

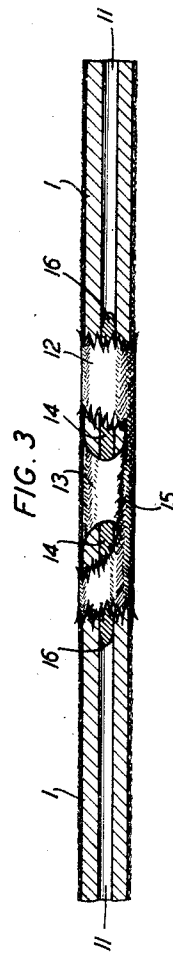
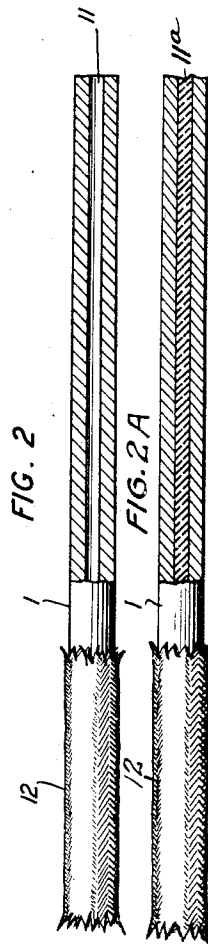
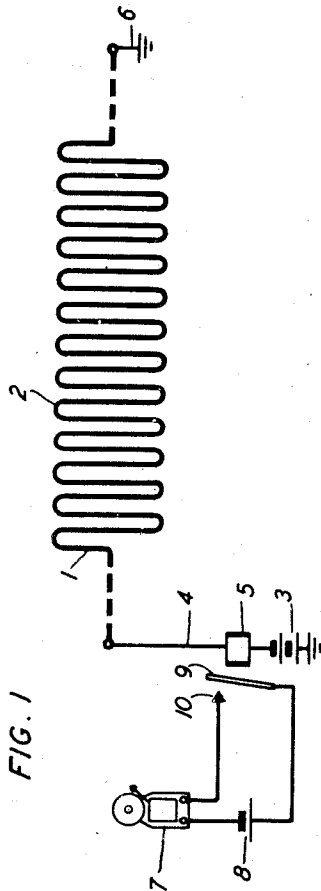
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ALARM SYSTEM

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ALARM SYSTEM

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5 Claims. (Cl. 200—143)

This invention relates to alarm systems and more particularly to automatic fire alarm systems.

5 The object of this invention is to aid in the reduction of damage to property by fire by automatically signaling a central station when a fire breaks out in protected premises.

10 A feature of this invention resides in a hollow conductor composed of material having a comparatively low melting point, the particular characteristic and function of which will be subsequently described.

15 Another feature of this invention resides in a covering for the conductor which materially aids in the effectiveness of operation of the system by preventing sagging of the conductor when softened by heat and confining movement of melted portions of the conductor to a flow area provided within the conductor.

20 A modification of this invention includes still another feature residing in a filling of insulating material for the hollow conductor which has a melting point as low or lower than the melting point of the conductor and which facilitates
25 manufacture of the hollow conductor and normally maintains it in hollow form.

30 In closed circuit fire alarm systems in which low melting point conductors are used it has been the practice to use solid conductors in either bare or insulated form.

35 When a bare conductor is used a portion of the conductor must be melted to such an extent that the melted portion will drop away clear of the conductor before a break in the circuit occurs and an alarm is given. Upon application of
40 heat to a solid low melting point bare conductor such as occurs when a fire breaks out in the vicinity of the conductor the low melting point conductor begins to sag when the temperature around the conductor rises to the melting point. The sagging of the conductor continues until the temperature has increased to a sufficiently high level to cause free flowing of the conductor material. Obviously the conductor may sag and still
45 maintain the alarm circuit unbroken for some appreciable time interval before free flowing of the conductor material occurs. During this time interval, the fire which has broken out gains considerable headway. The conductor in sagging
50 may also simply drop down onto some support such, for instance, as a beam or brace which happens to be located directly beneath the conductor. In such an event parting of the conductor might not occur for some considerable
55 length of time, or, if it actually did part, and the

beam or brace happened to be of conducting material, the circuit might still be maintained closed and no alarm would be given.

