

July 21, 1936.

B. JOHNSEN

2,048,388

SAFETY DEVICE

Original Filed March 5, 1932 3 Sheets-Sheet 1

FIG. 1.

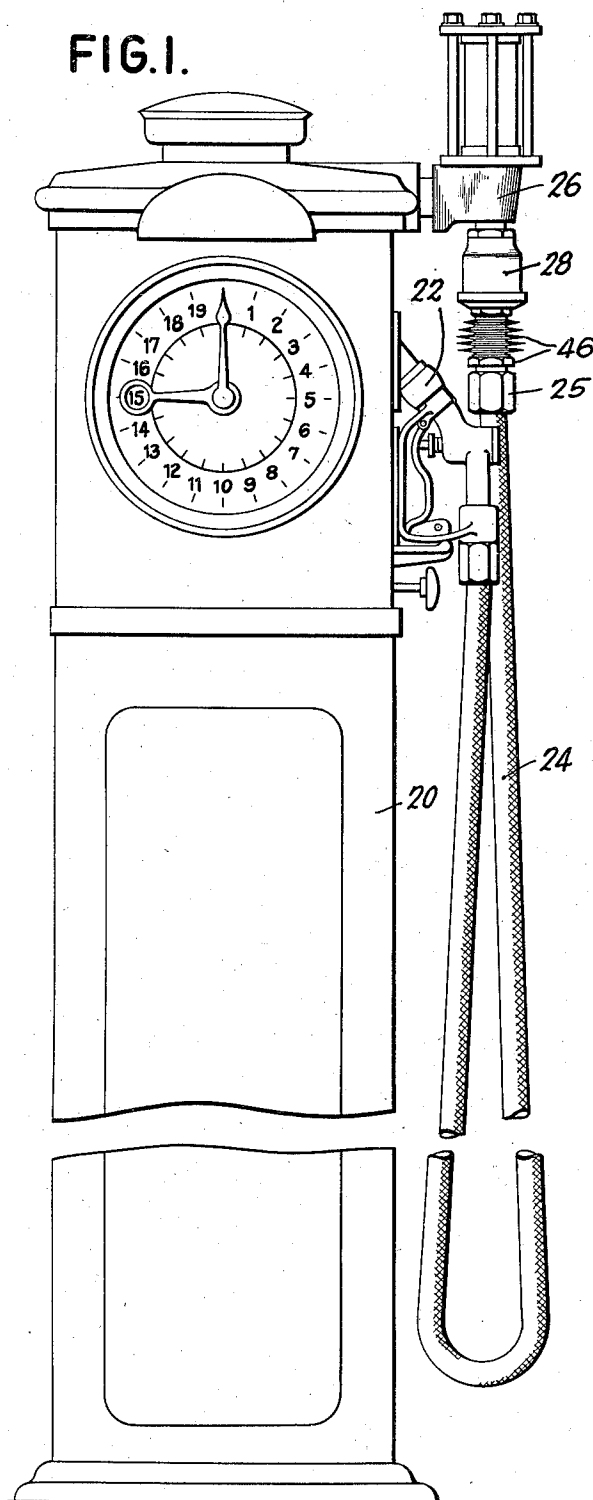
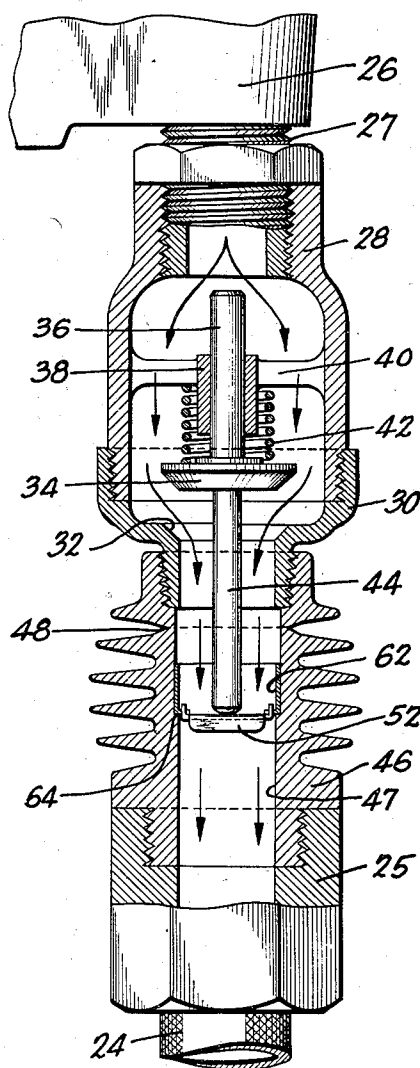


FIG. 2.



