

[54] SAFETY DEVICE

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[58] Field of Search 169/61, 62, 65, 26, 28, 169/42, 60, 23; 200/61.08; 222/5

[56] **References Cited**

UNITED STATES PATENTS

2,333,370	11/1943	Graham	169/42 X
2,753,926	7/1956	Beach	169/26 X
2,929,892	3/1960	Blomgren.....	200/61.08 X

3,387,662	6/1968	Molgano, Jr.	169/26
3,520,368	7/1970	Hayes	169/23
3,664,430	5/1972	Sitabkhan	169/42 X
3,754,602	8/1973	Magdars	169/26 X
3,773,111	11/1973	Dunn	169/26

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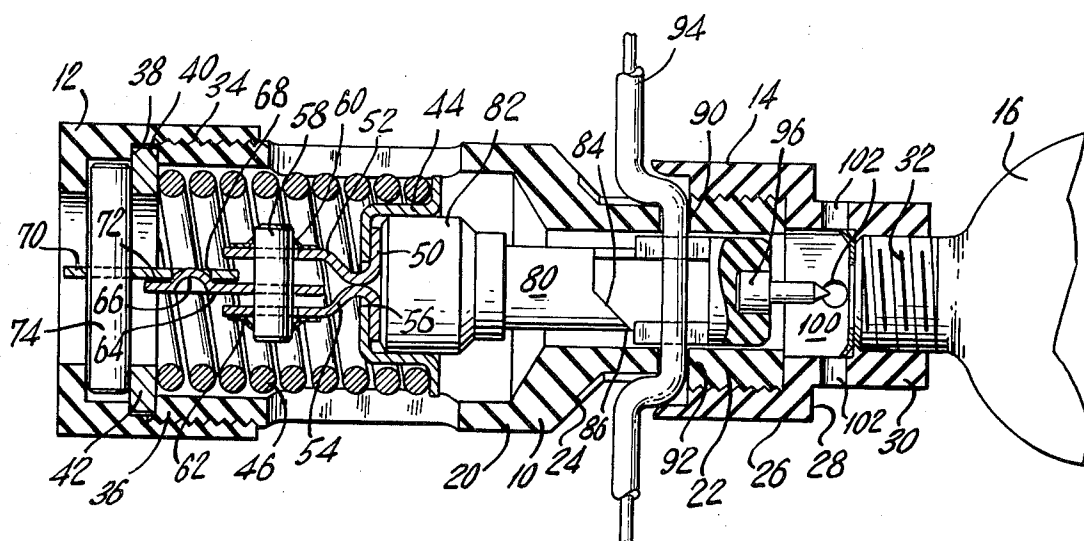
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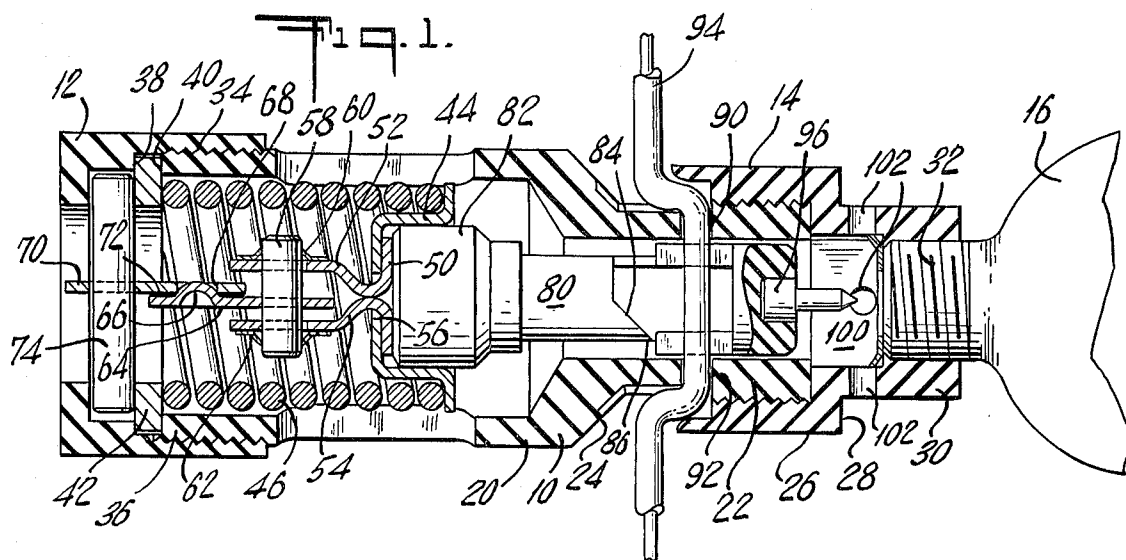
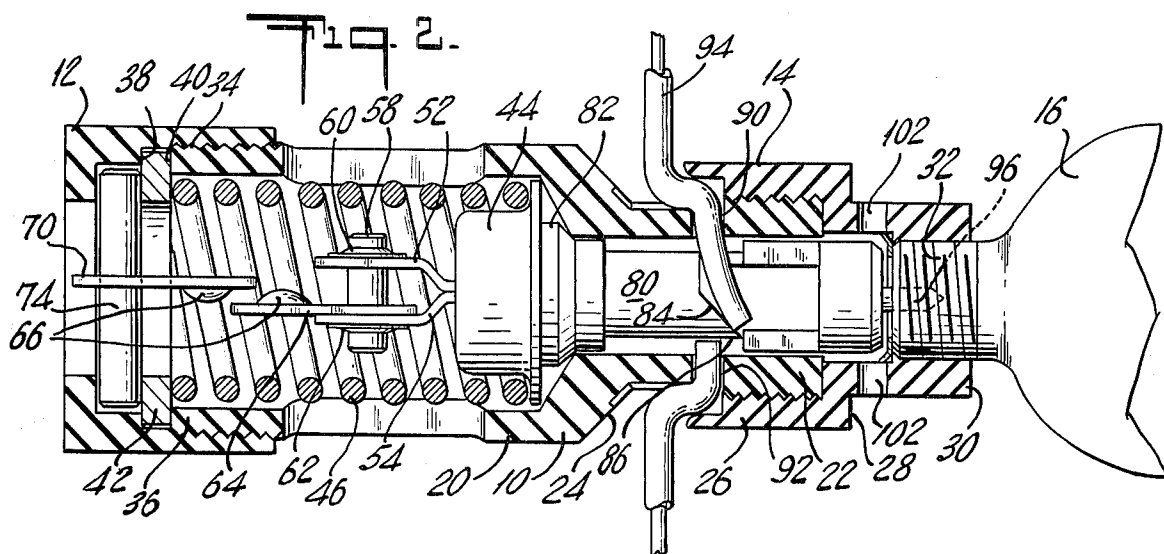
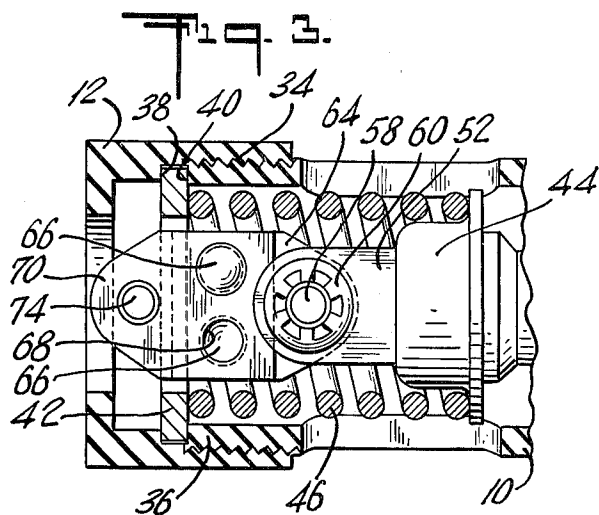
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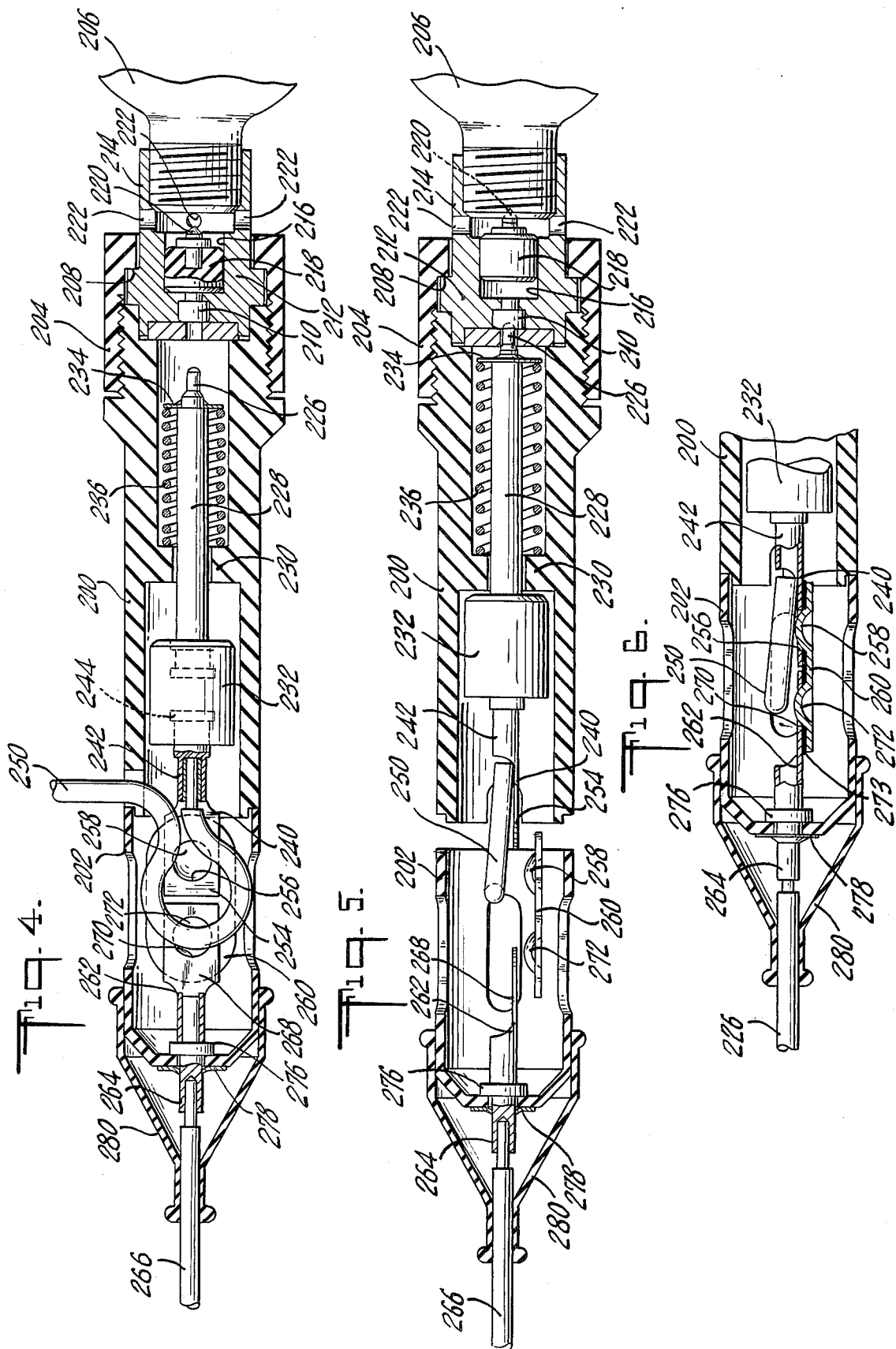
ABSTRACT

