March 5, 1963 J. W. GREEN, JR 3,079,886

FIRE DETECTOR DEVICE

Filed Nov. 14, 1961

FIG. 1

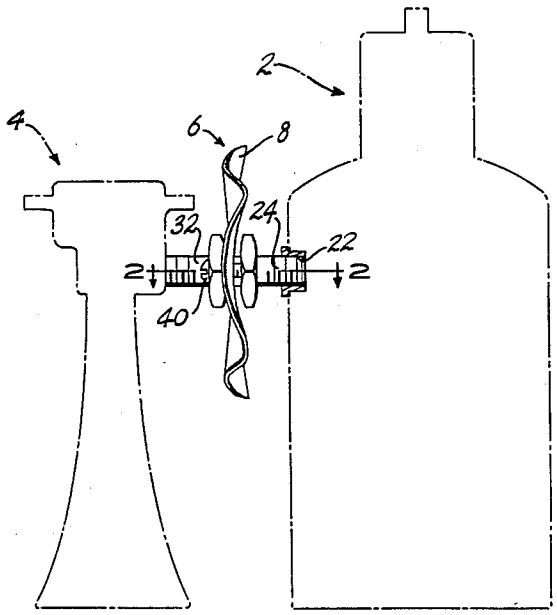


FIG. 2

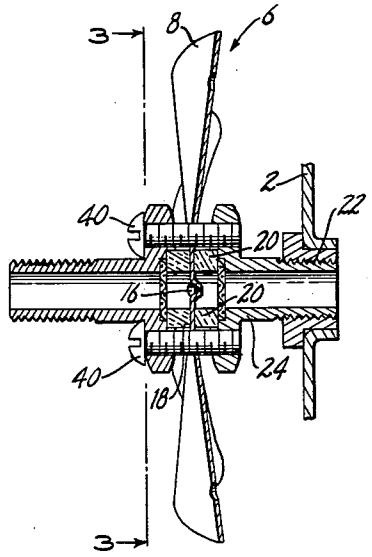


FIG. 3

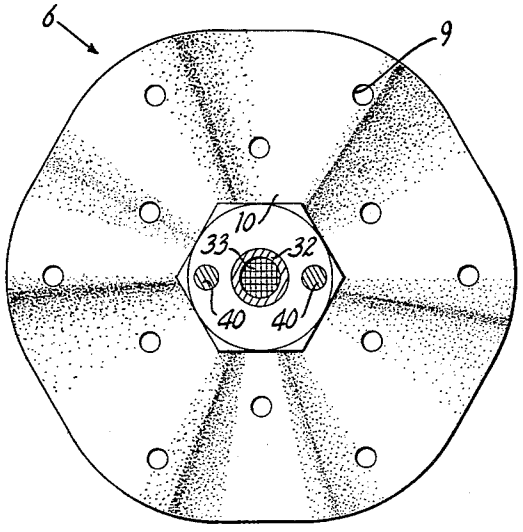
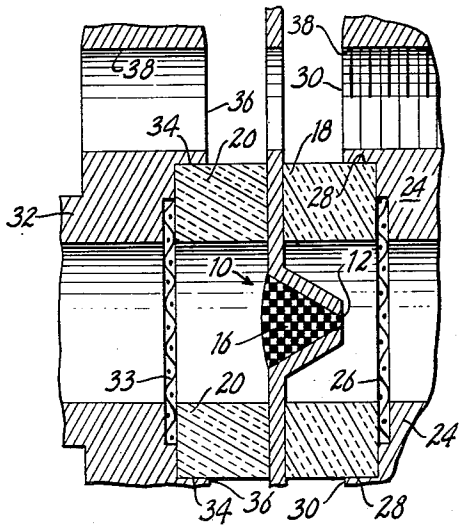


FIG. 4



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FIRE DETECTOR DEVICE

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This invention relates to a self-contained fire alarm device and more particularly to an improved self-contained fire alarm device which sounds an alarm in response to a predetermined temperature.