INVENTOR
BJORNULF JOHNSEN

BY *Frederick Griswold, Jr.*
ATTORNEY

July 21, 1936.

B. JOHNSEN

2,048,388

SAFETY DEVICE

Original Filed March 5, 1932 3 Sheets-Sheet 2

FIG. 3.

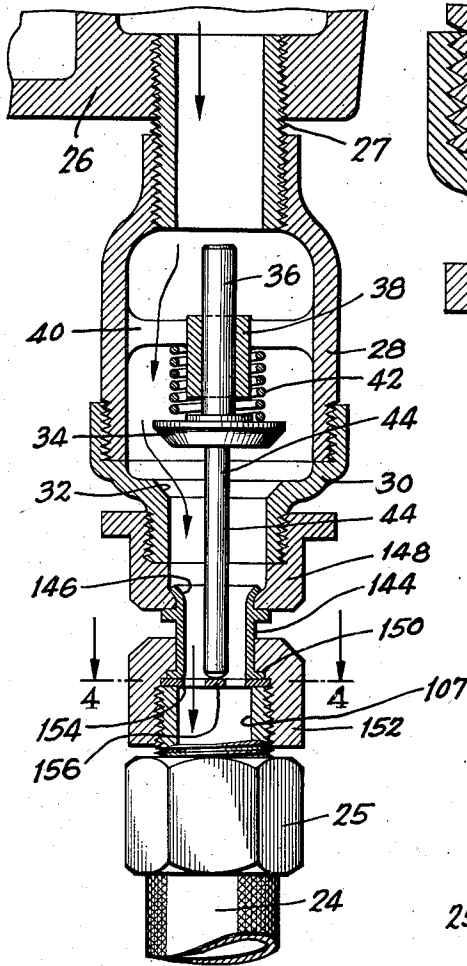


FIG. 4.

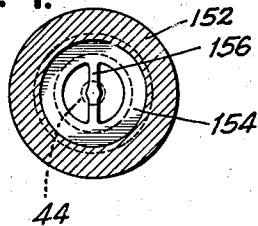
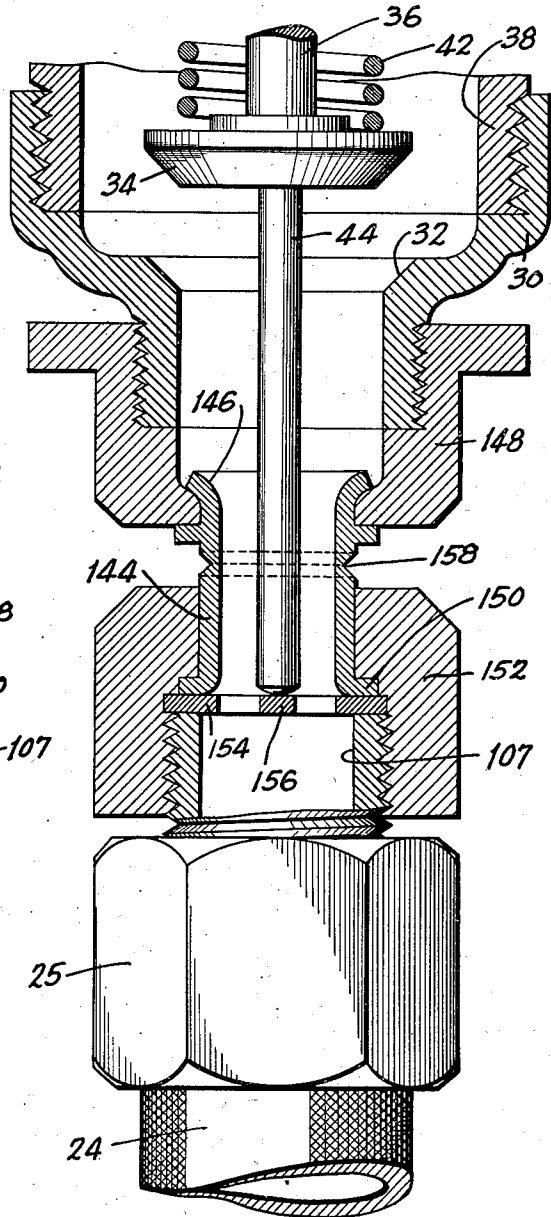


FIG. 5.



