July 26, 1932. H. SPIRO ET AL 1,868,925

TEMPERATURE ACTUATED CIRCUIT CLOSING DEVICE

Filed Dec. 8, 1930

Fig. 1.

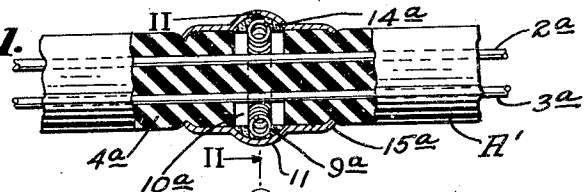


Fig. 2.

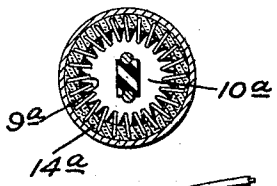


Fig. 3.

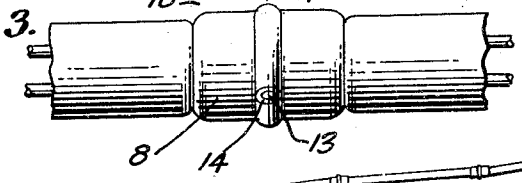


Fig. 4.

Fig. 5.

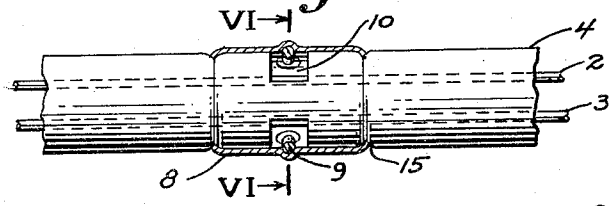


Fig. 6.

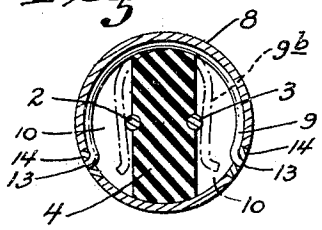


Fig. 7.

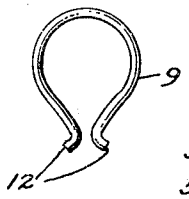


Fig. 8.

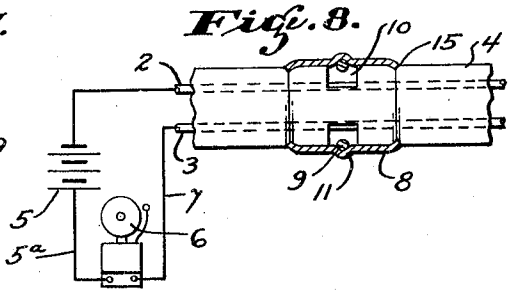


Fig. 9.

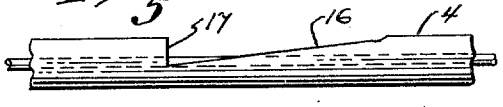


Fig. 10

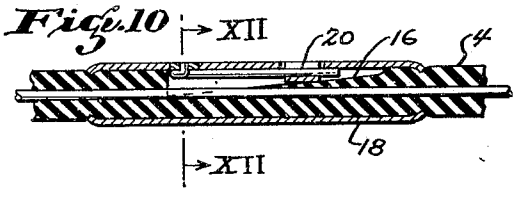


Fig. 11.

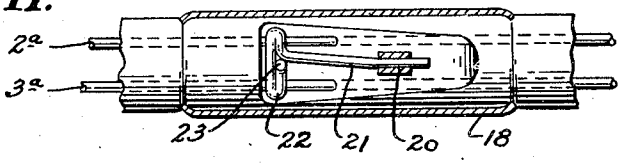


Fig. 12.

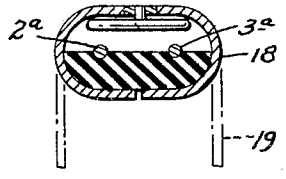
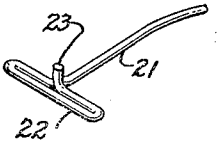


Fig. 13.



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UNITED STATES PATENT OFFICE

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TEMPERATURE ACTUATED CIRCUIT CLOSING DEVICE

Application filed December 8, 1930. Serial No. 500,778.