When a solid conductor with an insulating coating is employed in a closed circuit system
60 not only must a portion of the conductor be melted to a free flowing condition, but the insulating coating must be completely burned away from the melted portion before the melted portion can drop away and cause breaking of the circuit and
65 the operation of an alarm device. Until the insulating coating around the conductor is completely consumed the closed circuit is preserved even though the conductor material has been brought to a free flowing condition. 70

In the present invention a flow area has been provided in the conductor for molten portions of itself. The conductor may be in the form of a tube having a longitudinal bore devoid of any
75 filling material or may have a core of low melting point non-conducting material which will melt out and be displaced by the conductor material when heat is applied to the conductor.

I have found that when heat is applied to a hollow low melting point conductor sufficient to cause flowing of the conductor material, the molten metal flows away from the heated point back into the hollow conductor, and parting of the conductor at the point at which heat is applied takes
80 place much quicker than when a solid conductor is employed. 85

I have also experimented with hollow low melting point conductors filled with low melting point non-conducting material such, for instance, as rosin or paraffin and I have found that when sufficient heat is applied to the conductor to bring
90 the conductor material to a flowing condition, the filling material melts out of the bore of the conductor and is displaced by the molten material of the conductor. While rosin or paraffin have
95 been suggested as possible filling materials for the hollow conductor it is obvious that various compositions of rosin or paraffin or other non-conducting low melting point materials or compositions thereof may be used. In some cases I
100 have found it advisable to incorporate in the filling material a substance which will maintain the material in substantially a plastic condition when cold. For instance I have added rosin oil in various
105 proportions to the rosin filling material so that free bending of the filled conductor may be accomplished.

If the hollow low melting point conductor either filled or unfilled is provided with a jacket of insulating material, when heat is applied to
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the conductor sufficient to cause flowing of the conductor material the molten material finding no other area in which to flow than the bore within itself readily flows into this area. The insulating jacket provided for the conductor may be of woven fabric such as commonly used in insulated conductors or it may be of fire resistance fabric. When either a common woven fabric or a woven fire resistance fabric is provided as a covering for a hollow low melting point conductor, or a tubular conductor filled with low melting point non-conducting material, the conductor parts before the insulating coating is consumed when sufficient heat is applied to bring the conductor material to its melting point.

Tubular conductors consisting of alloys of lead-tin I have found well adapted for the purpose of this invention. Various compositions of low melting point conducting materials may be used to obtain conductors having desired low melting points. In some cases I have added bismuth to a lead-tin mixture to obtain a conductor of a desired low melting point value.

In the drawing, Fig. 1 shows a simple alarm system in which a hollow low melting point conductor is employed;

Fig. 2 shows a portion of the conductor partly in section;

Fig. 2—A shows a portion of a tubular low melting point conductor partly in section having a central core of low melting point non-conducting material running longitudinally of the conductor; and

Fig. 3 shows a portion of the conductor, shown in Fig. 2, partly in section after heat has been applied and parting of the conductor has occurred.

Referring specifically to Figs. 1, 2, 2—A and 3 of the drawing which illustrates the invention in its simplest form and in which like parts are identified by the same numerals, 1 is a hollow low melting point conductor arranged in a network 2 distributed over an area to be protected. The hollow low melting point conductor 1 may be either devoid of filling as shown in Fig. 2, or filled with a low melting point insulating material as shown in Fig. 2—A. The conductor 1 is connected to a source of current supply such for instance as the battery 3 by way of conductor 4 and the winding of relay 5. The conductor 1 may be connected to ground at 6. Controlled by relay 5 is an alarm device 7 energized by battery 8. Relay 5 is normally energized to hold its armature 9 away from back contact 10. When any break occurs in the conductor 1 such, for instance, as would happen if a fire broke out in the vicinity of the network 2, relay 5 becomes deenergized and releases its armature 9. Armature 9 upon being released moves against back contact 10 and closes the local circuit of the alarm device 7.