INVENTOR
BJORNULF JOHNSEN

BY
Frederick Griswold, Jr.
ATTORNEY

July 21, 1936.

B. JOHNSEN

2,048,388

SAFETY DEVICE

Original Filed March 5, 1932 3 Sheets-Sheet 3

FIG. 6.

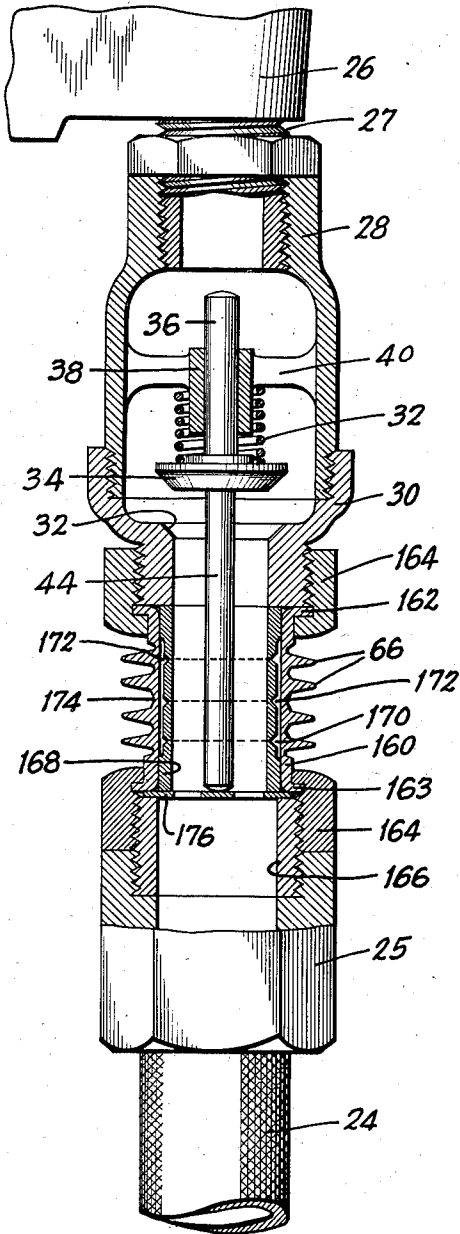
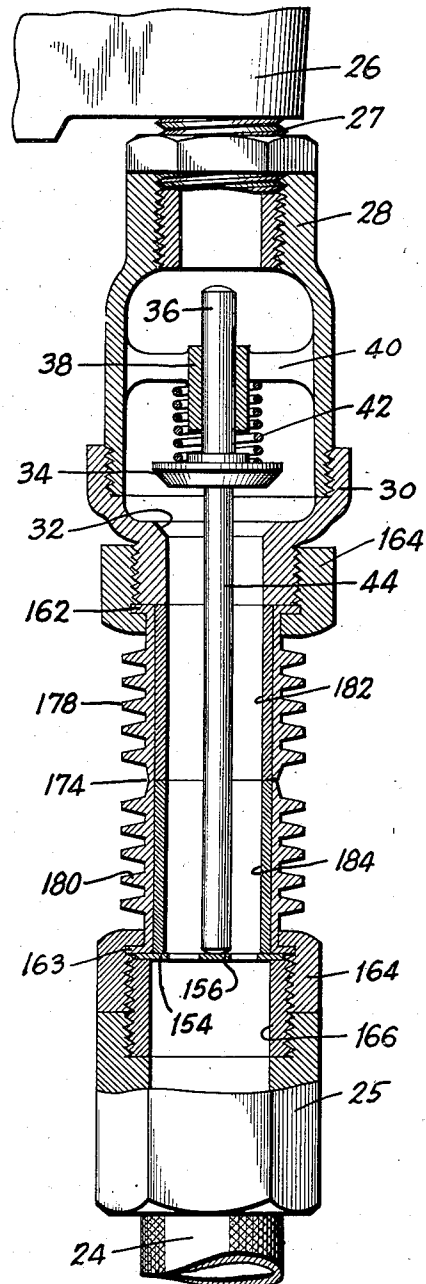


FIG. 7.



INVENTOR
BJORNULF JOHNSEN

BY *Frederick Griswold Jr.*
ATTORNEY

UNITED STATES PATENT OFFICE

2,048,388

SAFETY DEVICE

Bjornulf Johnsen, Summit, N. J., assignor to
Harry T. Goss and Bjornulf Johnsen, copart-
ners trading under the firm name and style of
Goss & Johnsen, New York, N. Y.