This invention relates to a temperature actuated circuit closing mechanism particularly intended for use in conjunction with automatic fire alarm sounding devices, signal systems, and the like.

Temperature actuated circuit closing devices employing thermostatic switches, fusible alloys, etc., are in common use and are extensively installed in warehouses, factories, and to some extent in private dwellings. The temperature actuated circuit closing mechanisms, whether a thermostatically actuated switch, a fusible alloy, or the like, are usually fairly expensive and as such are installed one or more in each room to be protected and preferably at a point adjacent the ceiling, hence if a fire is started in the room at a point remote from the circuit closing mechanism the fire may gain considerable headway before the temperature adjacent the circuit closing mechanism becomes sufficient to operate the same. Furthermore, it is a well known fact that at times a fire will start between the joists and the walls of a building and will under such conditions gain great headway before the fire attacks the inside of a room in a sufficient degree to actuate the circuit closing mechanism installed therein, hence considerable property may be destroyed and lives endangered before an alarm is sounded.

The object of the present invention is to generally improve and simplify the construction and operation of circuit closing devices of the character described; to provide a circuit closing mechanism which is so cheap to manufacture and install that where one circuit closing device has heretofore been installed a half dozen or more may be installed at the same or even less cost, thus making it possible to cover a greater area than has heretofore been considered economically practical; to provide a circuit closing device which is particularly adapted for attachment to multi strand cables without any material increase in the cable diameter or reduction in its flexibility, thus permitting a cable of this character with a circuit closing mechanism attached thereto to be strung along a picture molding in a room, to be pulled between joists, between wall spaces and through conduits, in this manner protecting spaces and area heretofore considered inaccessible; to provide a circuit closing mechanism in the form of a cable with the circuit closing mechanism enclosed within the same; to provide a circuit closing mechanism which is provided with means for visibly indicating if it is in proper operating condition before installation; and, further, to provide a circuit closing mechanism which can be readily reset after actuation.

The circuit closing mechanism is shown by way of illustration in the accompanying drawing, in which—

Fig. 1 is an enlarged view partly in section of an insulated two strand cable showing the circuit closing mechanism applied thereto,

Fig. 2 is a cross section on line 2—2 of Fig. 1,

Fig. 3 is a side elevation of an insulated cable showing circuit closing mechanisms as applied thereto,

Fig. 4 shows a long cable with a plurality of circuit closing mechanisms applied thereto,

Fig. 5 is a partial sectional view of a modified structure, said view showing the manner in which the insulation is removed to expose the two strands of the cable, said view also showing the sleeve and the spring actuated member whereby the circuit between the two strands of the wire is closed,

Fig. 6 is a cross section taken on line VI—VI of Fig. 5,

Fig. 7 is a perspective view of the spring which closes the circuit,

Fig. 8 is a diagrammatic view showing the cable connected with a source of current supply and an alarm mechanism,

Fig. 9 is an enlarged detail view of a portion of a cable showing the manner in which a portion of the insulation is removed to receive another modified form of circuit closing mechanism,

Fig. 10 is an enlarged vertical sectional view of a two strand cable showing a modified form of circuit closing mechanism applied thereto,

Fig. 11 is a plan view of the cable shown in Fig. 10, but showing the circuit closing mechanism and the sleeve supporting the same in section,

Fig. 12 is a cross section taken on line 12—12 of Fig. 10,

Fig. 13 is a perspective view of the spring arm shown in Figs. 10, 11 and 12, whereby the circuit between the two strands of the cable is closed.

Referring to the drawing in detail and particularly Figs. 1 to 4, inclusive, and 8, A' indicates a multi strand electric cable or conductor, which, in this instance, consists of two strands or conductors indicated at 2*a* and 3*a* which are surrounded and separated by insulating material such as indicated at 4*a*. One strand of the cable is, in this instance, connected with one side of a source of current supply as a battery 5 while the battery is in turn connected through a wire 5*a* with a bell or other sounding device 6 and this is in turn connected with a wire 7 with the other wire or strand of the cable. Applied to the cable at spaced intervals, for instance, a foot or more apart, are sleeves generally indicated at 8*a* and mounted within each sleeve is a spring 9*a* which is adapted to engage the two strands of the cable and thereby close the circuit through the same.