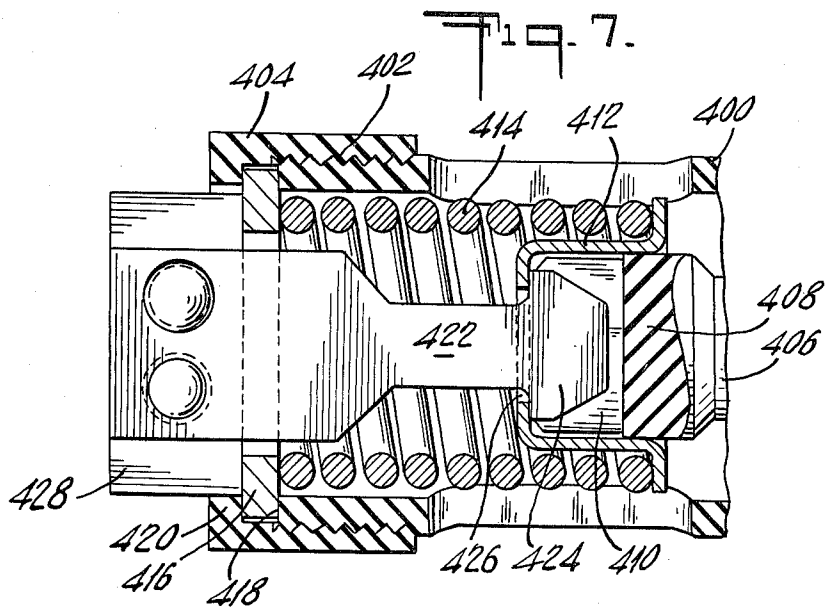
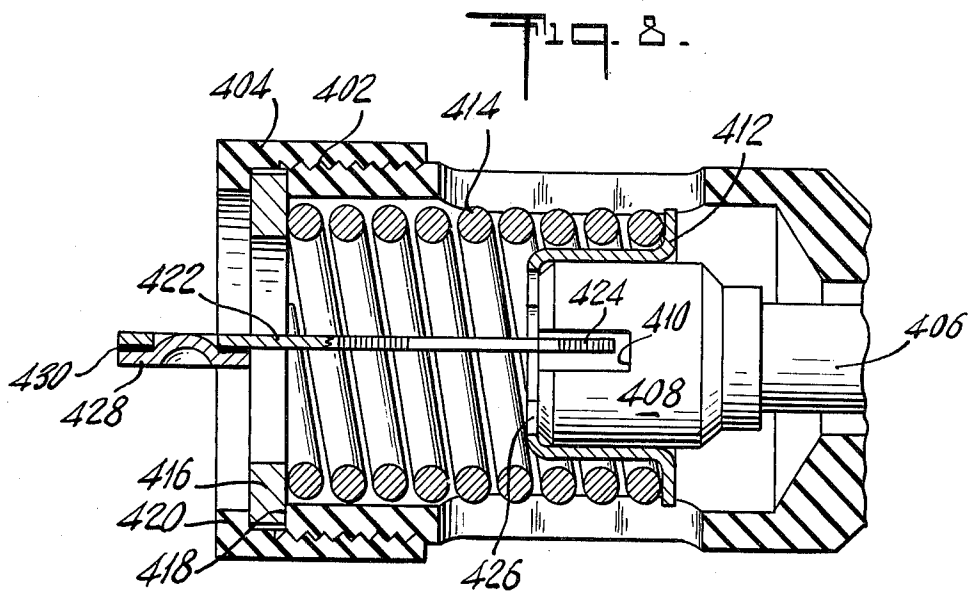
A safety device for association particularly with an appliance and operative when a malfunction occurs in the appliance which generates heat and which safety device is effective to release a fire extinguishing material and to break electrical or other supply circuits to the appliance while simultaneously sounding an audible alarm.