The conductor 1 is tubular in form such as shown in Fig. 2 having a flow area 11 running longitudinally of the conductor for its entire length. A woven fabric insulating coating 12 is provided on the conductor 1. The area 11 may be void of any filling material or filled as shown at 11—A in Fig. 2—A, with a low melting point non-conducting material such, for instance, as rosin or paraffin. When sufficient heat is applied to the conductor 1 to cause free flowing of the conductor material, the molten conductor material flows into the flow area 11. Flowing of the conductor material into the flow area 11 and parting of the conductor 1 takes place almost immediately upon the application of sufficient heat

to the conductor 1 to cause free flow of the conductor material. If the conductor 1 is provided with an outer insulating coating 12, parting of the conductor 1 occurs an appreciable time interval before the insulating coating 12 is consumed.

In Fig. 3 a break in the conductor is shown at 13. In this figure 1 is the tubular conductor, 11 is the flow area provided therein, 12 is a woven fabric coating over the conductor and 14—14 are portions of the material of the conductor 1 which have been melted and have flowed into the flow area 11 provided in the conductor 1. The insulating coating 12 is shown as broken away at 15 so that illustration could be made of the change which occurred in the conductor 1 when heat sufficient to cause free flowing of the conductor material was applied to the conductor 1. It is to be noted that the conductor material which formally occupied the space 13 has separated at this point, some of the material having passed longitudinally of the conductor 1 within the flow area 11 to the right of the point at which heat was applied and the remaining portion of the melted out portion of the conductor having passed longitudinally of the conductor within the flow area 11 to the left of the point at which heat was applied.

In experiments made with conductors such as shown in Fig. 3 it was found that the molten metal of the conductors separated at the heated points and traveled back within the flow areas 11 for a considerable distance. The extreme points of its travel took the form of rounded points as shown at 16—16 and in each instance a clear break, such as indicated at 13, occurred at the heated point.

In the protection from damage by fire of material and apparatus located on various floors or in different sections of a building, or apparatus supported in various shelf sections and in different parts of a supporting frame such, for instance, as the apparatus contained in a telephone exchange, it has been found necessary to provide a system which will quickly and automatically cause the sounding of an alarm signal at a central station or other remote points whenever any fire breaks out among the various wire networks or apparatus units.

In connection with the protection of telephone apparatus in a telephone exchange, the network 2 of the low melting point conductor may be distributed throughout the various cable and relay racks or other apparatus supporting means in the exchange, or distributed throughout any area in which a fire might break out.

The invention, however, is not limited to the particular system shown in Fig. 1 but may obviously be used in various other automatic fire detection and alarm systems without departing from the spirit of the invention as set forth in the following claims.

What is claimed is:

1. A tubular low melting point conductor for use in alarm systems and the like, said conductor having a flow area therein, consisting of the hollow space within the tube, for the accommodation of molten portions of the conductor.

2. A tubular low melting point conductor for use in alarm systems and the like having a flow area, consisting of the hollow space within the tube, running longitudinally of the conductor for accommodation of molten portions of the conductor, and an insulating coating to confine

movement of said molten portions of the conductor to the flow area.

3. A conductor for use in alarm systems and the like comprising a hollow shell of low melting point conducting material, a filling of low melting point insulating material in the hollow shell, and a woven fabric coating of insulating material surrounding the hollow shell conductor.

4. A tubular low melting point conductor having a filling of rosin composition running longi-

tudinally within the conductor, said conductor consisting of an alloy including lead and tin.

5. A tubular low melting point conductor for use in alarm systems and the like, said conductor having a flow area therein, consisting of the bore of the tube, for the accommodation of molten portions of the conductor and a filling material in the flow area, said filling material comprising a composition of rosin and rosin oil.

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