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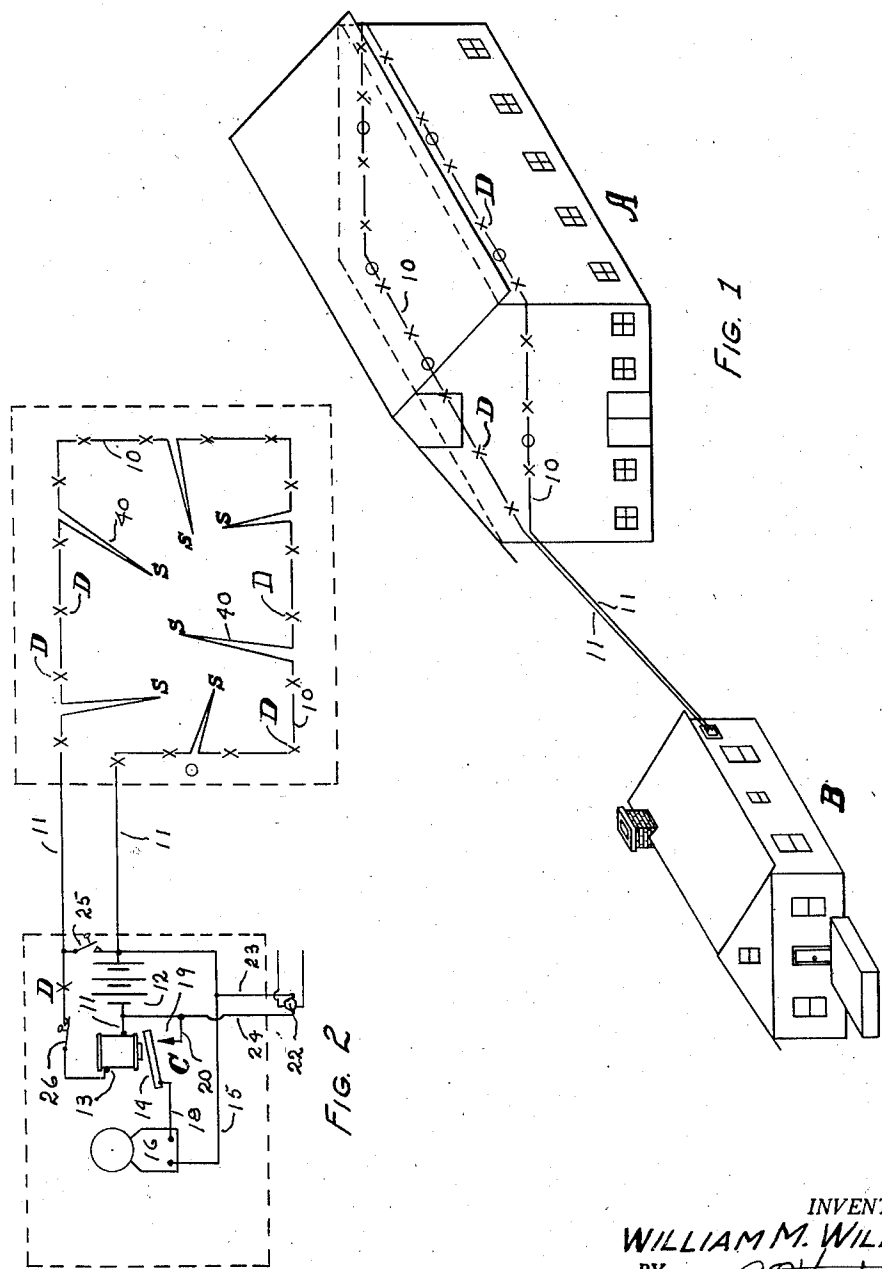
W. M. WILLETT