17 Claims, 12 Drawing Figures









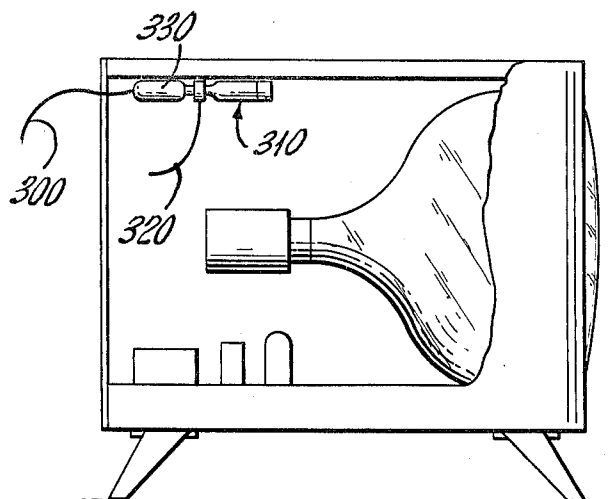


Fig. 9.

Fig. 10.

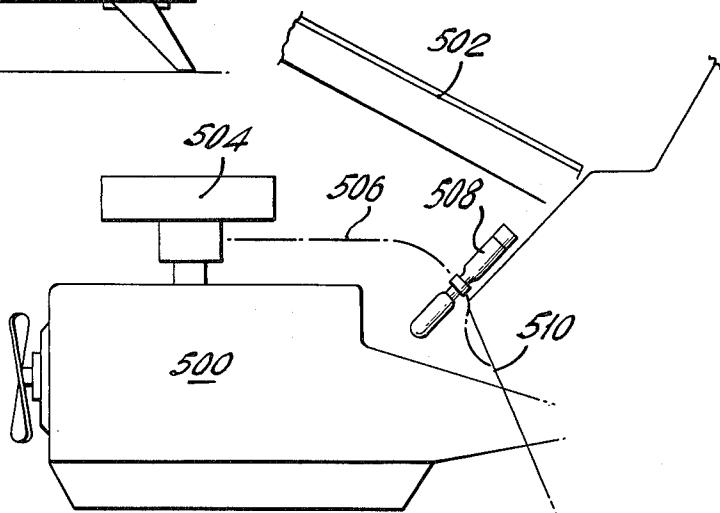


Fig. 11.

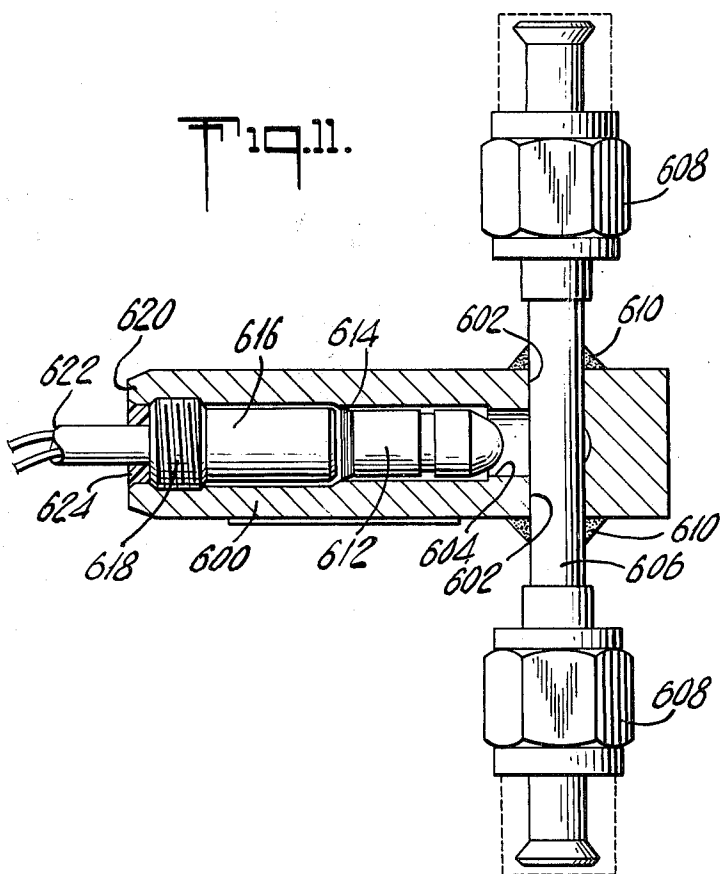
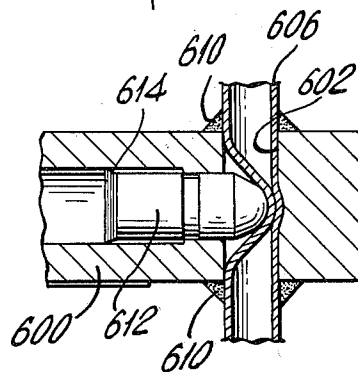


