June 12, 1956 E. M. GREGG 2,749,993

FIRE EXTINGUISHER

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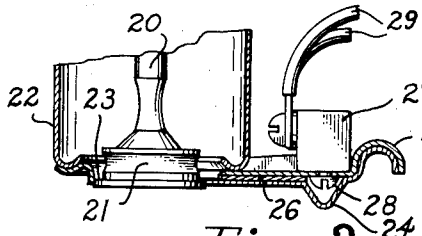

Fig. 2.

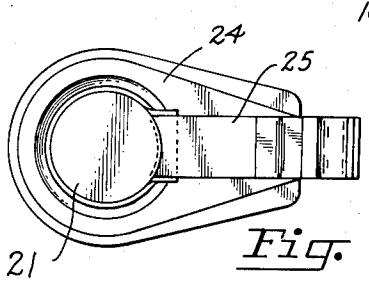

Fig. 3.

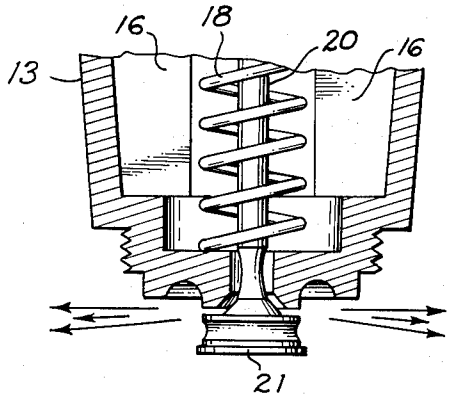

Fig. 4.

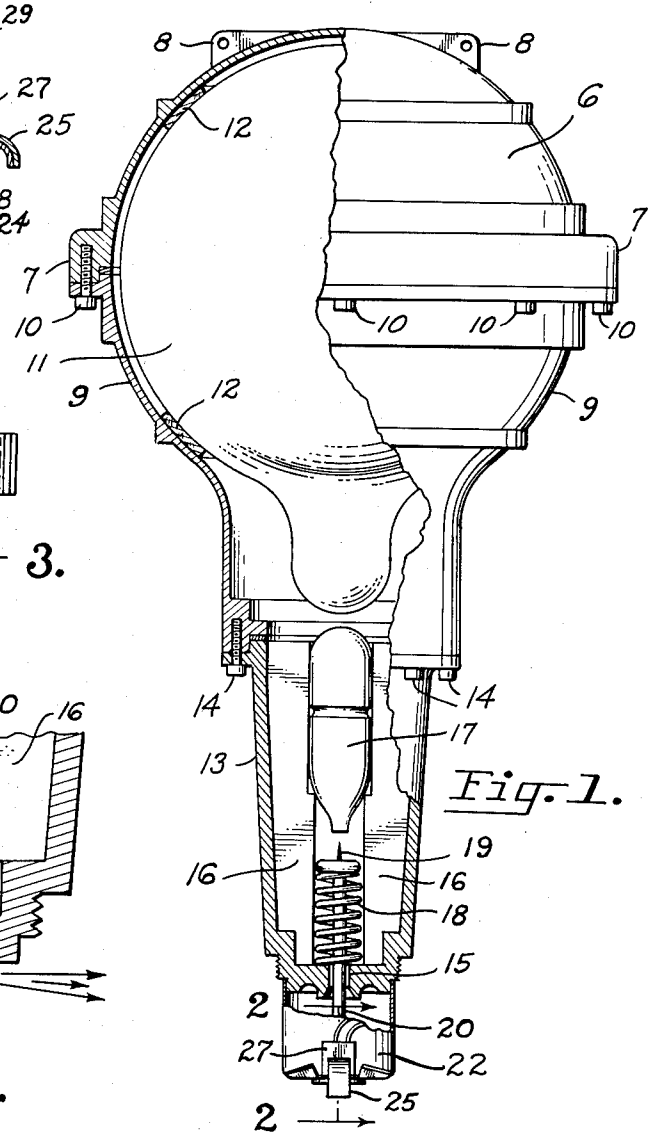

Fig. 1.