Original application March 5, 1932, Serial No.
597,081. Divided and this application Decem-
ber 1, 1933, Serial No. 700,441

16 Claims. (Cl. 137—162)

This invention relates broadly to the control of fluid, either liquid or gaseous, flowing through a conduit. More particularly, the invention relates to the stopping of the flow of fluid automatically upon the occurrence of a certain event such as, for instance, a break in the conduit, or a change in the temperature, beyond a predetermined range, in proximity thereto.

In one of its aspects, the invention relates to a valve controlling the flow of an inflammable liquid, such as gasoline, delivered, say, through a hose to a vehicle tank from a fluid dispensing device adapted to dispense gasoline and other liquid fuels at roadside service stations and the like, of the kind in which the pump is automatically actuated, as by a motor. In such fluid dispensing devices heretofore known, the operator, upon removing the nozzle from its support, starts the motor, for instance, by closing the circuit, manually or otherwise, and then moves to the vehicle tank where he can see exactly how much the tank will hold and serve it without spilling. If, while the fluid is being delivered, the vehicle should unexpectedly move off with the nozzle still inserted in the fuel tank, the hose may either be torn or broken or such a strain placed upon the fluid delivery device as to damage materially some or all of the parts thereof and, if a break occurred, inflammable fluid would flow out into the surrounding area and create a fire hazard. Similarly, if a fire should break out when fluid is being delivered, the flames of the burning fluid enveloping the hose or the heat therefrom might be sufficient to prevent the operator from returning to the dispensing device to shut off the motor with the result that the pump would continue to deliver inflammable fluid and feed the fire, thus rendering possible a conflagration of great extent and also increasing materially the fire hazard. When it is considered that underground storage tanks for gasoline sometimes have a capacity of one thousand gallons, which is delivered by the service pump at the rate of 12 or 15 gallons per minute, it will be readily appreciated that the fire hazard in connection with such fluid dispensing devices is a great one.

In another of its aspects, the invention is applicable as a safety valve in a pipe line conducting illuminating gas, say, into or throughout a building, as at the meter in the service line from the gas main in the street. Or such a safety valve may be disposed on each floor or in each branch pipe line in a building. In any event, should damage to the line occur or a fire break out, the valve will automatically close the conduit.

The invention is equally applicable to the conduit conducting fuel oil to burners, say, on ship-board or in buildings for the same purpose.

One object of the invention is, therefore, to provide that, when a force is exerted on a hose or pipe, a fracture will occur at a predetermined point, which fracture shall automatically result in the closing of the conduit to the flow of fluid. Accordingly, the wall of the conduit is weakened at at least one predetermined point, and provision is made to instantaneously release a valve and permit it to close the conduit.

Another object of the present invention is to provide a device which is responsive to a predetermined temperature to close a conduit for fluid of any character. Accordingly, a valve is placed in the conduit, which valve has a tendency to close but is retained in open position by a device, within the conduit, operative to hold the valve open, but rendered inoperative by a rupture of the conduit from, say, a predetermined temperature to permit the valve to close.

Yet another object is to prevent the dissipation of the heat conducted through the walls by the fluid flowing therewithin. To this end, the fluid may be separated or isolated from the heat transferring wall, conveniently, by a wall either non-conductive to heat or refractory.

It is a further object of the invention to incorporate the valve and its associated controlling means in a self-contained unit adapted to be interposed in a fluid conduit at a desired point.

The invention further seeks, for the control of a member movable for any purpose whatsoever, an element responsive to a given set of conditions as, for instance, a force applied thereto or a temperature change, which responsive element, may, if desired, be replaceable.

The invention also seeks a device of the character described, which is practical from the standpoint of ease and cheapness of manufacture and convenience and reliability in installation and use.

These and other objects of the invention and the means for their attainment will be more apparent from the following detailed description taken in connection with the accompanying drawings illustrating various embodiments by which the invention may be realized, and in which:—

Figure 1 is a view, in front elevation, of a fluid dispensing device to which the invention is applied;

Figure 2 is a view showing, on an enlarged

scale, a controlling device for a fluid passage, in longitudinal section and partly in elevation;

Figure 3 is a longitudinal sectional view showing a modified form of a disruptable and/or fusible element adapted to control a movable element;

Figure 4 is a transverse sectional view taken in the plane indicated by the line 4-4 of Figure 3 and looking in the direction of the arrows;

Figure 5 is a view, on an enlarged scale, showing a modification of the structure shown in Figure 3, in which the fusible and/or disruptable element is weakened at a predetermined point;

Figure 6 is a view showing still another modification of the invention in longitudinal section, which may also be inserted in any pipe line or conduit; and

Figure 7 shows still another modification of the invention in longitudinal section.