Fig. 12.



SAFETY DEVICE

Electrical appliances are notoriously a cause of fires and this invention is concerned with a device for installation into an appliance or with an appliance including the device which will, in the event of a fire be effective to extinguish the fire and which preferably at the same time will interrupt the electrical supply to the appliance.

The invention is also applicable in devices other than electrical appliances as, for example, the invention can be used in a motor vehicle where it would be located in the engine compartment and be effective to extinguish a fire in that compartment and to interrupt the supply of gasoline to that compartment.

According to this invention, there is provided a device for installation in an appliance which has a housing or other enclosure or compartment within which a fire may occur, the device comprising a container of a fire extinguishing material, the container holding sufficient of the material to put out a fire within the housing or enclosure and a fire responsive element which may, for example, be a fusible link but which could conceivably be a smoke detector or other unit, operable to cause the release of the fire extinguishing material upon the existence of a fire. Additionally, the device includes means for interrupting an electrical or other supply to the appliance.

Embodiments of this invention are illustrated in the accompanying drawings in which:

FIG. 1 shows a cross-section of a device according to the present invention;

FIG. 2 is a similar view to FIG. 1 but after the device has been activated;

FIG. 3 is a detail of the embodiment of FIG. 1;

FIG. 4 is a cross-sectional view of a second embodiment of this invention;

FIG. 5 is a cross-sectional view of the device of FIG. 4, subsequent to activation;

FIG. 6 is a detail of the embodiment of FIG. 4;

FIG. 7 is a cross-sectional view of a detail of a third embodiment of the invention;

FIG. 8 is a part sectional view on line 8—8 of FIG. 7;

FIG. 9 shows schematically how the invention is incorporated in an electrical appliance;

FIG. 10 shows how the invention may be utilized in a motor vehicle;

FIG. 11 is a part cross-sectional view of a device according to the invention; and

FIG. 12 shows the device of FIG. 11 after actuation.

The device of FIGS. 1 through 3 comprises a housing 10 with an end closure cap 12, a connector element 14 by which a sealed container 16 filled with an appropriate fire extinguishing material is secured to the housing.

The housing comprises a main cylindrical part 10 and a lesser diameter screw threaded part 22 parts 10 and 22 being separated by shoulder portion 24. The screw threaded portion 22 serves to connect the connector element 14 which has a portion 26 which is internally threaded to cooperate with the screw threaded portion 22 of the housing, a shoulder portion 28 and an internally threaded collar portion 30 which receives the externally screw threaded neck 32 of the fire extinguishing material containing bottle 16.

The end closure cap 12 has an internally screw threaded portion 34 which cooperates with an externally screw threaded end region 36 of the main housing

part 10 and between a shoulder 38 of closure member 12 and the end face 40 of the housing there is secured an annular abutment member 42 between which and between a cap member 44, the purpose of which is described in detail hereinafter, a spring 46 extends, the spring 46 urging the cap member 44 to the right as viewed in FIG. 1.

The cap member is secured against movement under the influence of the spring by means of element 50, the two limbs 52 and 54 of which project through a central opening 56 of the cap member and through openings in which two limbs a pin 58 is passed, the pin being secured by snap rings 60 and 62. Assembled on the pin 58 is a link element 64 which includes a pressed out dome 66 and a hole 68 which project into and receive respectively a corresponding hole and dome of a second link element 70, the two link elements being secured by a fusible material 72.

Link element 70 secured upon a pin 74 which is disposed and held between the abutment member 42 and the end cap 12.