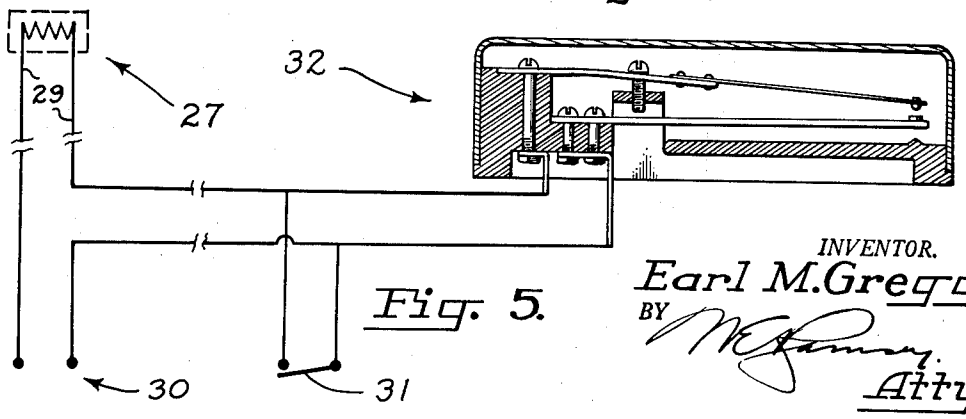

Fig. 5.

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FIRE EXTINGUISHER

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7 Claims. (Cl. 169—26)

This invention relates to a self-contained, pressure operated fire extinguisher which is responsive to any one of several diverse conditions to sense a fire and spray an area with fire extinguishing fluid.

One object of the invention is to provide a self-contained fluid type fire extinguisher which is operable in response to any one of several means such as a distant sensing means responsive either to a preselected rate of temperature change or a preselected maximum temperature, a distant actuation means which is operable manually, and a close up sensing means which is operable either manually or in response to a preselected maximum temperature. Actuation of the extinguisher by any of these means serves to provide an indicia noticeable at a glance to a watchman to indicate that the extinguisher has operated and requires a replenished pressure supply and extinguishing fluid.

The body of the fire extinguisher of my invention is self-contained and is self-operable in that it is not dependent upon an outside supply of electricity, pressure, water, or other fluid for actuation. Thus, the body member is a pressure retaining hollow shell in which is mounted a frangible container filled with a fire extinguisher fluid. A self-contained projectile such as a standard CO_2 cylinder is mounted for movement adjacent to and is aimed at the container such that puncture of the cylinder will release the CO_2 and drive the projectile through the frangible container releasing the fluid. In addition, a spring biased firing pin is urged toward contact with and actuation of the CO_2 projectile but is restrained from such movement by a dependently mounted fusible link which covers the spray head of the fire extinguisher body member. The fusible link is responsive to a preselected maximum temperature, at which temperature the firing pin is released, the spray head exposed, and the fire extinguisher actuated. There is thus provided a close up actuation mechanism for the fire extinguisher whereby a rise in the ambient temperature immediately adjacent the body member will melt the fusible link and release the fire extinguishing fluid.

As an element of the above described self-contained fire extinguisher, my invention provides an electric heater which is mounted upon and carried by the fusible link so as to melt the same when an electric current is passed through the heater. At a distance from the electric heater, sensing means are mounted and, within the scope of my invention, this sensing means is of the type which is responsive to a preselected rate of temperature change as well as to a preselected maximum temperature in order to pass a current through the aforementioned electric heater in response to a fast rise of temperature or a preselected maximum temperature in the vicinity of the mounting of the sensing means. Still further, a manual switch is joined in parallel with the electric heater and the sensing means is located distantly from both of these elements in order to provide an optional manual means of actuation for the fire extinguisher.