It has become increasingly popular in recent years to protect homes, offices and buildings from conflagrations by providing fire alarm devices in strategic locations throughout the home, office or building, which will warn the occupants or persons nearby that a conflagration has occurred. Many of these alarms have been of the type wherein a horn or other audible signal is actuated when the surrounding atmosphere reaches a predetermined temperature. One of the most popular types of these fire alarm devices is the type wherein a container, which is designed to withstand sufficiently high pressures, is filled with a vaporizable fluid such as Freon 12, dichlorodifluoromethane (CCl_2F_2). Although Freon is preferred because it is stable, non-toxic, non-flammable and non-corrosive, it will be appreciated that any fluid is satisfactory which will create substantial pressure within the container after proper ambient temperatures are reached. Accordingly although the present application will make frequent reference to Freon, it will be understood that the invention is not necessarily limited to Freon containers. Typically, the warning device has been a horn which is operated by the vaporized Freon. Intermediate the horn and the container, an orifice is provided which is normally closed by a fusible plug. The plug, which may be a eutectic metal, is selected so that it may melt at about 136° F. and permit the Freon, which has become vaporized by this time, to egress into the horn and cause the horn to operate, thereby sounding an alarm. Of course, different melting points such as 174° F. may be desired where the ambient temperature is higher.

Many problems have arisen in the manufacture, use and sale of these prior fire detection devices. One problem which has plagued the industry has been the relatively large number of parts which have been required in the manufacture and assembly of these devices, some of which, it has now been determined, are not only not necessary to the effective operation of the device, but indeed, it has been found, that some o f these parts actually detract from efficient operation of the self-contained fire alarm device.

Another problem that has faced this industry is that the overall effectiveness and desirability of the self-contained fire alarm system depends upon the ability of the device to act quickly in response to a predetermined temperature to operate the horn or other alarm sounding device. In prior devices, the response of the fire detector device to a predetermined temperature has been slower than desirable, because the container, horn and fusible plug have been connected each to the other through heat transmitting elements which has resulted in the entire self-contained system acting as a heat sink. Thus, when the horn, container and fusible plug have been thermally connected, heat which should be used to melt the fusible plug has been directed away from the fusible plug and toward the remaining elements in the combination. Obviously, this has resulted in a slow response of the fire detector device and has resulted in an inefficient detector, requiring a relatively high temperature over a relatively long period of time, to operate the alarm.

Another reason why the prior fire detector devices have been slow to operate is that they have used one element or disc for carrying the fusible plug and another element or disc which serves as a heat collector. However, when the heat collector and the fusible disc element are separate parts, the total mass required to be heated before the fusible plug melts is quite substantial and results in a slow and inefficient operation. This problem was multiplied where the disc carrying the fusible plug and the heat collecting disc were separated by an insulator since this decreases the efficiency of the heat collector.

Accordingly, although prior heat detector devices have generally operated satisfactorily under certain conditions, they have created certain problems. The present invention is directed towards a solution of these problems.

The present invention includes a container carrying a vaporizable fluid such as Freon which, when vaporized, will actuate a horn or other alarm device.

Accordingly, to this invention, however, means are provided for serving as a heat collector and for holding the fusible plug. As embodied in this invention, this means comprises a relatively thin, preferably corrugated, disc which is made from any suitable heat transmitting material, such as copper, and which has an orifice formed in the center thereof in which a plug of fusible material is located. The heat collecting, fusible plug holding disc is located intermediate to the container and the horn element and is insulated from the container and horn and from the remaining detector parts. Thus, the fusible plug melts quickly when the atmosphere surrounding the container reaches a predetermined temperature, because heat which is collected by the disc goes directly to the fusible plug and is not dissipated through the remaining parts of the combination as has heretofore been the case.

The invention consists in the novel parts, constructions, arrangement, combinations, and improvements shown and described.