This application is a division of United States application Serial No. 597,081 filed March 5, 1932.

While the invention has been illustrated as applied to a fluid dispensing device having a hose for delivery of fluid, it will be apparent, as the description proceeds, that the invention is not limited in its application to liquid dispensing devices having hoses for the delivery of liquid but that it is equally applicable in any situation in which the flow of any fluid, either liquid or gaseous, is to be controlled dependent upon the happening of an event, as a rupture in the conduit or associated or contiguous parts or a force applied to the conduit or associated parts or a rise in temperature resulting in a rupture of the fitting.

In the application of the invention illustrated in Figure 1, a standard or housing 20 of any convenient shape is adapted to support and contain the devices for establishing the flow of fluid from a source, such as a tank (not shown), say, beneath the ground and measuring it for delivery from a nozzle 22 on the end of a hose 24 into, say, the fuel tank of a motor vehicle. The hose 24 is shown as leading from an outlet fitting 26 of any convenient kind.

It is proposed, in accordance with this invention, to provide a device, indicated generally at 28, 46, in Figure 1, between the end of the hose 24 and the fitting 26, which shall control the flow of fluid through the hose and interrupt its flow under certain conditions such as when there is a pull on the hose of such magnitude as to rupture it or displace or otherwise damage the dispensing device or any of its parts, or as the result, say, of a fire subjecting the fluid within the hose to a temperature such as to cause the fluid to ignite. In other words, a device 28, 46 is installed in a fluid conduit which shall interrupt the flow of fluid upon a rupture of the conduit by a force applied thereto which exceeds that to which the device is normally exposed or upon an increase of temperature to that above a predetermined one.

In the embodiment illustrated in Figure 2, a valve casing 28 is shown as connected as by a threaded connection with a nipple 27 to the outlet fitting 26. Obviously, the nipple 27 may represent the threaded end of any pipe, anywhere. This valve casing 28 is a two-part member in which a separable portion 30 is provided with a valve seat 32 and the passage for the fluid is adapted to be closed by a valve closure member 34 carried with a valve stem, one portion 36 of which extends upwardly from the closure 34 and is guided for reciprocation in a bearing member

38 carried, say, by a spider 40 mounted in the valve casing portion 28. The valve 34 is normally moved to its seat 32, in the illustrated embodiment, by a spring 42. Depending downwardly from the valve 34 in a direction opposite to that of the stem portion 36 is a valve stem portion 44. Preferably, the two portions 36 and 44 of the valve stem are in axial prolongation with one another and are disposed in the axis of the conduit, the downwardly depending valve stem portion 44 passing through the valve opening into a portion of the conduit formed by a supplemental tubular fitting 46 conveniently threaded into the end of the separable valve chamber portion 30. Obviously, the portions 28, 30, and 46 are illustrated as separable only from manufacturing considerations, although it is desirable to form the member 46 as a separable element so that it may be replaced if fractured. To the fitting 46 is secured the other conduit section, for instance, the hose 24 in any convenient fashion, as by a coupling member 25.

The supplemental fitting 46 is provided, within the flow passage, with means to retain a movable member in one position of its movement. As shown, there is mounted therein a stop or abutment for the valve stem, conveniently, a bridge member 52 formed substantially as shown, of a strip of relatively light material, such as metal, having downwardly bent parallel flanges 30 on each side, for strength, supported by an annular or tubular carrier member 62 carried within the supplemental fitting 46. As shown, this annular supporting member 62 is carried upon a shoulder 64, formed in the inner wall of the conduit portion 46 but any other way of supporting a stop for the valve stem with provision for flow of fluid there past may be adopted. The bridge member 52 is so disposed in the passage 47 as to be engaged by the valve stem 44 when the valve is in fully retracted position, the passage being thus open to the flow of fluid. Thus the normally movable member 44 is restrained. Obviously, the valve stem 44 may represent any movable element operative to perform some function, such as opening a switch, for instance, and the spring may represent any device in which power (kinetic or potential energy) may be stored to effect movement of a movable member to another position to accomplish a desired result.