Returning to the body member of the fire extinguisher,

it has been noted that the fusible link is dependently mounted therefrom. In addition, a cup member is provided to cover the spray head and spray passages from the body in order to keep dust and dirt from accumulating therein should long periods of time elapse before the fire extinguisher is utilized. By appropriate mounting arrangement, the only element which retains the cup member in covering position over the spray passages is the dependently mounted fusible link. Thus, when the electric heater is actuated or when the ambient temperature adjacent the fire extinguisher exceeds the preselected maximum temperature, the fusible link melts and the cup member falls away exposing the spray passages to view and releasing the fire extinguishing fluid therethrough. At this point, the electric heater which has been carried by the fusible means also will fall away from the body of the fire extinguisher, and thereinafter, will hang dependent by the electric wires that join the heater to the distant sensing means. In total, the above rearrangement and falling away of parts serves as an indicia, it being noticeable at a glance to a watchman or other person thereinafter approaching the fire extinguisher that the fluid and pressure have been released and replenishment is required. That is to say, the cup member and fusible link will fall to the floor and the electric heater will hang from the wires joined thereto after the fire extinguisher is actuated and this arrangement of the parts will be effected irrespective of the manner in which the fire extinguisher was actuated. There thus is served one of my inventive objects in that an indicia is provided.

Another object of my invention is to provide a fire extinguisher that is self-contained and automatic in actuation so that disruption of utility services will not impair the operating efficiency of the fire extinguisher. In amplification of the last described objective, it will be apparent that my self-contained, pressure operated fire-extinguisher is usable in any of the normal locations where sprinkler heads or other conventional automatic fire extinguishers are located. In addition, it now will be apparent that my fire extinguisher is of particular utility in isolated locations, in unattended storage areas and in out buildings. This latter utility is of particular value where buildings or materials may be left for days or weeks unattended and without the presence of humans. Additionally, in many of these isolated locations there may be no electricity, water or other utilities or else such utilities may be subject to interruptions by storms, earthquakes or acts of God. Under such conditions, my fire extinguisher is of particular utility in that it still will function even though electricity, water or other utility service is disrupted or is not available at the time the fire breaks out. Still further, in many of these isolated and unattended locations it is conventional for a watchman to merely check the premises at periodic intervals, such intervals often being days or weeks. Because the actual arrangement of the parts of my fire extinguisher is changed quite noticeably when the extinguisher is actuated, such a watchman will notice at a glance while inspecting isolated premises that one or more of the fire extinguishers requires a replenishing of the pressure cylinder and extinguishing fluid. Thus, the indicia is saving of time and is not subject to the frailities of electrical or other more conventional indicating devices.

The above and other objects and advantages of my invention will be described with reference to the accompanying single page of drawings wherein:

Fig. 1 is a side view of the body member and dependently mounted fusible link, parts being broken away to reveal the details of the container of fire extinguishing fluid and the projectile and firing pin which shatter the container to actuate the extinguisher;

Fig. 2 is a partial detail view, taken substantially on

the line 2—2 of Fig. 1, showing the spray head and the fusible link with the electric heater mounted thereon, the various elements being shown in their dormant or inactive position prior to actuation of the fire extinguisher;

Fig. 3 is a bottom view of the mechanism shown in Fig. 2, the fusible link being shown arranged to retain the spray head in an extended position;

Fig. 4 is an enlarged detail view showing the spray head and spray passages as they are arranged during actuation of the fire extinguisher, the flow of fluid from the spray passages past the spray head being illustrated diagrammatically by direction arrows; and

Fig. 5 is an electric wiring diagram illustrating the manner in which the electric heater is actuated by a manual switch and a rate of temperature change bimetallic switch, the latter element being illustrated in cross section.

The structural details of the pressure retaining hollow body member have been shown in Fig. 1 by breaking away a portion thereof. The upper half of this body member consists of a hemispherical shell 6 having a radially protruding flange 7 and suspension ears 8. With the ears, the fire extinguisher can be suspended from above, and with the flange 7, a lower body portion 9 detachably is carried as by means of screws 10.

Within the interior of the hollow body member, a sealed frangible container 11 is mounted. This type of container is well known in the fire extinguisher art and it includes a glass container in which is sealed a quantity of fire extinguishing fluid such as carbon tetrachloride or the like. Because of the frangible nature of this container, multiple cushions 12 line the hollow interior of the body member and the container 11 rests thereon.