2,433,080

FIRE ALARM SYSTEM

Filed July 20, 1942

2 Sheets-Sheet 1



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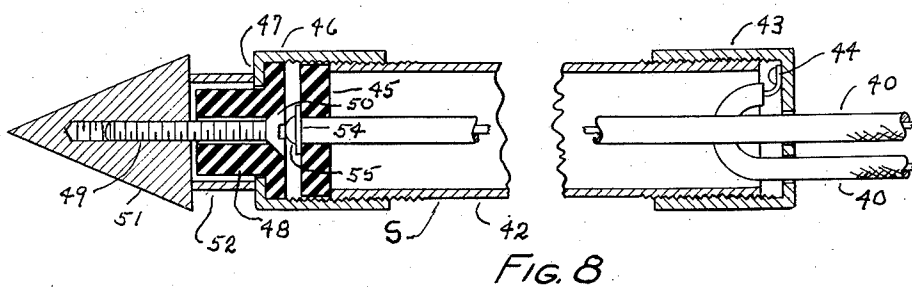
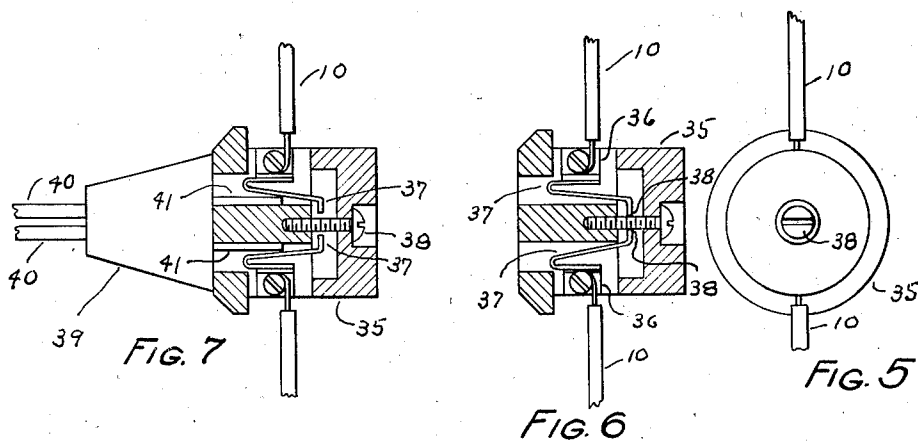
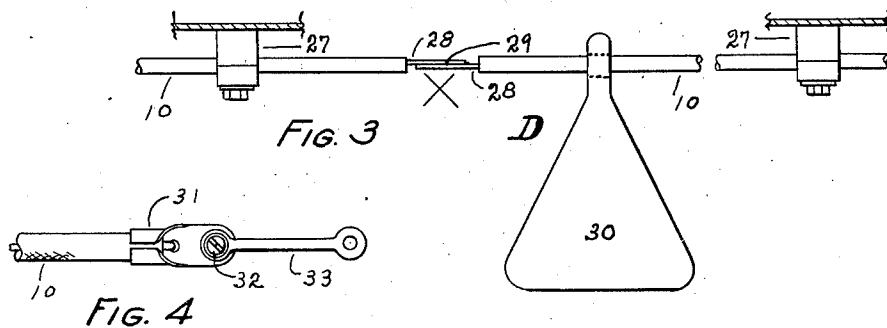
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## UNITED STATES PATENT OFFICE

2,433,080

## FIRE ALARM SYSTEM

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The present invention relates to a closed circuit fire alarm system having a source of power and a relay in the closed circuit adapted to operate an alarm when the circuit is opened.

An object of my invention is to provide an alarm system having one or more stations each of which will be caused to open the circuit if exposed to a predetermined maximum temperature.

A further object of my invention is to provide a closed circuit which may be positioned along a convenient path in which any number of stations may be attached in series in the circuit.

Another object of my invention is to provide extensions which may be plugged into sockets which are in the circuit, the free ends of the extensions adapted to be optionally positioned or inserted into a mass of hay, grain, or the like and having means so when the end of the inserted member is exposed to a predetermined maximum temperature, the extension circuit will be opened and an alarm sounded.

A further object of my invention is to provide a novel relay controlled switch and manually operatable switches positioned preferably near the relay whereby the relay and the circuit may be tested.

A still further object of my invention is to provide a plug-in extension whereby the extension may be removed without opening the circuit and whereby the free end of the extension may be provided with a rigid elongated structure having at its end a point or spear for convenient insertion into stored hay, grain or the like, the spear end being provided with means whereby when exposed to a predetermined maximum temperature, the circuit will be opened and the alarm sounded.

An object of my invention is to provide means whereby when an alarm is sounded, the attendant may first determine whether the relay and alarm device or source of power is out of order or a true alarm was sounded and whereby the operator may readily find the open circuit and remove the cause of the trouble.

To these and other useful ends, my invention consists of parts, combinations of parts, or their equivalents, and mode of operation, as hereinafter set forth and claimed and shown in the accompanying drawings in which:

Fig. 1 is a diagrammatic drawing of a building equipped with my closed circuit and a home or office located remote from the building and equipped with the alarm device and, if desired, one or more stations.

