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2,704,797

FIRE DETECTOR

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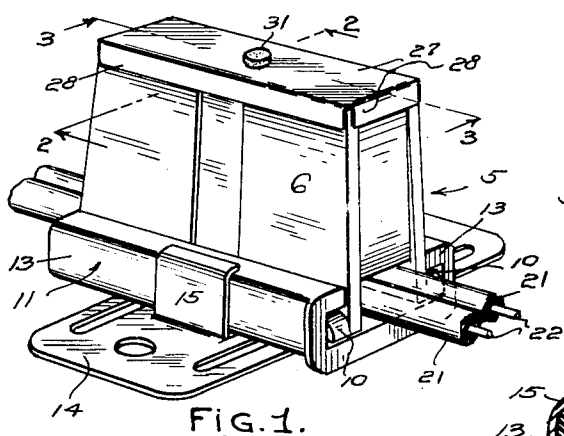


FIG. 1.

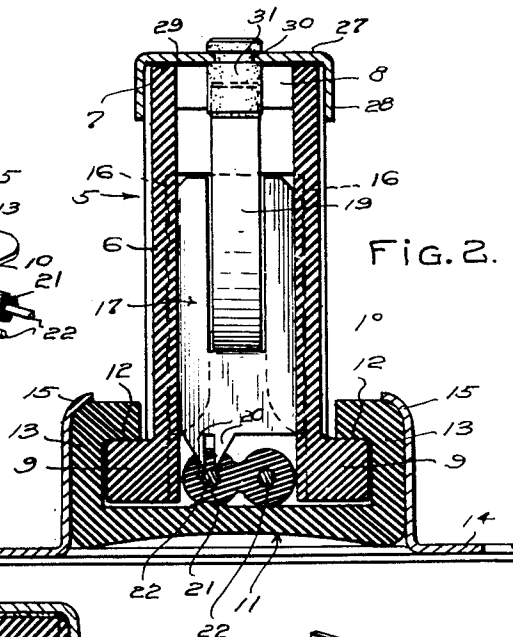


FIG. 2.

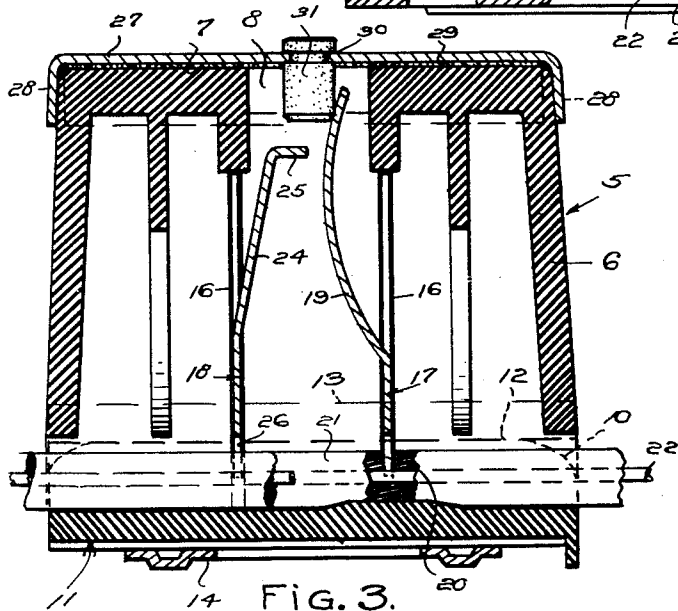


FIG. 3.

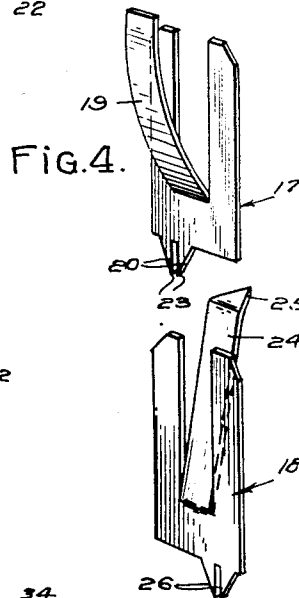


FIG. 4.