Progressing to the lower portion of Fig. 1, a cylindrical shell is joined to the lower body portion 9 by screws 14. A plurality of elongated spray passages 15 is formed in the lower end of the cylindrical body 13. These define the only fluid outlet passages from the entire hollow interior of the fire extinguisher, appropriate seals being provided at all body joinder points to define a pressure retaining hollow body member.

A plurality of upstanding ribs 16 extend down through the cylindrical body portion 13 to serve two related functions. Thus, the upper portions of these ribs 16 slidably retain a standard CO_2 cylinder 17 which is used as a projectile and the lower portions of the ribs slidably guide a compression spring 18. It is the spring 18 which pushes a firing pin 19 to puncture the lower end of the CO_2 cylinder releasing the contained pressure and actuating the projectile. The firing pin itself is provided with an elongated stem 20 which terminates in a spray head or deflector 21 (see Fig. 2). Thus, release of the spray head 21 allows the spring 18 to press the firing pin 19 into the lower end of the cylinder 17 whereupon the cylinder is projected upwardly shattering the frangible container 11 and releasing the fluid as well as providing pressure for the fluid (see Figs. 2 and 4).

Referring now to Figs. 1, 2 and 3, a hollow cup member 22 slidably rests upon the lower end of the cylindrical body portion 13 to act as one member retaining the spray head 21 and firing pin 19 in the loaded, dormant position. In conjunction therewith, a flat radial lip 23 is formed about the periphery of the spray head 21 and a circular link 24 surrounds the lip with a strap 25 bearing on the surface of the lip. The circular link 24 and strap 25 are joined, one to the other, by means of a quantity or link of fusible material 26. As will be appreciated by those skilled in the fire extinguisher art, the fusible material 26 is responsive to a preselected maximum temperature, at which temperature the fusible material melts allowing the strap 25 to slip off of the lip 23 under the bias force of the compression spring 18.

To the side of Fig. 2 and, diagrammatically, in Fig. 5 an electric heater 27 is shown. This electric heater is carried upon the fusible means which includes the strap 25, the circular link 24, and the fusible material 26. To this end, a screw 28 secures the heater 27 to the strap 25 immediately adjacent the fusible material. A pair of electric wires 29 join the heater 27 to a suitable source of electric current such that passage of the current through the heater will melt the fusible material 26 and actuate the fire extinguisher.

As a means of supplying electric current to the electric wires 29, I have shown an electric circuit in Fig. 5. This circuit is joined either to a main electric line or to a battery as indicated by the terminal connections 30 and a manual switch 31 is provided to close the circuit should manual actuation be desired. In addition, I have illustrated at 32 a bimetal sensing means or switch which is joined electrically to the heater and which is responsive to a preselected rate of temperature change to actuate the heater. The details of construction and operation of this sensing means are well known in the art and are described in United States Patent No. 2,699,480, application Serial No. 275,966, filed March 11, 1952, by Charles E. Armstrong and entitled Fire Alarm Thermostat. Suffice to say in the instant case, the sensing means 32 is an electric switch with a pair of bimetal strips arranged in stacked relationship and carrying two normally spaced electric contacts on the free ends thereof. The strips are arranged to deflect equal distances along the same path in response to a given change in temperature in order to maintain the normal spacing of the contacts. As an additional provision, however, one bimetal strip is thinner and shorter than the other. Thus, the thinner strip is more sensitive and is provided with a faster rate of response to an ambient temperature change to the end that a sudden temperature change of preselected intensity will close the electric contacts and will complete the circuit through the wires 29 and the heater 27 when the faster strip catches up the slower strip. Still further, an extreme limit of movement is provided for the bimetal strips such that when a preselected maximum temperature is reached, the contacts also will be closed. This means 32 I term as "sensing means" and, from the above description, it will be seen to be responsive to a preselected rate of temperature change as well as to a preselected maximum temperature in order to actuate the heater 27 and, thus, the fire extinguisher.