In view of the foregoing, it is an object of this invention to provide an improved self-contained fire detector device.

Another object of this invention is to provide an improved, self-contained fire alarm device which sounds an alarm in quick response to a predetermined temperature.

A further object of this invention is to provide an improved fire alarm device wherein a single disc serves as the fusible plug carrying member, and the heat collecting disc.

A further object of this invention is to provide an improved, self-contained fire alarm device of the type wherein a fusible plug is carried by a heat collecting disc which is insulated from the container and horn.

A still further object of this invention is to provide an improved, self-contained fire alarm device wherein a single disc serves as the fusible plug carrying member and as the heat collecting disc and is thermally disconnected from the remaining parts of the fire alarm device.

Additional objects and advantages of the invention will be set forth in the description which follows and in part will be obvious from the description or may be learned from practice of the invention, the objects and advantages being realized and attained by means of the instrumentalities and combinations particularly pointed out in the claims.

The accompanying drawings which are incorporated in and constituted a part of this specification illustrate one embodiment of the invention and together with the description serve to explain the principles of the invention.

Of the drawings:

FIG. 1 is a side elevation view of the present invention;

FIG. 2 is an enlarged sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2; and

FIG. 4 is a further fragmentary enlarged sectional view similar to FIG. 2.

Reference will now be made in detail to the present preferred embodiment of the invention, an example of which is illustrated in the accompanying drawings. It is to be understood that both the foregoing general description and the following detailed description are exemplary of, but not restrictive of, the invention. For example, although the present invention is particularly useful in detecting fire, it can be used to detect an abnormally high ambient temperature.

As embodied herein, the present invention comprises, in general, a container **2** which is adapted to contain vaporizable fluid such as Freon. It is generally preferred that Freon **12** dichlorodifluoromethane (CCl_2F_2) be used, although it will be understood that any vaporizable fluid which is stable, non-toxic, non-corrosive and non-flammable, can be used. When the atmosphere surrounding the container reaches a predetermined temperature, the fluid Freon vaporizes and is in condition to operate the audible device or horn **4** upon release of the Freon. The details of the horn element are not significant in the present invention, and for this reason, they need not be discussed further.

In accordance with this invention, means are provided for releasing the vaporized liquid at a predetermined temperature so as to permit actuation of the horn. As embodied herein, this means comprises a disc **6** having an undulated or corrugated outer surface **8** with a plurality of apertures therein and a plug receiving recess **10** in the center thereof. The plug receiving recess **10** is formed by dimpling or recessing the center of the disc and includes an orifice **12** which is formed by thereafter drilling a small diameter hole having a diameter in the neighborhood of .025 inch. The plug receiving recess **10** is conical in shape and comprises, therefore, tapered sides which end in an orifice **12**. A fusible plug **16** which can be made of any suitble meltable material such as eutectic metal having a sharp melting point at about 136° F. and is located in the plug receiving recess **10**.

In accordance with this invention, means are provided for insulating the heat collecting, fusible plug carrying disc from the remainder of the elements in the fire detector device. As embodied herein, the disc **6** has, in engagement with both sides thereof, insulated sealing washers **18**, **20** which serve to insulate the disc from the remaining elements of the fire detector device and provide thereby a self-contained fire alarm system which responds to the predetermined temperature more rapidly than devices heretofore known.

In accordance with this invention, means are provided for connecting the heat collecting, fusible plug carrying disc intermediate the container and the horn element in a thermally disconnecting manner.

As embodied herein, this means includes an opening **22** in the container **2** in which is located a fitting **24** which may be attached to the opening **22** in any suitable manner, such as by threads. The fitting **24** has a recess at one end thereof in which is mounted a screen **26** to prevent direct or other contamination from passing from the container into the disc **6** where it could possibly clog the orifice **12**, even after the fusible plug material **16** has melted. Mounted in the recess **28** of the fitting **24** is an insulating washer or gasket **18** which may be made of nylon or some other equivalent insulating material. The insulating washer **18** fits within the recess **28** in a tight force fitting fashion and extends slightly beyond the end face **30** of the fitting.