Fig. 2 is a diagrammatic drawing illustrating

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my improved relay system and the closed circuit illustrating the building and office or home by dotted lines.

Fig. 3 illustrates a circuit opening station adapted to be positioned in the main circuit.

Fig. 4 illustrates a modification of Figure 3.

Figures 5 and 6 illustrate a plug-in socket.

Fig. 7 illustrates a plug with which the loop extensions may be plugged into the socket and into circuit in series.

Fig. 8 illustrates fractionally a spear point connection for the free end of the extension and means whereby when the spear point end of the device is exposed to a maximum predetermined temperature, the loop circuit will be opened.

In Figure 1 reference character A designates the main building and B designates a home or office building. In Figure 2, the central station alarm operating mechanism is designated in its entirety by reference character C. Reference character D designates the alarm stations in their entirety and reference characters S designate the spear points in their entirety.

Wire loop 10 forming the main circuit of the device is suitably insulated and positioned in the building so alarm stations D may be positioned in danger zones of the building or buildings.

Member C comprises a source of power 12 which may be a storage battery or otherwise. The relay comprises a magnetic member 13 connected in series in circuit 10 by means of wires 11; thus as long as the circuit remains closed, relay 12 is adapted to be energized and hold a switch 14 in its open position. Wires 11 may be in the form of a cable and of any desired length forming a convenient means for connecting circuit 10 to member C.

A wire 15 leads from one side of the source of power 12 to an alarm mechanism 16. Another wire 18 forms an electrical connection between members 14 and 16. When switch 14 is released by member 13 to close the alarm circuit, it is preferably adapted to be closed by gravity on contact point 19, the point being connected to the other side of the source of power 12 by a wire 20.

It will be seen that when switch 14 is closed, the source of power will be operatively connected to member 16 which will be caused to sound the alarm. By scrutinizing Figure 2, it will be seen that as long as circuit 10 and its connection to member C is complete, the switch will be held open and that if the circuit is opened, the relay will cause the switch to close and sound the alarm.

I therefore provide means whereby the attendant may test member C as follows:

A normally open switch 25 is connected across wires 11 and a normally closed switch 26 is connected in series to one of wires 11; thus to test member C, all that is necessary is to open switch 26 and if member C is in working condition, the alarm will be sounded. If the operator is uncertain as to the condition of the system, he may close switch 25. This would be equivalent to having the rest of the circuit in normal condition and in this condition, the relay switch should be held open. If however it is not, then it will be apparent to the attendant that there is something out of order in member C.

In some installations, when the source of power 12 is, for example, a storage battery, I provide a trickle charger 22 for the battery and connect it to the battery by means of wires 23 and 24. It is possible that this trickle charger may have a capacity sufficient to suitably energize relay 13; thus regardless of the condition of battery 12, the relay will be caused to hold switch 14 open as long as the alarm circuit is closed.

I provide stations D which will open the closed circuit 10 when exposed to a predetermined temperature as follows:

Wires 10 are mounted at various spaced intervals on insulating brackets 27. Close to one of brackets 27 the insulating material on the wires is removed as at 28—28 and the bare ends lapped and bonded together as illustrated by means of a soft solder as at 29. I provide a weight 30 having an opening through which wire 10 extends as illustrated, the weight being heavy enough to break the circuit between the wire ends when the bonding material is fused; thus, as already outlined, the circuit will be opened and the alarm sounded and continue to sound until the circuit is again closed either by closing switch 25 or by rebonding the ends of the wires.

In Figure 4 I illustrate a clip 31 (one not shown) on the ends of wires 10, these clips being suitably bonded to the ends of the wires, each having a screw 32 by means of which a fuse link 33 may be used with which to close the circuit. When this device, as illustrated in Figure 4 is used in place of the joint shown in Figure 3, the weight 30 may clearly be dispensed with.

I provide means for opening the circuit in remote positions and positions difficult to reach in the following manner:

A socket 35 is connected in circuit 10 as illustrated in Figures 5, 6 and 7. The sockets are provided with brackets 36—36 to which spring bars 37—37 are connected. A bolt 38 made preferably of copper or brass is positioned in the socket as illustrated in Figures 6 and 7 and normally springs 37 are adapted to yieldingly contact this bolt as at 38—38 so as to close the circuit (see Figure 6).