As shown, this fitting 46 may be capable of fracture when a predetermined force or a greater force is applied thereto or to the conduit in which it is inserted. Conveniently it may have a weakened portion. That is, the wall of the fitting may be relatively thin, as at a point 48, so that any pull on the hose or displacement of a pipe relative to the axis of the fitting greater than a predetermined one will cause a rupture of the fitting at the point 48.

In this, as well as in all subsequently described modifications comprising a carrier and a stop, it is desirable that the carrier and/or stop be replaceable.

If, now, a predetermined force or load is exerted on the conduit 24, the conduit or fitting 46 will rupture at the point 48 and the two parts of the fitting 46 will separate at that point, thus permitting the bridge 52 and the parts to which it is secured to move or fall away from the valve casing and allow the spring 42 to force the valve 34 upon its seat 32, thus effectually closing the conduit to the flow of fluid and preventing any escape thereof below the break.

Referring now to Figures 3 and 4, a valve structure substantially similar to that shown in Figure 2 is there illustrated, and similar reference characters are applied to corresponding parts.

5 The responsive element in this instance comprises a tubular member 144 which may be either of material fusible at a predetermined temperature or material capable of fracturing when a predetermined force is applied thereto or both. 10 As shown, the cylinder 144 is flared outwardly at its upper end, as at 146, whereby the same is held within a coupling member 148 threaded onto the separable part 30 of the valve casing 28, 30. The lower end of the tubular member 144 is provided 15 with an outwardly extending flange 150 by which it is secured, by a coupling member 152, to a conduit shown as the hose 24. Clamped between the end of a pipe 107, for instance, on the hose coupling 24 and the flange 150 on the responsive element 144, is the annulus 154 of a bridge member, the bridge 156 of which serves 20 as a stop for a removable member such as the valve stem 44 and by which, in the illustrated embodiment, the valve is held in open position against the action of the spring 42. When, therefore, the responsive device 144 is ruptured either 25 by strain or heat, the coupling member 152, falls away, carrying with it the stop 156, and the spring 42 is permitted to close the valve.

30 In Figure 5, there is shown a modification of the invention shown in Figure 3, in which the responsive member 144 is so formed as to facilitate breaking as by thinning the material, as at 158, so that tension or displacement on the conduit transmitted to the coupling member 152 will 35 fracture the member 144 at the point 158, thus permitting the operation of the device, as hereinbefore described.

40 Due to the fact that fluid flowing through the conduit will carry away the heat conducted through the walls thereof very rapidly and thus, in some situations, preventing the effective operation of the responsive device, there may be provided, if found necessary, the construction 45 illustrated in Figure 6 and 7, whereby the dissipation of the heat is prevented. Any movable member may be controlled. There is shown as an illustration, the valve member hereinbefore described in connection with Figure 2, and similar reference characters have been affixed to 50 corresponding parts.

To facilitate the transfer of heat from the outside by the conduit portion, its wall is made of a good heat absorptive material and outwardly 55 thereof is formed with a plurality of fins 66, 178, conveniently circumferentially extending, thus offering an extended surface for heat absorption. Thereby is the temperature of the member 66, 160 rapidly raised and the heat is 60 conducted readily therethrough.

As shown in Figure 6, a tubular responsive member 160 is formed with flanges 162, 163 by which, by means of coupling members 164, the tubular member 160 is secured to proximate conduit sections, say, on the one hand, by flange 65 162 to the separable member 30 and on the other hand by flange 163, say, to the hose coupling 25 of the hose 24. Wedged between the flange 163 and a nipple 166 which, of course, may represent the threaded end of any pipe and by which the coupling members 25 and 164 are connected, is a bridge member which acts as a stop for a movable member 44.

75 In some situations it may be found desirable to prevent the transfer of heat from the carrier to

the fluid flowing through the conduit so that substantially all of the heat units conducted through the walls of the conduit will be utilized in heating and not dissipated by conduction in the fluid.