Slidably disposed within the section 22 of the housing is a cutter element 80 which has a head portion 82 received within the cap member 44, a cutter section 84 having a cutting edge 86, and a slotted region 88 through which and through aligned radial holes 90 and 92 of portion 22 of the housing, a conductor 94 extends, the conductor 94 being a part of the electrical supply to the appliance in which the safety device is to be located.

Set into the front face of the cutter element 80 is a pin device 96 which is aligned with a rupturable seal in bottle 16. The pin 96 may, if desired, be fluted so that the escape of the fire extinguishing material from the bottle and pass the pin is facilitated.

Communicating with the chamber 100 defined between the plunger element 80 and the bottle 16 are a plurality of radial openings 102 in this case there being four, 90° spaced apart openings. The openings are selected so that the passage of the fire extinguishing material therepast produces a whistling sound which serves as an alarm.

It will be appreciated, especially from the consideration of FIG. 2, that when the device is installed in an appliance and the temperature in the region of the fusible material 72 reaches the melting point of that material, the connection between the link element 64 and 70 will be broken and the cap element 44 will be pushed firmly to the right as viewed in FIGS. 1 and 2 under the influence of spring 46. As this occurs, cutting edge 86 is driven through the conductor 94 severing that conductor and the pin 96 ruptures the seal of the fire extinguishing material bottle 16 so that the electrical supply to the appliance is interrupted and so that the extinguishing material in the bottle 16 passes through the seal, and openings 102 into the appliance within which the device is located to put out any fire which may have occurred in that appliance or to inhibit any fire.

It will of course be appreciated that the housing element and the cutting element, or at least those parts thereof adjacent to the cutting edge 86, are of insulating material to prevent the short circuiting of the electrical supply to a chassis or other elements within the appliance.

The device of FIGS. 4 through 6 operates on principles similar to that of FIGS. 1 through 3 but is an explo-

sively actuated device. This embodiment comprises a main housing unit 200, a link containing housing element 202, connector element 204 and fire extinguishing material containing bottle 206.

Secured between the right hand end, as viewed in FIG. 4, of the housing part 200 and the shoulder surface 208 of the connector element 204 is an assembly comprising a percussion primer 210 held in position by a generally cylindrical part 212 which has a neck 214 by which the bottle 206 is attached to the assembly.

Secured within a central passageway, 216, of the unit 212 is a bottle piercing assembly comprising a molded plunger 218 and a pin 220 which is adapted to pierce a seal of bottle 206 and allow the release of the fire extinguishing material from that bottle.

Four 90° spaced radial openings 222 are formed in the sleeve 214 to allow the egress of fire extinguishing material from the bottle and into the housing of an appliance within which the device is located and to produce an alarm whistle.

A firing pin 226 is formed on rod 228 which extends axially through a flange 230 of body part 200 and which terminates at its opposite end in an insulating connector element 232, the end of rod 228 being embedded within that insulating member. Between the shoulder surface presented by radial flange 230 and a snap-on element 234 secured to the rod 228 a spring 236 is disposed to urge the rod and the firing pin 226 to the right as viewed in FIG. 4, i.e. to urge the firing pin towards the primer to cause detonation of that primer and activation of the bottle piercing assembly 218.

A link element 240 has a rearwardly extending connector sleeve 242 of which a terminal portion 244 is embedded in connector element 232. It is to be appreciated that the connector element 232 is of insulating material.

Secured in connector element 242 is a conductor 250 which comprises a part of the electrical supply to the appliance with which the device of this invention is to be associated.

The link element 240 has a spade-like configuration 254 with an opening 256 within which a dome 258 of a link element 260 projects.

A third link element 262 comprises a tubular extension 264 within which conductor 266 is conductively connected, the conductor 266 being a continuation of the supply circuit through conductor 250.

The link 262 has a spade configuration 268 with an opening 270 through which a second dome configuration 272 of link element 260 projects. The two elements 262 and 254 are secured to link element 260 by a fusible material 272.

The link element 262 is secured to housing part 202 by means of a shoulder surface 276 and a snap-on connector 278 to prevent movement of the link element 262 relative to the housing of the device.

A rubber terminal boot 280 is pressed onto the end of the housing.

It will be appreciated that when the device is subject to a temperature at which the material 272 melts the link element 260 will be separated from the two link elements 254 and 262 as shown in FIG. 5 and under the influence of spring 236 the rod 228 and the connector block 232 and link element 240 will move to the right interrupting the circuit through conductors 250 and 266

causing detonation of the primer and release of the fire extinguishing material.

In FIGS. 7 and 8 there is illustrated an alternative means for maintaining the actuating device in the readied position, the embodiment of FIGS. 7 and 8 being in operation largely similar to that of the embodiment of FIGS. 1 through 3. In FIGS. 7 and 8 the device comprises a housing 400 with an externally screw threaded end portion 402 upon which an internally threaded cap member 404 is secured. The plunger element 406 is largely similar to plunger element 80 of the embodiment of FIGS. 1 through 3 but has its head region 408 slotted as at 410 for the purpose described hereinafter. The head is received within a cap 412 which is spring loaded by spring 414 to the right as viewed in FIG. 7, the spring 414 acting between the cap 412 and the abutment ring 416 which is secured between end face 418 of the housing 400 and the flange 420 of the cap 404.