The cable is particularly intended for use in conjunction with fire alarm sounding devices and the like and the circuit closing mechanism applied to the cable at spaced intervals is accordingly intended to be heat actuated so that when any one of the circuit closing mechanisms are subjected to a certain temperature a circuit through the battery and the sounding device 6 will be automatically closed and an alarm given.

The specific construction of the one form of the circuit closing device is shown in Figs. 1, 2 and 4. Any ordinary two strand insulating cable may be employed. In applying the circuit closing mechanism to the cable the insulating material is cut away as indicated at 10*a* so as to expose the strands 2*a* and 3*a*. A sleeve such as shown at 8*a* is then slipped over the cable and within the sleeve is mounted a helical wound contractable spring ring 9*a*. The spring ring lies within an annular recess 11*a* formed centrally of the sleeve and is retained in an expanded condition in the recess by means of a low temperature fusing alloy or other suitable material, such as wax, or the like indicated at 14*a*. When the sleeve is slipped over the cable the annular recess 11*a* containing the spring ring is placed directly in alignment to the cut away portion 10*a* of the cable. The ends of the sleeve are then crimped so as to bite or grip the cable as shown at 15*a*. When a suitable number of circuit making mechanisms have been applied and the cable has been installed in the building, it is obvious that whenever a predetermined temperature is obtained the fusible alloy or other material employed fuses thereby releasing the spring ring and permitting the same to contract. When the spring ring is released and contracted it engages the strands 2*a* and 3*a* and thus closes the circuit through the same thereby sounding the alarm mechanism indicated at 6.

The specific construction of a modified form of circuit closing mechanism is shown in Figs. 5 to 7, inclusive. Any ordinary two strand insulated cable may be employed and the circuit closing mechanisms may be applied as close or as far apart as may be desired. In applying the circuit closing mechanism to the cable the insulation is cut away on opposite sides of the cable as indicated at 10 so as to expose the strands 2 and 3. A sleeve such as shown at 8 is then slipped over the cable and within the sleeve is mounted a spring such as shown at 9. The spring lies within an annular recess 11 formed centrally of the sleeve and the ends of the spring are turned substantially at right angles as shown at 12, these ends projecting into or partially through openings 13 formed on opposite sides of the sleeve. They are here secured by means of a low temperature fusing alloy or any other suitable material such as wax or the like indicated at 14. When the sleeve is slipped over the cable the annular recess 11 containing the spring is placed directly in alignment with the cut away portons 10 of the cable. The ends of the sleeve are then crimped so as to bite or grip the cable as shown at 15. When the sleeves have been applied and the cable has been installed in a building, it is obvious that whenever a predetermined temperature is attained the fusible alloy or other material employed fuses thereby liberating the spring and permitting the ends thereof to spring inwardly as shown by dotted lines at 9*b*, see Fig. 6. When this position is assumed the ends of the spring contact with the exposed portions of the strands 2 and 3 and as such closes the circuit through the same thereby sounding the alarm mechanism indicated at 6.

In Figs. 9 to 13 another modified form of the circuit closing mechanism as applied to a cable is shown. The cable employed, in this instance, is flattened or substantially elliptical in cross section, see Fig. 12. In preparing it for the purpose of applying one or more of the circuit closing mechanisms the upper portion of the insulating material is cut away first on an angle as shown at 16 and then vertically as shown at 17 so as to expose a portion of the two strands indicated at 2*b* and 3*b* which pass through the cable. A sleeve such as shown at 18 substantially U-shaped as indicated by the dotted lines at 19, see Fig. 12, is then applied. This sleeve contains a spring arm which is secured as at 20 to one end of the sleeve. The opposite end

of the spring arm indicated at 21, see Fig. 13, is provided with a head member 22 which is formed by bending the wire as shown. The free end of the wire is turned upwardly to form a pin 23 and when it is placed in the U-shaped sleeve the arm is bent upwardly against the upper surface of the sleeve until the pin projects through a perforation formed therein. It is here secured with a fusible material. The sleeve containing the spring arm in said position is slipped over the cut away portion of the cable shown at 16 and 17 in Fig. 12 and the free ends 19 are then bent around the cable and clinched. A suitable number of the circuit closing devices are applied to the cable at spaced intervals and the cable so prepared may be installed wherever desired and when a certain predetermined temperature is encountered the fusible material releases the spring arm and it moves inwardly against the strands 2*b* and 3*b* thereby causing the head member 22 to engage the same and close the alarm circuit.