Disposed within the tubular responsive element 160 is a cylindrical element 168 formed preferably of a material non-conductive to heat or refractory. This non-conductive member 168 5 may, if desired, be spaced in part from the responsive element 160 as by having the midportion of a slightly smaller outside diameter than the interior diameter of the responsive member to define a space 170 and may be weakened at at least one point, several being shown at 172, where- 10 by it may fracture when the responsive element 160 separates either by breaking or by fusing. In order that the responsive element may fracture, it is also weakened at at least one point, say, 174. Here again, if a force greater than a predetermined maximum is exerted on the conduit, the responsive element 160 will fracture, as at 174, and 15 the interior refractory cylinder will also fracture at one of the points 172, thus permitting the structure below the point of fracture to fall away 25 carrying with it the bridge 176 to release the movable member 44. If, on the other hand, the temperature of the responsive device 160 is raised beyond a predetermined point, sufficient heat will be absorbed thereby to cause it to fuse. Since the 30 heat cannot be dissipated by convection in the fluid flowing through the conduit by reason of the non-conductive wall 168 therebetween, the responsive element 160 will fuse thus releasing the structure below the point 35 of fusing and allow the spring to force the responsive element away and close the valve. A substantially similar device is illustrated in Figure 7 and corresponding reference numerals are applied to similar parts. In this instance, 40 the responsive device is 178, 180 while unitary may be considered as formed of two portions 178, 180, the former being formed with the flange 162 and the latter with the flange 163 and these two portions 178 and 180 are defined by 45 the weakened part 174 which unites them. Inwardly of the responsive part 178, 180 are disposed two tubular sections of non-conductive material indicated as 182 and 184, and their point of contact is substantially in the plane of the weak spot 50 174, so that when the portions 178 and 180 of the responsive member 178, 180 separate as from a fracture, the two non-conductive members 182 and 184 will separate on the same plane and readily permit the lower section of the valve to close. 55 On an increase in temperature, if the responsive element 178, 180 fuses, a lower portion carrying the stop 154, 156 will fall away or separate by a push from the movable member 44 under the influence of the spring 42, as before, the two part 60 refractory shield 182, 184, readily permitting this separation.

It will thus be seen that a safety valve or cut-out valve or fire hazard valve has been provided which involves an element responsive to force 65 and permitting one element to move relative to another element to permit the actuation of a movable member as, for instance, to release a closure member, which movable member closes an orifice through which fluid normally passes or 70 performs some other movement. The strength of the material may be selected such as to withstand the strains or temperatures to which the device is normally exposed but will respond to forces or loads or temperatures thereabove. It 75

will be further observed that the responsive element, say, the bridge piece and carrier or fitting capable of fracturing or fusing are all readily removable and replaceable so that the same movable member may be reused and only the member
5 subject to destruction need be replaced.

Various modifications will occur to those skilled in the art in the composition, configuration and disposition of the component elements going to
10 make up the invention as a whole as well as in the selection and combination of the individual elements hereinbefore described and their use to perform a desired function, and no limitation is intended by the phraseology of the foregoing
15 description or illustrations in the accompanying drawings, except as indicated in the appended claims.

What is claimed is:—

1. In a device of the character described, the
20 combination with a conduit, of a valve casing insertable therein comprising a valve having a valve stem extending without the casing and a seat therefor, a spring normally urging the valve to its seat, a tubular conduit portion formed with
25 a weakened portion into which the valve stem extends and comprising material fusible at a predetermined temperature, a stop carried with an end of the conduit portion remote from the valve and engaging the valve stem to hold the valve in
30 open position, and a shield within the tubular conduit portion formed with at least one weakened portion and serving to conduct the fluid flowing therethrough out of contact with the tubular conduit portion.

35 2. In a device of the character described, the combination with a conduit, of a valve casing insertable therein comprising a valve having a valve stem extending without the casing and a seat therefor, a spring normally urging the valve
40 to its seat, a tubular conduit portion into which the valve stem extends and comprising material fusible at a predetermined temperature, said conduit portion being provided outwardly thereof with fins of conductive material, a stop carried
45 with an end of the conduit portion remote from the valve and engaging the valve stem to hold the valve in open position and a multi-part tubular shield of refractory material within the tubular conduit portion and serving to conduct the
50 fluid flowing therethrough out of contact with the tubular conduit portion, said conduit portion being formed with at least one weakened portion.

55 3. In a device of the character described, the combination, with a conduit, of a valve casing insertable therein comprising a valve having a valve stem extending without the casing and a seat therefor, a spring normally urging the valve to its seat, a conduit portion into which the valve stem extends, said conduit portion being fusible,
60 a stop carried with an end of the conduit portion remote from the valve and engaging the valve stem to hold the valve in open position.

4. In a device of the character described, the
65 combination with a conduit, of a valve casing insertable therein comprising a valve having a valve stem extending without the casing and a seat therefor, a spring normally urging the valve to its seat, a conduit portion into which the valve stem extends, said conduit portion being fusible
70 upon being subjected to a predetermined temperature, a stop carried with the conduit portion therewithin on the opposite side of the normal area of fusing from the valve and engaging the valve stem to hold the valve in open position.