The retainer element 422 comprises an enlarged head 424 which is inserted into the cap 412 through the longer limb of an asymmetrical cruciform slot 426, the head lying within the slotted portion 410 of the head of plunger 406. The link element 422 is then turned so that the head is retained within the cap.

The link has a dome and hole arrangement by which it is secured to a plate-like element 428 much in the manner of the connections of the similar parts in the FIG. 1 embodiment. The element 428 is prevented from moving to the right under the influence of spring 414 by abutment with the ring member 416. The link 422 is connected to plate member 428 by means of fusible material 430 and of course when that fusible material is subjected to a temperature at which it melts the link will be released and it, together with the plunger 406, will moved to the right to release the fire extinguishing material and sever a supply much in the manner of the FIG. 1 embodiment.

FIG. 9 of the drawings shows how the device of the present invention may be disposed within an appliance, in this particular case within the cabinet of a television set. As can be seen from FIG. 7, a first conductor 300 extends to the device 310 and the supply circuit to the television set is continued through conductive wire 320. Upon the occurrence of a fire within the television set, the link of device 310 will be released and the supply circuit from conductor 300 to 320 will be broken. At the same time, a fire extinguishing material contained in bottle 330 will be released to quench any fire in the television set. It is to be appreciated that the bottle 330 will be proportioned to the size of the container with which the device is to be associated so as to be effective to quench any fire in that appliance. It is further to be appreciated that the selection of the extinguishing material is one which is effective in electrical fires and which can readily be removed from the appliance, for example, by a simple vacuuming process after activation of the device.

It will be appreciated that while the present invention has been described as being associated with an electrical appliance, it could well be associated with an automobile, in which case, the means for interrupting power could constitute a device for interrupting the fuel flow such as, for example, a device for crimping a fuel line to prevent the passage of fuel therepast. Alternatively, the device could be associated with an electrical line as, for example, in the embodiment of FIG. 1.

An application of the device of this invention is illustrated schematically in FIG. 10 in which the motor vehicle has an engine 500 disposed within an engine compartment which is closed by hood 502. A carburetor as indicated at 504 and the supply of gas to the carburetor is made through a gas line 506 which passes through a device 508 according to this invention. The device 508 is mounted upon fire wall 510 of the vehicle and has either a crimping mechanism which is effective upon actuation of that device to crimp a fuel line to prevent the continued flow of gasoline to the engine compartment past the device 508 or the device associated with a fuel line and has a valve mechanism which is closed upon actuation of the device.

In FIGS. 11 and 12 there is shown a device which could be used in conjunction with the device of, for example, FIG. 1 in an automobile. The device comprises a body 600 of generally cylindrical form having a pair of aligned radial holes 602 therethrough and an axial passageway 604 with which said holes intersect. Disposed in said holes 602 is a section 606 of fuel conducting line which has means 608 by which it is connectable into a fuel conducting line of an automobile. The section 606 is secured by soldering 610 to the body 600.

Disposed within this passageway 604 for movement therealong is a crimping element 612, the end of which nearest to the line 606 is rounded to crimp that line in a manner described hereinafter. The other end of crimping element 612 is slightly flared as at 614 closely to fit this passageway. Also disposed in passageway 604 is a cartridge 616 and an externally threaded detonator 618 which is secured in the screw threaded end portion 620 of this body. The detonator is electrically activated and has wires 622 which will be connected, in use, to an appropriate fire detecting element such as a heat responsive bridge circuit.

The assembly is sealed by an epoxy resin plug 624 cast in end portion 620 of the body.

It will be understood that when the cartridge is fired the crimping element 612 will be driven to the right (as viewed in the drawing) along the passageway to crimp the section 604 of the fuel line and prevent the supply of fuel therealong.

Conveniently, the device of FIGS. 11 and 12 will be disposed under the hood of a vehicle and will be used in conjunction with a device such as that in FIG. 1 which will be effective to release a fire extinguishing material and to sever an electrical conductor of the vehicle wiring system.

Of course, it is to be understood that the device of FIGS. 11 and 12 can be combined with a fire extinguishing device which would be released upon activation by cartridge 616.

It is further to be appreciated that while in the particular embodiments of the invention illustrated there is shown a fusible link, it is within the ambit of this invention that the device for being responsive to a fire condition could be smoke detector or a fine metal strip and could be responsive to any of the conditions indicative of the fire or risk of fire.