FIG. 5.

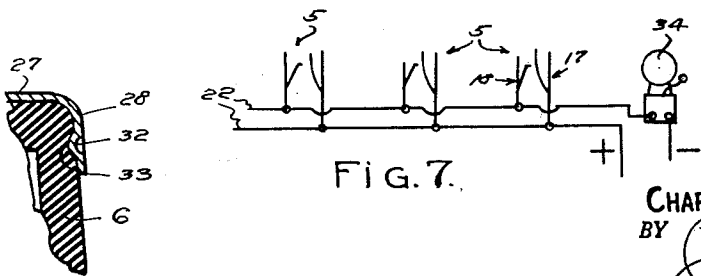


FIG. 6.

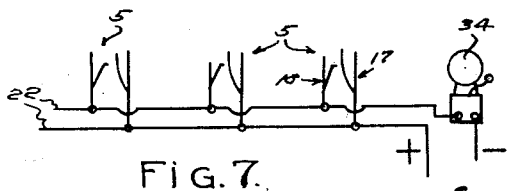


FIG. 7.

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FIRE DETECTOR

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2 Claims. (Cl. 200—142)

This invention relates broadly to a fire detector and more specifically to a circuit closer embodied in a fire detecting system of many and varied electrical systems.

The invention has for its prime purpose, the provision of an extremely simple and highly effective circuit controlling means that may be installed in a wiring system with a minimum of effort and expense and without interrupting service now in operation. The simplicity of construction enables the operator to install the fire detectors in various places as the need occurs and requires no cutting of presently installed wires and the usual difficulties attendant thereto.

Novel features of construction and operation and the adaptation of known facilities will be apparent during the course of the following description, reference being had to the accompanying drawings, coupled with the following preferred form of the device and wherein the several figures of the drawings have been referred to in detail and with similar reference characters employed to denote like parts throughout.

In the drawings:

Figure 1 is a perspective view of a fire detector constructed in accordance with the invention,

Figure 2 is a transverse vertical section, taken substantially on line 2—2 of Figure 1,

Figure 3 is a central vertical longitudinal section, taken on line 3—3 of Figure 1,

Figure 4 is a perspective view of a contact element embodied in the device,

Figure 5 is a perspective view of another contact element embodied in the device,

Figure 6 is a fragmentary sectional view illustrating a modified form of heat collector cap and,

Figure 7 is a diagrammatic illustration showing the use of the detectors in a double wire alarm system.

Referring specifically to the drawings, the numeral 5 designates the device as a whole, embodying a generally rectangular housing 6, the ends and side walls of which are formed flat and with the end walls tapering as shown. The housing 6 is formed of any well known insulating material, such as the commercial Bakelite and with the housing being of such design as to facilitate the molding thereof in a simplified manner. The housing 6 has a top 7, provided with a central relatively large opening 8. The lower or bottom edges of the side walls are provided with outwardly directed flanges 9 that extend for the full length of the side walls with the flanges having their opposite ends downwardly rounded as at 10 to facilitate the assembly of a bottom closure cover, indicated as a whole by the numeral 11. As clearly shown, the housing 6 is formed open at its bottom, with its end walls terminating on a line substantially with the top faces 12 of the flanges 9. The upper, lower and outer sides of the flanges 9 are formed flat, as clearly shown to facilitate the sliding movement of inwardly directed channels 13, formed integral with the bottom cover 11. The bottom closure cover is preferably formed of the same insulating material as the body or housing 6. The bottom closure cover is preferably provided with detachable slip-on type metallic mounting clips, indicated at 14, through the medium of which the fire detectors can be rigidly secured in a desired position. The clips have a friction gripping connection with the channel sides of the bottom, by flexible tongues 15, struck from the body of the clips.