In operation, it will be assumed that either the manual switch 31 or the sensing means 32 has closed an electric contact to actuate the electric heater 27 via the wires 29. This distant type of control for the electric heater 27 will heat the fusible link means 24, 25, 26 to release the spray head 27 and allow the compression spring 18 to drive the firing pin 19 into the CO_2 cylinder 17. When punctured, the CO_2 cylinder 17 releases the confined gas and defines a projectile. Guided by the upstanding ribs 16, the projectile then moves against the frangible container 11 to shatter the same and release the fire extinguisher fluid contained therein. As additional CO_2 gas is released from the cylinder 17, the pressure within the hollow body member 6, 9, 13 adds to the pressure causing the fluid to issue through the spray passages 15, against the spray head 21 and out over a wide area with considerable force. As shown in Fig. 4, the spray head is arranged immediately below the passages such that the spray of fluid is emitted in substantially a horizontal direction. That is, the fluid is sprayed radially in all directions from the lower end of the fire extinguisher.

Returning to the initial steps in the actuation of the fire extinguisher, it will be apparent that when the fusible material 26 is melted, the strap 25, circular link 24 and hollow cup member 22 all fall away from the lower end of the fire extinguisher because no attachment mechanism remains. Since the electric heater 27 is joined to the strap 25 by means of the screw 28, these elements will depend and hang from the electric wires 29 to one side of the fire extinguisher after an actuation cycle. Thus, in spite of the fact that the pressure retaining hollow member is not transparent, there is provided an in-

dicia or an indication mechanism or arrangement of the parts to indicate that the fire extinguisher has been actuated. At some later time, for example, a watchman making the rounds in an area protected by my fire extinguisher quickly and easily will notice this misarrangement of the parts whether a fire has been extinguished or not and whether the actuation was purposeful or accidental. The watchman then will be informed that the fluid and pressure cylinder within the fire extinguisher should be replenished. Such replenishment is effected, of course, by loosening the screws **10** and **14** and breaking open the body member. Thereafter, a new CO_2 cylinder **17** and a new frangible container of fire extinguishing fluid **11** are provided and the parts are reassembled with the firing pin **19**, cocked and held by a new fusible link assembly. Further, it will be noted that the position of the parts after actuation of the fire extinguisher is identical irrespective of the cause of the actuation. That is to say, if the ambient temperature immediately adjacent the fusible material **26** has caused said fusible material to melt and actuate the fire extinguisher or if the manual switch **31** or the rate of temperature change sensing means **32** have caused the actuation, the same result ensues. This result is that the hollow cup member **22**, the circular link **24**, the strap **25**, and the heater **27** all fall away to expose the heretofore protected spray passages **15** allowing the extinguisher to function as intended.

In summary, it will be seen that the hollow cup member **22** serves to cover and to protect the spray passages **15** until the moment of actuation. In addition, this cup, the links and the electric heater **27** all serve as an indicia when the fire extinguisher is actuated. In isolated warehouses and storage spaces and in unattended pump houses, buildings, yards, stations, and other locations these features are of particular utility. Thus, under the conditions mentioned, a fire extinguisher may remain idle for months or years on end without need for an actuation thereof. By guarding the parts as above described the fire extinguisher will remain in perfect working order, none of the fluid will evaporate, and it can be told at a glance that the parts thereof are ready to function should the need arise. On the other hand, once an actuation of the parts has been effected, a watchman or other human attendant immediately can tell that the expendable parts of the mechanism need replenishment. In simplicity of operation, inexpensiveness of parts and reliability of operation, I deem this fire extinguisher to be an improvement.

I claim:

1. A fire extinguisher, comprising a sealed frangible container of fire extinguishing fluid, projectile means mounted immediately adjacent said container and operable to shatter the container, firing pin means urged toward actuation of said projectile normally spaced therefrom by a dependently mounted fusible means, said dependently mounted fusible means being pivotally joined to the remainder of said fire extinguisher and being responsive to a preselected maximum temperature to release said firing pin and thereby to allow the fusible means to fall away indicating that an actuation has been effected.

