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T. F. PETERSON
HIGH TEMPERATURE ALARM
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2,750,482

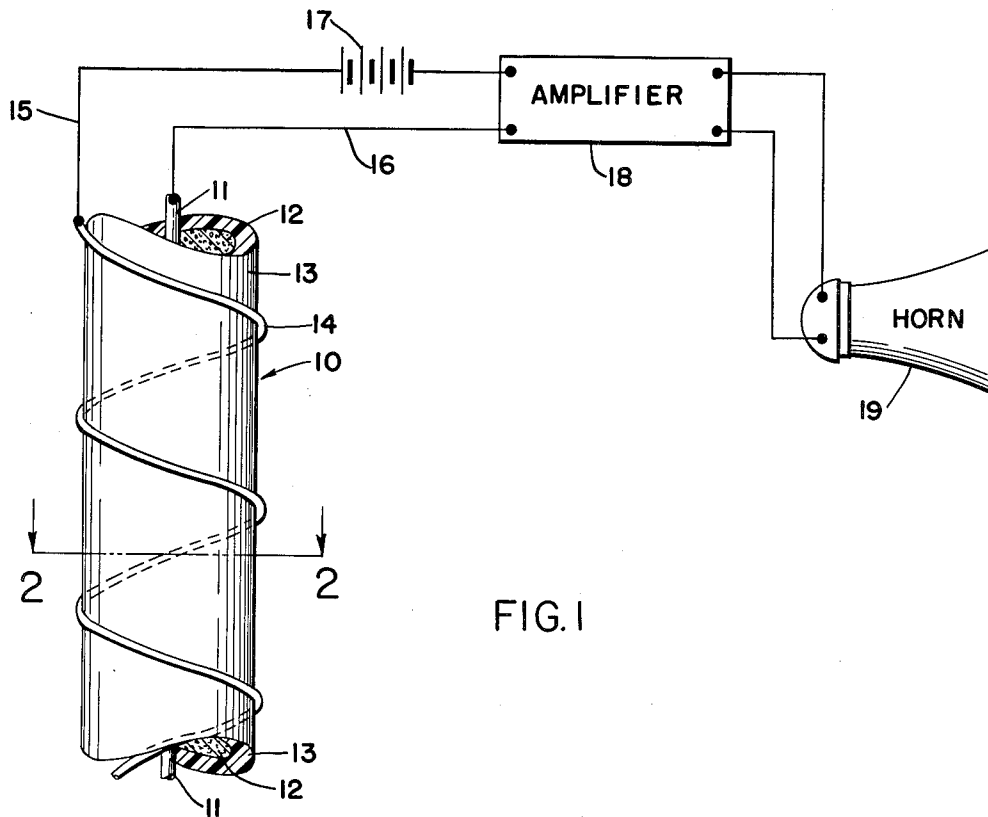


FIG. 1

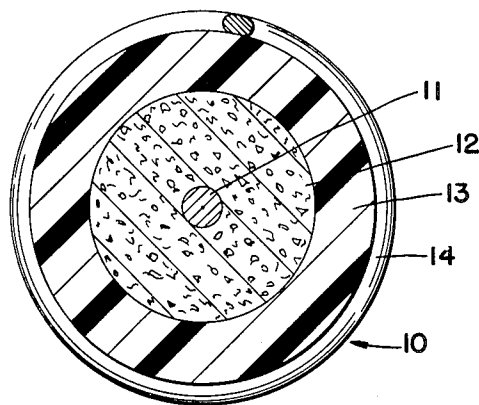


FIG. 2

INVENTOR.
THOMAS F. PETERSON
BY
Richard H. Mac Cutcherson
ATTORNEY

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2,750,482

HIGH TEMPERATURE ALARM

Thomas F. Peterson, Shaker Heights, Ohio

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2 Claims. (Cl. 201—63)

This invention relates to high temperature alarms, warnings, control, and the like, and has particular significance in connection with improvements in thermo alarms of the fusible insulation type.

Heretofore in the design of electric controls for actuating fire alarms or sprinkler systems, the use of high temperature fusible contact material has presented problems (because conductors have such a high melting point) and the use of high temperature fusible insulation has led to difficulties because such insulation was always used between resilient metal contacts whose resiliency often caused cold flow of the plastic or other insulating material, resulting in false operation at ordinary or slightly elevated temperatures. Additionally, the fusible insulation type detectors, with or without prior cold flow, sometimes failed to operate despite the highest of ambient temperatures because of interference by the insulation with the making of proper contact due to sticky nature of the insulation.

It is an object of the present invention to provide simple and inexpensive means for overcoming the above-mentioned difficulties.

Another object of the invention is to provide a fusible insulation type electric circuit actuator characterized by improved assurance of operation when desired.

A further object of the invention is to provide a low cost fire detector which is highly resistant to foreign elements (such as water, oil, acids, alkalies, and the like) and has novel advantages of providing continuity of protection from one spot to another.

Other objects and advantages will become apparent and the invention will be better understood from consideration of the following description taken in connection with the accompanying drawing in which:

Fig. 1 is a pictorial and diagrammatic view of apparatus constructed in accordance with the invention,

Fig. 2 is a cross-section taken along line 2—2 through the detector cable shown in Fig. 1.

