmuch as no auxiliary boxes are associated therewith. A contact 7 is, however, installed in box 10 to be actuated mechanically when the box is pulled. Contact 7 is wired in series with contact 15 in box 5, and the series connection of the contacts 15 and 7 is shunted across the coil of a relay 17 which, in turn, is installed in a cabinet 4 also located in area A. Relay 17 includes an armature movable between contacts 12 and 13, of which the former is normally closed and the latter is normally open, corresponding to the deenergized condition of relay 17. The relay 17 is kept deenergized by the shunt circuit (contacts 15 and 7) so that, when either contacts 7 or 15 are opened, the relay 17 becomes energized, thereby opening contact 12 and closing contact 13. As will appear, this action serves to precondition or set up the local alarm circuit to be responsive to signals generated in either of the code-signalling means 101, 103 to sound an alarm. Contacts 12 and 13 remain in open and closed positions, respectively, until the fire box that is signalling has finished its signalling operation and has been reset. The coded signal from either box 5 or 10 activates the coil of a relay 3 serially connected in the box circuit, and having a pair of contacts 29 and 40. Contact 29 is normally closed while contact 40 is normally open corresponding to a normally energized condition of relay 3. As shown, the contact 12 of relay 17 and the contact 29 of relay 3 are electrically connected in parallel with each other, and the pair of contacts 12, 29 is shunted across a resistor 30 in the gong circuit, said resistor being adjustable to a resistance value substantially equal to the resistance of the gong 100.

Area B is controlled by an alarm box 14 which may be substantially of the same master type as box 5 in area A but having a pair of trip contacts 32 and 33 instead of the single contact 15 in box 5. As shown, area B may also be provided with one or more auxiliary boxes of the type described above in connection with boxes 8 and 8'. Only one such auxiliary box 8'' is here disclosed connected to a code signalling means 105, which may be of the same type as that shown at 101 and 103 in area A. A normally closed contact 9 is serially connected to box 8'' and mounted in box 14 in a manner and for a purpose substantially the same as described in connection with contact 6 in box 5. The contacts 32, 33 cooperate with normally closed and normally open contacts 34, 41, respectively, of a relay 26, housed in a cabinet 4', and of which the coil is connected for actuation by the coded signal from the signalling means 105, to pre-condition or set up the local alarm preparatory for the box signal.



Normally closed contact 32 in box 14 is connected in parallel with normally closed contact 34 in cabinet 4' and the parallel connection of the contacts 32, 34 is shunted across a resistor 38, of which the resistance value is adjustable to be equal to that of a gong 200 in area B. Normally open contact 33 in box 14 is connected in series with normally open contact 41 in cabinet 4', and the series connection of the contacts 33, 41 is shunted across the local alarm gong 200 which, together with resistor 38, is connected in the gong circuit. Thus, when the box 14 is pulled from an auxiliary station such as 8'' or manually, the trip contacts 32 and 33 are actuated and remain tripped until the box 14 has finished its signalling operation resulting in the sounding of gong 200, and has been reset.

Area C is controlled by an alarm box 21, which is of the same standard type of box described above in connection with box 10 in area A. Contact 22 is installed in the box 21 similarly to the installation of contact 7 in box 10, area A, so that when box 21 is pulled causing a coded signal to be set up in a signalling means 107 while contact 22 is tripped open. Contact 22 is connected to shunt out the coil of a relay 23 in cabinet 4'' and, when the contact 22 is tripped open, the relay 23 becomes energized thus actuating normally open contact 24 to closed position and normally closed contact 25 to open position, thus preparing or preconditioning the local alarm in area C for the box signal. In a manner similar to the connection of relay 3 and contacts 40 and 29 in area A, a relay 27 having normally open and normally closed contacts 42 and 36, respectively is connected, with the coil of relay 27 in series with the output of the signalling means 107. The contacts 24, 25, 42 and 36 are connected in the gong circuit in substantially the same manner as are the contacts 13, 12, 40 and 29 in area A. Hence, repetition of the description is not deemed necessary.

As thus far described, the three areas, A, B and C are shown wired by means of the box and alarm circuits from the switchboards 1 and 2 to the control cabinets 4, 4' and 4''; alarm boxes 5, 10, 14 and 21; and gongs 100, 200 and 300. This illustrates the method of installation and wiring system of the box circuit as provided by the present invention.