2. A fire extinguisher, comprising a pressure retaining hollow body member having a spray head and containing a sealed frangible container filled with a fire extinguishing fluid, a normally dormant projectile means mounted adjacent said container and operable upon actuation of the projectile to shatter the container, firing pin means urged toward contact with and actuation of said projectile but restrained therefrom by a dependently mounted fusible means which covers said spray head, said dependently mounted fusible means being pivotally joined to the remainder of said fire extinguisher and being responsive to a preselected maximum temperature to release said firing pin and expose said spray head and thereby to allow the fusible means to fall away, and electric heater means carried by said fusible means and controllable at a distance from said container to heat the fusible means above said maximum temperature.

3. A fire extinguisher, comprising a sealed frangible container filled with a fire extinguishing fluid, a normally dormant projectile means mounted adjacent said container and operable upon actuation of the projectile to shatter the container, firing pin means urged toward contact with and actuation of said projectile but restrained therefrom by a dependently mounted fusible means, said dependently mounted fusible means being pivotally joined to the remainder of said fire extinguisher and being responsive to a preselected maximum temperature to release said firing pin and expose said spray head allowing the fusible means to fall away, and sensing means joined electrically to a heater mounted upon said fusible means and responsive to a preselected rate of temperature change to actuate said heater, said sensing means being located at a point remote from said heater and container.

4. A fire extinguisher, comprising a pressure retaining hollow body member having a spray head and containing a sealed frangible container filled with a fire extinguishing fluid, a normally dormant projectile means mounted adjacent said container and operable upon actuation of the projectile to shatter the container, firing pin means urged toward contact with and actuation of said projectile but restrained therefrom by a dependently mounted fusible means which covers said spray head, said dependently mounted fusible means being pivotally joined to the remainder of said fire extinguisher and being responsive to a preselected maximum temperature to release said firing pin and expose said spray head and thereby allow the fusible means to fall away, electric heater means carried by said fusible means and controllable at a distance from said container to heat the fusible means above said maximum temperature, and sensing means joined electrically to said heater and responsive to a preselected rate of temperature change to actuate said heater, said sensing means being located at a point remote from said heater and container, and manual switch means joined electrically to said heater to actuate the same irrespective of the condition of said sensing means.

5. A fire extinguisher, comprising a pressure retaining hollow body member having a plurality of elongated spray passages open through one end thereof, a cup member covering said spray passages and the said one end of the body member, a sealed frangible container of fire extinguishing fluid mounted within said hollow body member, projectile and firing pin means arranged coaxially of said spray passages within said hollow body member for shattering said frangible container, said latter means including a spring biased spray head bearing upon a fusible means carrying said cup member and defining the only element retaining the cup member in covering position over the said one end of the body member, electric heater means controlled at a distance from said body member and mounted upon said fusible means to heat and actuate the same.

6. A fire extinguisher, comprising a pressure retaining hollow body member having elongated spray passages open through one end thereof, a cup member covering said spray passages and the said one end of the body member, a sealed frangible container of fire extinguishing fluid mounted within said hollow body member, projectile and firing pin means arranged coaxially of said spray passages within said hollow body member for shattering said frangible container, said latter means including a spring biased spray head bearing upon a fusible means carrying said cup member and defining the only element retaining the cup member in covering position over the said one end of the body member, electric heater means controlled at a distance from said body member and mounted upon said fusible means to heat and actuate the same, said fusable means being responsive to a preselected maximum temperature to release said spray head and allow said cup member and electric heater to fall away exposing said spray passages.

7. A fire extinguisher, comprising a pressure retaining hollow body member having elongated spray passages

through one end thereof, a cup member covering said spray passages and the said one end of the body member, a sealed frangible container of fire extinguishing fluid mounted within said hollow body member, projectile and firing pin means arranged coaxially of said spray passages within said hollow body member for shattering said frangible container, said latter means including a spring biased spray head bearing upon a fusible means carrying said cup member and defining the only element retaining the cup member in covering position over the said one end of the body member, electric heater means mounted upon said fusible means to heat and actuate the same, said fusible means being responsive to a preselected maximum

temperature to release said spray head and allow said cup member and electric heater to fall away exposing said spray passages, said electric heater means including electric wiring joined to a distant sensing means responsive to a preselected rate of temperature change to actuate the heater.

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