What is claimed is:

1. A safety device for disposition in an enclosure of equipment including an electrical supply circuit, said device comprising a container of a fire extinguishing material, a seal normally closing said container, means for rupturing said seal to release the fire extinguishing material, means for holding a supply circuit element

and fire detecting actuating means operative upon the occurrence of a fire to activate said means for rupturing said seal and to interrupt a supply circuit element disposed in said holding means, said means for supporting a supply circuit element comprising an electrical conductor holder means and said actuating means comprises an element for breaching said conductor.

2. A device as claimed in claim 1 wherein said means for holding said electrical conductor is of insulating material and said actuating means includes a cutting element of insulating material whereby upon severance of the conductor the severed ends thereof are insulated from one another.

3. A device as claimed in claim 2 wherein said fire detecting actuating means comprises a fusible link said link holding said cutter element in a ready position and spring means urging the cutter element in a cutting direction.

4. A safety device as claimed in claim 1 wherein alarm means are associated with said container of fire extinguishing material, said alarm means being operated by the egress of said fire extinguishing material from said container.

5. A safety device for disposition in an enclosure of equipment including an electrical supply circuit, said device comprising a container of a fire extinguishing material, a seal normally closing said container, means for rupturing said seal to release the fire extinguishing material, means for holding a supply circuit element and fire detecting actuating means operative upon the occurrence of a fire to activate said means for rupturing said seal and to interrupt a supply circuit element disposed in said holding means, in which said means for supporting a supply circuit element comprises a pair of electrical terminal elements bridged by a link element and connected to said link element by a fusible material.

6. A safety device for disposition in an enclosure of equipment including an electrical supply circuit, said device comprising a container of a fire extinguishing material, a seal normally closing said container, means for rupturing said seal to release the fire extinguishing material, means for holding a supply circuit element and fire detecting actuating means operative upon the occurrence of a fire to activate said means for rupturing said seal and to interrupt a supply circuit element disposed in said holding means, wherein said actuating means comprises a fusible link, a firing pin element held in a ready position by said fusible links and said means for rupturing said seal are operated by an explosive device fired by said firing pin.

7. A safety device for disposition in an enclosure of equipment including an electrical supply circuit, said device comprising a container of a fire extinguishing material, a seal normally closing said container, means for rupturing said seal to release the fire extinguishing material, means for holding a supply circuit element and fire detecting actuating means operative upon the occurrence of a fire to activate said means for rupturing said seal and to interrupt a supply circuit element disposed in said holding means, for disposition within an enclosure of equipment including an internal combustion engine and a fuel line supplying said internal combustion engine, said means for interrupting a supply circuit comprising means for crimping said fuel supply line to preclude the passage of fuel therethrough.

8. A safety device comprising a container of fire extinguishing material, a seal closing said container, plunger means having means for rupturing said seal, and including a cutter element, means for holding an electrical conductor in a position to be severed by said cutter element, said plunger means being movable from a ready position to an actuated position and during that movement being effective to rupture said seal and severe an electrical conductor held in said supporting means, drive means for moving said plunger means from the ready position to the actuated position and fire detecting means preventing the actuation of said drive means until the occurrence of a fire.

9. Apparatus as claimed in claim 8 in which said fire detecting means comprises a fusible link.

10. Apparatus as claimed in claim 8 in which said drive means comprises a spring and said fire detecting means comprises a fusible link operable to hold said spring in a compressed condition.

11. A safety device as claimed in claim 8 wherein alarm means are associated with said container of fire extinguishing material, said means being operated by the egress of said fire extinguishing material from said container.

12. A safety device comprising a container of fire extinguishing material, seal means closing said container, explosively actuated means for rupturing said container, firing pin means for detonating said explosively actuated means, fusible link means holding said firing pin means in a cocked position, an electrical terminal means linked by said fusible link means whereby upon the occurrence of a fire said firing pin is released and

the terminal means separated.

13. A safety device as claimed in claim 12 wherein alarm means are associated with said container of fire extinguishing material, said alarm means being operated by the egress of said fire extinguishing material from said container.

14. An electrical appliance comprising an enclosure and an electrical supply circuit, said supply circuit including a power conductor, a safety device disposed within said enclosure and comprising a container of a fire extinguishing material, a seal normally closing said container, means for rupturing said seal to release the fire extinguishing material, means supporting said power conductor and fire detecting actuating means operative upon the occurrence of a fire to activate said means for rupturing said seal and to interrupt said power conductor, said means for rupturing said seal including a cutter element and said means supporting said power conductor supports said conductor to be severed by said cutter means.

15. Apparatus as claimed in claim 14 wherein said fire detecting actuating means comprises a fusible link.

16. Apparatus as claimed in claim 14 wherein said fire detecting means comprises a fusible link, said fusible link bridging terminal elements of said power conductor means.

17. An appliance as claimed in claim 16 wherein said means for rupturing said seal comprises an explosive device said safety device having firing pin means held in a cocked position by said fusible link means.

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