The means which connects the disc **6** to the horn element comprises a second fitting **32** which is quite similar to the first fitting **24** in that it too includes a screen

element **33**, which prevents the plug material **16** from entering the horn **4**. The second fitting **32** has a recess **34** in which is mounted a second washer **20**, so that it extends beyond the end face **36** of the fitting **32**. The washer **20**, in the second fitting **32**, engages the other side of the disc **6** so that the disc is insulated by the washers **18**, **20** and is thermally separated from the remaining elements of the fire detector or alarm.

In order to hold the disc in its assembled relationship, means are provided for maintaining the disc between the container **2** and horn **4**. As embodied herein, the first and second fittings **34**, **32** have a plurality of matching apertures **38** therein. Nuts and bolts **40** are provided which pass through the apertures **38** to thereby hold the disc in its assembled relationship between the container **2** and horn **4**, as shown in FIG. 2. It will be understood that other and equivalent means could be used for this purpose.

It is to be understood that the invention in its broader aspects is not limited to the specific elements shown and described, but also includes within the scope of the accompanying claims any departures made from such elements which do not sacrifice its chief advantages.

What is claimed is:

1. In a self-contained temperature sensitive signalling device of the type having a cylinder containing a supply of vaporizable fluid under pressure such as dichlorodifluoromethane therein, and an audible signalling device, the improvement which comprises a heat collector disc having a plug receiving recess and a plug of fusible material in said recess and means locating said disc between said cylinder and said signalling device and insulating said disc from the container and from the said signalling device whereby said fusible plug is melted by heat collected by said heat collector disc.

2. In a self-contained fire alarm system of the type having a cylinder having a vaporizable fluid therein and a horn, the improvement which comprises an opening in said container, a fitting engageable in said opening, a first insulating washer at one end of said fitting, a heat collector disc engaging said first insulating washer having corrugations on the surface thereof, a tapered recess in the center of said disc including an orifice adjacent said fitting, a second insulating washer engaging the other side of said disc, said washer being mounted in the end face of a second fitting, said second fitting being engageable with said horn.

3. A fire detector device comprising: a cylinder containing vaporizable fluid, a fitting engageable with and communicating with said cylinder, a second fitting engageable with and communicating with a horn, a disc made of relatively thin heat conducting material and having a recess including an orifice in the center thereof, a plug of fusible material in said recess, and means for insulating said disc from said cylinder and said horn whereby said plug is melted in response to heat collected by said disc.

4. In a fire detecting device of the type including a cylinder containing vaporizable fluid, a horn adapted to be actuated by vaporized fluid, and a fusible plug between said cylinder and said horn, the improvement which comprises a thin disc of heat conducting material having a recess and an orifice for seating said fusible plug and means insulating said disc from the remaining elements of the fire detection device whereby said plug is melted in response to heat collected by said disc.

5. In a fire detection device of type including a cylinder containing vaporizable fluid, a horn adapted to be actuated by vaporized fluid, and a fusible plug between said cylinder and said horn, the improvement which comprises thin circular disc of heat conducting material having a recess which includes an orifice for seating said fusible plug and means for positioning said disc between said cylinder and said horn including washers for insulating said disc from said cylinder and from said horn

whereby said fusible plug is melted by heat collected by said disc.

6. A heat detector device comprising a cylinder containing vaporizable fluid, a horn adapted to be operated by the vaporized fluid, a relatively thin substantially circular disc made of heat conducting material, said disc having a recess in the center thereof, a fusible plug mounted in said recess, means mounting said disc intermediate said horn and said container, said last mentioned means including insulating means for insulating said disc from said container and said horn whereby said fusible plug is melted by heat collected by said disc.

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