The alarm circuit continuity may be traced as follows:

The circuit is traceable from switchboard 2 through wire 28 to the normally closed contacts 12 and 29, which shunt out variable resistor 30, through the gong 100 to the series-connected normally closed contacts 15 and 7 which shunt the coil of relay 17, to wire 31 which carries the circuit current to area B. The circuit continues through wire 31, through normally closed contacts 34 and 32, through the gong 200 to wire 35 leading to area C. Finally the alarm circuit extends from wire 35, through normally closed contacts 25 and 36, through gong 300 to closed contact 22, to wire 37 which returns the circuit to switchboard 2.

It is noted from this circuit continuity that the gongs 100, 200 and 300 are held in normally energized condition and the variable resistors 30, 38, 39 and the coils of relays 17 and 23 are normally shunted out of the circuit.

In operation, the box circuit is normally closed holding all the relays 3, 26 and 27 energized. When any of the boxes in areas A, B and C is pulled and begins to transmit a coded signal all

the relays 3, 26 and 27 become energized and deenergized as the circuit is opened and closed. The local alarm however, that operates is determined by the actuation of the contacts 13 and 12, area A; or 32 and 33, area B; or 24 and 25, area C. These contacts are only actuated in the area that an alarm box is pulled. Assuming boxes 5 or 10 were pulled in area A, contact 15 or 7, respectively, depending on which box was pulled, would open the shunt circuit holding relay 17 deenergized and allow it to energize actuating contacts 13 and 12. The alarm circuit is now prepared for the signal. As the alarm box opens and closes the box circuit 1 relays 3, 26, 27 operate in the same order as box signal coded. However, local alarms in areas B and C remain fixed because the contacts 32 and 33 (area B) and 24 and 25 (area C) are not affected, and the signal does not operate the gong in these areas.

After contacts 12 and 13 are actuated the normal flow of current is still through the gongs 100, 200 and 300. However, when the relay 3 is actuated, and thus deenergized, the flow of current is through resistor 30 through series contacts 13 and 40 through the coil of relay 17 to wire 31. Current flowing through contacts 13 and 40 shunt out the gong 100 deenergizing it so as to give one signal for each pulse of the relay 3 which therefore constitutes a signal characteristic of the particular box pulled. Resistor 30 is preferably made adjustable as shown and described, to compensate for the resistance of gong 100, shunted out of this circuit, thus stabilizing the current flow.

The circuit from wire 31 follows the same path, as previously outlined, back to the switchboard.

Substantially the same operation as described for area A occurs at areas B or C when alarm boxes are pulled in these areas with relay 26 (area B) operating contacts 34 and 41 and relay 27 (area C) operating contacts 36 and 42, respectively.

In area B, for example, when a coded signal from signalling means 105 is initiated as by the pulling of box 14 manually or by remote action from auxiliary box 8'', normally closed contact 32 is opened and normally open contact 33 is closed simultaneously. The interruption, by the signal, of the current flow in the coil of relay 26 causes the normally closed contact 34 and normally open contact 41 to open and close respectively, in synchronism with the coded signal. It will be understood that the periodic opening and closing of contacts 34 and 41, occurring after the preconditioning produced by the actuation of contacts 32 and 33, results in the production of an intermittent flow of current in gong 200 thereby causing it to sound a number of times corresponding to the coded signal.

The operation in area C is so similar to that in area A as not to require separate description.

From the foregoing description it will be observed that the present invention provides a complete, compact method for an alarm system, such that, the alarm may be localized in any section wherein the alarm is "pulled" without alarming any other section of the completely alarm controlled area.



The system of my invention is relatively simple to install, has few moving parts that require service attention, and is easy and simple to manufacture.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What I claim is:

1. A signalling system comprising a plurality of alarm-producing means disposed in different areas, a series electrical circuit interconnecting said alarm-producing means, said circuit being constantly energized and including relay means normally rendering said alarm-producing means inoperative to produce an alarm, signal-generating means in each of said areas actuatable to condition said relay means for response to a signal from said signal-generating means, and means in each said area responsive to a signal from the signal-generating means in the same area only after conditioning of said relay means to short-circuit a part of said circuit associated with the corresponding alarm-producing means, thereby to render the latter operative to produce an alarm.

2. The system as defined in claim 1 further comprising means in said circuit operable upon short-circuiting of said part to introduce resistance equivalent to that of said part, thereby to maintain current flow in said circuit substantially constant.

JOSEPH H. KIRKPATRICK, JR.


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