The circuit closing mechanism is in reality nothing more or less than a flexible insulating cable containing two or more wires or strands, which is provided with a suitable number of circuit closing mechanisms such as described. The circuit closing mechanisms are enclosed by the metal sleeves shown and these are crimped over the cable wherever the insulation is cut away to permit their application. The diameter of the cable is not materially increased by the application of the sleeves nor is the flexibility at points intermediate the sleeves in any way impaired. It is accordingly possible in employing a cable thus prepared to pass it between wall partitions, to string it between beams, joists, etc., to support it on a picture molding, and in fact, to place or install it wherever desired and it is due to the ease with which it may be strung between partitions, etc., that it is possible to protect against fireplaces which heretofore would be considered inaccessible. The construction of the circuit closing mechanism is so cheap and simple and so easy to apply that the cost is negligible. For this reason it is possible to employ a materially increased number of circuit closing devices when comparison is made with thermostatic switches and like devices heretofore employed.

While the flexibility of the cable remains substantially the same as before, it will be noted that the sleeves enclosing the circuit closing mechanism affords sufficient rigidity at the point of application to prevent bending or injury of the circuit closing mechanism. It should also be noted that the projecting ends of the spring arms whereby the circuit is closed are visible, hence permitting ready inspection of a cable before installation. For instance, by referring to Fig. 1, the hole 13 through which the end 12 of the spring arm projects is plainly shown. If the spring arm has for any reason become released either accidentally, or otherwise, it will be retracted from the hole and it is thus possible to visibly indicate whether the circuit closing mechanism is in operating condition or not. Similarly, if a fire has started in a building equipped with the circuit closing device here shown and an alarm has been sounded, it is possible to inspect the cable and determine which particular circuit closing mechanism has been separated, that is, providing the fire was put out before any damage was done to the cable. In that case where one or more of the circuit closing devices have released and closed the circuit it is possible to remove them and either apply new sleeves and springs or to reset the old ones.

Another important feature which should be stressed is the fact that the fusible material whereby the spring arms are secured in extended position is placed directly in the sleeve, that is, in the openings 13. They are here exposed directly to the heated atmosphere and as such are exceedingly sensitive and rapid in operation as it is not necessary to heat the entire sleeve or the interior mechanism before the spring arms may be released.

While certain features of the present invention are more or less specifically described, we wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finish of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. An electric current carrying flexible cable comprising a pair of conductors enclosed in insulating material and insulated with relation to each other, a portion of said insulating material being removed to expose the conductors, an elongated sleeve enclosing the exposed portions of the conductors, a contractable spring ring mounted within the sleeve and adapted during contraction to engage the conductors to close a circuit therethrough and temperature actuated means normally retaining the spring ring against retraction.

2. An electric current carrying cable comprising a pair of conductors insulated with relation to each other, said insulating material being removed at spaced intervals to expose the conductors, a plurality of elongated sleeves enclosing the exposed portions of the conductors, circuit closing means within each sleeve engageable with the conductors to close a circuit through the same, temperature actuated means normally maintaining the circuit closing means out of engagement with the conductors, and means for visibly

indicating the position of the circuit closing means.

3. An electric current carrying cable comprising a pair of conductors insulated with relation to each other, said insulating material being removed at spaced intervals to expose the conductors, a plurality of elongated sleeves enclosing the exposed portions of the conductors, circuit closing means within each sleeve engageable with the conductors to close a circuit through the same, and fusible means carried by the sleeves and normally maintaining the circuit closing means out of engagement with the conductors, said fusible means visibly indicating the position of the circuit closing means.

4. An electric current carrying cable comprising a pair of conductors insulated with relation to each other, said insulating material being removed at spaced intervals to expose the conductors, a plurality of elongated sleeves enclosing the exposed portions of the conductors, spring actuated means within each sleeve and engageable with the conductors to close a circuit through the same, and temperature actuated fusible means carried by each sleeve and normally retaining the spring actuated means out of engagement with the conductors, said fusible means visibly indicating the position of the spring actuated means.

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