The inner vertical side walls of the housing 6 are provided with spaced pairs of slots 16, see Figure 3, termi-

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nating adjacent the top of the housing, but with the lower ends of the slots opening upon the bottom edges of the side walls. Disposed within the slots 16, are opposed metallic contact elements indicated each as a whole by the numerals 17 and 18. The contact element is of rectangular shape, stamped from a sheet of copper, brass or the like that has been hardened sufficiently to impart a substantial spring quality. The element 17 has been stamped to provide a forwardly curved spring contact strip 19. The upper corners of the element are preferably bevelled to facilitate the insertion of the element into its respective slots 16. The lower end of the element 17 is also provided with a pair of closely arranged piercing prongs 20, calculated to pierce the insulation 21 of a pair parallel electrical conductors 22. The spacing apart of the prongs 20 is such, that upon piercing the insulation 21, the sharp ends 23 will bite into the wire of one conductor 22, it being apparent, that the spacing of the prongs to one side of the element as shown, has been calculated as being properly positioned with respect to the spacing of the conductors. The element 18 has been stamped identically with the element 17, with the exception, that the tongue 24 has been shown flat and angularly disposed toward the tongue 19. The terminal end of the tongue 24 is bent in a horizontal plane and terminates in a point 25 as a means to effect a better electrical contact, if and when contacted by the tongue 19. The element 18 likewise is provided with a pair of piercing prongs 26, similar in all respects to the prongs 20, but spaced to the opposite side, so as to be properly positioned for piercing engagement with the conductor 22 opposite to that pierced by the prongs 20. As clearly shown, the termination of the housing end walls above the bottoms of the side walls, provides adequate clearance for the conductors 21, to be assembled in a manner to be presently described.

Positioned over the top of the housing 6, for its full length and width, is a pan shaped heat collecting cap 27, flanged entirely around its circumference for frictional contact with the sides and ends, as shown at 28. The cap 27 is preferably held in bonded engagement with the top of the housing by any suitable cement 29. The cap 27 is apertured centrally and concentric with the opening 8 and, positioned in the aperture 30, is an inwardly directed fuse stem 31, formed of a material having a low melting point. The fuse stem 31 extends inwardly in the path of movement of the tongue 19 and serves to normally maintain the tongue 19 out of contacting engagement with the point of the tongue 24. The stem 31, due to its low melting point, is preferably pressed into position within the aperture 30, since the application of heat thereto would to a large extent, destroy its effectiveness. Other releasable type low melting point fuse stems may be employed such, for instance as a wire stem that is supported in a mass of low melting point solder, with the wire stem projecting into the path of movement of the contact tongue 19. In such a case, when the detector is subjected to a degree of heat adequate to melt the solder, the pin will be deflected to one side to allow the tongues 19 and 24 to establish a flow of current to a remote alarm device.

Figure 6 illustrates a slightly modified form of the heat collecting cap 27. In this form of the invention, the cap has been constructed in a manner that makes it easy to reset a detector after it has previously functioned. The cap flanges 28 are here pressed at predetermined points to form inwardly projecting lugs 32 that normally snap into recesses 33 and serve to securely hold the cap 27 in position upon the housing. After a fuse pin 31 has once melted, the alarm has been actuated and, assuming the detector has not been otherwise damaged, a new cap carrying its fuse pin 31, is substituted for the old cap, the operator being obliged to mechanically shift the tongue 19 to the inoperative position so that the fuse pin can be properly positioned. Figure 7 illustrates a series of the fire detectors 5 arranged in parallel in a continuous pair of electrical conductors that have connection with an alarm device, illustrated here as an electric bell 34, although no claim is here laid to a particular system. The fire detector 5 is normally as-

sembled for distribution and sale as shown in the drawings, obviously, without the electrical conductors. The assembly of the contact elements 17 and 18 and the heat collector cap 27 are normally performed at the point of manufacture. It is contemplated that the elements 17 and 18 will have sufficient frictional contact with the walls of the grooves 16 to prevent them from becoming disarranged when subjected to vibration in handling.