A plug-in member 39 is provided with suitable connections to flexible loop wires 40—40, these wires being insulated from each other and connected at their ends to prongs 41—41. When plug 39 is inserted into the socket as shown in Figure 7, bars 37 at their free ends will be moved away from bolt 38 (see Figure 7) so wires 40 will be connected into the circuit in series, their free ends being adapted to close and open the circuit by means of a station as will hereinafter appear.

Wires 40 may be any desired length and have mounted preferably on their free ends my improved spear point station S as illustrated in Figure 8. This station comprises preferably a tube 42 having a cap 43 through which wires 40 extend

as illustrated in Figure 8, one end being secured to the cap as at 44, the other end extending through the cap and an insulating washer 45 which lies against the end of tube 42. The end of tube 42 is provided with a metal cap 46. This cap is provided with an inwardly turned flange 47.

A flanged insulating washer 48 is shaped and positioned as illustrated, having rotatably mounted therein a screw threaded bolt 49 with a head 50.

I provide a spear point 51 which is screw threaded for the reception of bolt 49 and a fusible sleeve 52 which lies between flange 47 and the inner surface of spear point 51. The inner end of the wire which extends through washer 45 is provided with a metal washer 54 to which the protruding end of the wire is soldered as at 55. The threads on the end of member 42 are made long enough so member 46 may be moved to a position which will make a firm contact between members 50 and 55; thus it will be seen that as long as member 52 is in position, the circuit will be closed, however if the temperature to which this sleeve is exposed rises above its fusion point, the circuit will then be opened and the alarm sounded.

To replace sleeve 52, cap 46 is removed from tube 42 and bolt 49 removed and a new sleeve placed into position and the bolt again made taut, after which cap 46 is again screwed on pipe 42 far enough to again close the contact.

It will be seen that if member 42 is inserted into a mow of hay or into a mass of grain or the like so spear point 51 is in a danger zone, if the material is overheated at this point, sleeve 52 will be fused and the spear point circuit opened.

In Figures 3 through 7, I have illustrated my preferred design. It will be seen that other designs equally effective may be provided particularly in regard to the device shown in Figure 8. Clearly tube 42 may be made quite long so the spear point may be moved into remote positions.

It will be seen that loop wires 40 may be made in any length and provided at their free ends with any means for opening the circuit when exposed to the maximum predetermined temperature. The advantage of this extension design is that it can be plugged in or out of the circuit without sounding the alarm and it will also be understood that if, for example, member 52 has been fused so as to open the circuit, the attendant then can readily find the spear point which is open by simply removing plugs 39 until the one is removed which again establishes a closed circuit.

Having thus shown and described my invention, I claim:

1. A device of the character described; comprising a normally closed main electric circuit having a source of power, a relay connected in series in said circuit, a switch associated with said relay and adapted to be normally held open by the relay and caused to close when said main circuit is open, an alarm in circuit with said switch, the alarm and switch being operatively connected to said source of power, whereby when said switch is closed the alarm will be operated, a plug-in socket in series connection with said main circuit, and means for closing the circuit in the socket when the plug is removed, an extension loop associated with the plug of said socket, said plug having means for connecting said extension in series with the circuit when inserted, the free end of said extension having a relatively long rigid element with a fuse in its free end adapted to open the circuit when ex-

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posed to a predetermined maximum temperature, the mounting of said fuse comprising an elongated tube having a pointed cone, said fuse comprising a sleeve and being held concentrically and snugly between the cone and tube and means whereby the circuit is closed through the sleeve.

2. A device of the character described comprising; an elongated tube having a pointed cone removably secured thereto, said elongated tube having at its cone end an inturned flange, circular in cross section insulating material the body lying on and extending outwardly through said tube flange, a fuse comprising a sleeve positioned between the base of said cone and said tube flange, a screw having a head extending through said insulating material and screw threaded into said cone whereby the screw may be used to bind fuse between the cone and said tube flange, another insulator positioned within said tube and a short distance from said first insulator and having a metallic projection adapted to contact said bolt, said elongated tube having a cover cap at the other end, two wires one secured to the other end of the tube and the other wire extending into the tube and to said projection and having an insulating covering, the other ends of the wires being adapted to be connected to the

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closed circuit of a fire alarm system whereby when said fuse is melted the circuit will be opened.

WILLIAM M. WILLETT.

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