Referring to the drawings, in Fig. 1, I have shown a fire alarm system having an alarm cable indicated generally at 10, and comprising an innermost center conductor 11, surrounded by a thick layer of an amorphous substance or component 12 which, as hereinafter explained, is semi-conducting and which, in turn, is surrounded by a flexible tubing comprising a heat fusible insulating material 13 which is itself surrounded by an outer metallic conductor which may take the form of a sleeve, or a braid or, as indicated in the drawing, a spirally wound on (or even helically preformed and applied from the side) wire 14.

Conductors 11 and 14 are preferable of ordinary conducting metal such as copper or the like.

Preferably the semi-conductive component (substance 12) comprises an amorphous base material, plus electrically conductive particles to impart a semi-conducting character providing a resistivity falling within the range of several to many thousand ohms per inch cube. The

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resultant semi-conducting material 12 will also be amorphous (at least if materials as listed immediately below are used) by which is meant that, though it could be a liquid, or a gas carrying particle, it is usually a semi-solid capable of flow.

This semi-conducting material 12 (and which is interposed between the center conductor 11 and the coaxial fusible tube 13) is thus somewhat viscous and for it I prefer to use "Vistanex" together with semi-conducting particles of carbon or graphite. "Vistanex" is a trade name of Enjay Company, New York 19, N. Y., and while exact content of materials bearing such name are unknown to me it is defined by that company as a trademark for use on high molecular weight polymers of isobutylene. It is not absolutely essential to my invention that the substance at this point expand with heat (although Vistanex will do so, and this is often a desirable property for this application) but it is essential that the substance conduct or at least be a semi-conductor within the semi-conducting range, and, as was the case for the non-metallic organic bases described in my Patents 2,322,702 and 2,446,387, "Vistanex" may be brought into this range by the incorporation of particles of conducting carbon black, for example, acetylene.

The flexible tubing 13 is a thermoplastic, and good results can be obtained by using for this member an extruded vinyl resin such as polyvinyl chloride or even polythene (polymer of ethylene). "Geon," a trade name applied by The B. F. Goodrich Chemical Co. to a polyvinyl chloride formulation (the exact contents of which are unknown to me) has been used with good results to provide a fusible material which will lose tensile strength and/or fail in case of fire or other cause of excess temperatures, and many other materials having this property are, of course, already known to those skilled in the art.

One advantage of using Goodrich "Geon" or certain other polyvinyl chlorides, is that the device can be made extremely sensitive, in case of one composition operative only within a range of 164—167° F. in as short a time as two minutes and without any creep or deformation at lower temperatures (for example 125° F.) even over test periods of months.

As shown in Fig. 1 the circuit of the system is completed through a connection 15 extending from the outer conductor 14 and a connection 16 extending from the inner conductor 11, with these leads being taken through a series connected source of power, as indicated by a battery 17, to the in-put of an amplifier 18 (if required). The output of the amplifier shown may be used to control sprinkler or other apparatus, or to sound an alarm as indicated by a horn 19.

The arrangement of the alarm detector of the invention provides an inert insulation shielded resilient material 12 which gives excellent fire protection because neither it nor the shielding 13 are apt to be attacked by acids, alkalies, alcohols, chlorine fumes, water, grease, or other elements. The cable 10 is easy to seal off at the ends by hot gas welding of the insulation 13 material, still it is not essential that the ends be sealed (as is the case with mercury, or water or other expansible liquid type thermal detectors).

The carbon particle carrying Vistanex (or other semi-conductive component at 12) carries the alarm circuit potential at all times, and at the time of desired operation (at high temperature) alarm actuating current will get out of the cable just like water springing out of a broken water pipe.

The arrangement provides for large areas of contact at the time of breakdown, and this acts as added insurance against high temperature failure due to insula-

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tion clinging to metal contact members. Resilience of metal members need not be depended upon for operation and this is an added assurance against low temperature failure due to cold flow of plastic.

From an economic standpoint, the continuous alarm cable is very easy, hence inexpensive, to fabricate and to install, even if it is desired to have absolute sealing against ingress or egress of water, oil or other substances during normal operation. The cable is even esthetic and compared to present detectors it has the important advantage of providing fire protection which is continuous, rather than discontinuous, from point to point.

While I have illustrated and described a particular embodiment, various modifications may obviously be made without departing from the true spirit and scope of the invention which I intend to define in the appended claims.

I claim:

1. A high temperature responsive electric control actuating device of the fusible insulation type and comprising a cable having an inner conductor of metal; an amor-

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phous substance of polyisobutylene combined with conducting particles for bringing said substance within the semi-conducting range; an insulating tube of a thermoplastic resin impermeable at room temperatures, said tube being arranged around said inner conductor and said amorphous substance being interposed between inner conductor and tube; and a metallic conductor arranged around the outside of the tube.

2. A high temperature responsive electric control actuating device as in claim 1 further characterized by the amorphous semi-conducting substance comprising the combination of high molecular weight polyisobutylene and carbon black and the thermoplastic resin being a polyvinyl chloride.

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