In the use of the device, the bottom cover 11 is first removed from the housing 6, by sliding the channelled sides 13 of the cover end-wise from the flanges 9 of the housing. The conductors 22, as supported by their common insulation 21, are pressed firmly into the bottom of the housing, with each of the conductors underlying a pair of the piercing prongs 20, at which time, the insulation is firmly pressed against the prongs, causing the prongs to partially pierce the insulation and prevent endwise shifting of the wires when the bottom cover is reinstalled. The operator then engages the channelled sides 13 with the rounded ends of the flanges 9 and, while tending to force the channels to slide over the flanges, the bottom 11 is tilted upward to a parallel line of movement upon the flanges 9 and, as the bottom is progressively forced into a full covering position as shown, the conductors are firmly forced into piercing and contacting engagement with the prongs 20, causing them to bite through the insulation and firmly bite upon their respective conductors 22. It is important that the conductors be held against shifting with respect to the housing during the assembly, since any shifting of the conductors with respect to the housing would possibly bend or seriously damage either or both sets of the prongs and destroy their ability to effectively engage the conductors. Thus, the housing and the conductors are firmly held by the operator while the bottom cover is being forced into position. Should a condition prevail where the temperature rises to the point where the fuse pin 31 is melted by heat conducted through the cap 27, the pin will be readily deflected under the influence of the spring tongue 19, causing the tongue to shift into contact with the point 25 of the tongue 24, establishing a flow of current to the alarm device, or other equipment that is to be actuated in the event of abnormal temperatures. Suitable means, not shown, may be embodied in the detector for indicating at a remote station, the location of the detector that has functioned. An alternate application of the invention would be to place the fuse stem on the opposite side of the spring tongue 19, so as to hold the contacts in fully engaged position and with the spring tension of the tongue 19 reversed so that, when the fuse stem melted, the circuit will be interrupted. Such an arrangement would form a simple and novel closed circuit automatic switch.

It will be apparent from the foregoing, that a very simple and novel form of fire detector device has been provided. The device consists of a new combination of elements resulting in a relatively small, sensitive, fusible release type detector with normally open electrical contacts and with wire connecting features to facilitate easy connection to the conductor wires. The detector is extremely low in costs both from the standpoint of materials and assembly. The use of the fusible stem as the means for retaining the spring tongue in open circuit position is believed to be novel and permits of the handling of the detector with reasonable care without danger of breaking or creating unnecessary stress on the solder or fuse pin, such as would be the condition with

the old and well known solder links. The fuse pin is substantially wholly within the housing where it is protected against accidental breakage.

It is to be understood, that the invention is not limited to the precise arrangement shown, but that changes in the shape, size and materials employed and the alternate methods of application, may be resorted to as readily fall within the spirit of the invention or the scope of the subjoined claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A fire detector of the character described comprising a hollow housing formed of insulating material, the housing formed open at its bottom and having its end walls cut away upwardly from the lower open bottom for the passage of a pair of electrical conductors, the side walls of the housing terminating at their lower ends in outwardly directed flanges and with the flanges having their opposite ends rounded, a top wall for the housing that is centrally apertured, the side walls upon their inner sides being vertically grooved for their major height and with the grooves being arranged in spaced apart opposed relation, a pair of flat metallic contact elements that have a width to slidably engage within each pair of opposed grooves, one of the strips provided with a spring tongue that is biased to closed circuit contact with the other strip, the lower edge of each strip provided with piercing prongs and with the prongs of each strip being offset with respect to each other whereby the prongs are directly disposed above the pair of electrical conductors, a closure cover for the lower open end of the housing that is channeled to have a sliding engagement over the flanges, the closure cover when shifted to closure position engaging the conductors to force them upwardly for piercing engagement with the prongs, a heat conducting plate disposed over the top of the housing and with the plate apertured concentrically with the aperture of the top wall, a fusible element fixed within the opening of the heat conducting plate and projecting into the housing for its major length to be disposed in the path of movement of the spring biased tongue to retain the tongue in an open-circuit position.

2. The device according to claim 1, wherein the contact strips are proportioned to have a frictional engagement with the grooves, one of said strips having a relatively non-flexible and sharpened contact tongue and the other of said strips having a spring tongue that is biased in the direction of the sharpened tongue for establishing a closed circuit contact, the piercing prongs of each strip being formed in slightly separated pairs that are sharpened for piercing an insulating cover of the conductors and establishing a piercing contact with the conductors, the heat conducting plate and its associated fusible element being removably supported upon the top of the housing.

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