75 5. In a device of the character described, the

combination with a conduit, of a valve casing insertable therein comprising a valve having a valve stem extending without the casing and a seat therefor, a spring normally urging the valve to its seat, a conduit portion into which the valve stem extends, said conduit portion being breakable upon being subjected to a predetermined strain, and fusible upon being subjected to a predetermined temperature, a stop carried with the conduit portion therewithin on the opposite side
10 of the normal area of fracture or fusing from the valve and engaging the valve stem to hold the valve in open position.

6. In a device of the character described, in combination, a valve casing formed with a seat,
15 a valve having a valve stem, a spring tending to close said valve, a conduit portion through which fluid flows after passing the valve seat comprising a portion adapted to fuse upon the application of a predetermined temperature to the conduit portion and restraining means for the valve stem to hold the valve in open position fixed
20 within the conduit portion on the opposite side of the fusing portion from the valve seat.

7. In a device of the character described, in
25 combination, a valve casing formed with a seat, a valve having a valve stem, a spring tending to close said valve, a conduit portion through which fluid flows after passing the valve seat comprising a portion adapted to fuse upon the application of
30 a predetermined temperature to the conduit portion, fins carried outwardly of the conduit portion and restraining means for the valve stem to hold the valve in open position fixed within the conduit portion on the opposite side of the
35 fusing portion from the valve seat.

8. In a device of the character described, in combination, a valve casing formed with a seat, a valve having a valve stem, a spring tending to close said valve, a conduit portion through which
40 fluid flows after passing the valve seat comprising a portion adapted to fuse upon the application of a predetermined temperature to the conduit portion, restraining means for the valve stem to hold the valve in open position fixed within the conduit portion on the opposite side of the fusing
45 portion from the valve seat and shielding means adapted to conduct fluid out of contact with the conduit portion.

9. In a device of the character described, in
50 combination, a valve casing formed with a seat, a valve having a valve stem, a spring tending to close said valve, a conduit portion through which fluid flows after passing the valve seat comprising a portion adapted to fuse upon the application of
55 a predetermined temperature to the conduit portion, restraining means for the valve stem to hold the valve in open position fixed within the conduit portion on the opposite side of the fusing portion from the valve seat, a tubular shield adapted to conduct fluid out of contact with the conduit portion, said shield being
60 formed with at least one weakened portion.

10. In a device of the character described, in
65 combination, a valve casing formed with a seat, a valve having a valve stem, a spring tending to close said valve, a conduit portion through which fluid flows after passing the valve seat comprising a portion adapted to sever upon the application of a predetermined temperature to the conduit portion, restraining means for the valve stem to hold the valve in open position fixed
70 within the conduit portion on the opposite side of the portion adapted to sever from the valve seat, a two-part shield adapted to conduct fluid
75

out of contact with the conduit portion, the line of separation being proximate the severing portion of the conduit portion.

11. In a device of the character described, the combination with a conduit, of a valve casing insertable therein comprising a valve having a valve stem extending without the casing and a seat therefor, a spring normally urging the valve to its seat, a tubular fusible conduit portion of heat conductive material into which the valve stem extends, said conduit portion being provided outwardly thereof with fins of heat conductive material and formed with a weakened portion, a stop carried with an end of the conduit portion remote from the valve and engaged by the valve stem in valve open position and a tubular shield of refractory material within the tubular conduit portion and serving to conduct the fluid flowing therethrough out of contact with the tubular conduit portion, said tubular shield being formed with at least one weakened portion.

12. In a device of the character described, the combination with a conduit, of a valve casing insertable therein comprising a valve having a valve stem extending without the casing and a seat therefor, a spring normally urging the valve to its seat, a tubular fusible conduit portion of heat conductive material into which the valve stem extends, said conduit portion being formed with a weakened portion, a stop carried with an end of the conduit portion remote from the valve and engaged by the valve stem in valve open position and a tubular shield of refractory material within the tubular conduit portion and serving to conduct the fluid flowing therethrough out of contact with the tubular conduit portion, said tubular shield being formed with at least one weakened portion.

13. A safety device of the character described comprising a valve casing having a valve seat, a valve normally tending to move into engagement with said seat, said valve casing having a conduit portion comprising material fusible upon being subjected to a predetermined temperature, and

a stop carried with the conduit portion on the opposite side of the fusible portion from the valve and engaging the valve to hold said valve in valve open position.

14. A safety device of the character described comprising a valve casing having a valve seat, a valve normally tending to move into engagement with said seat, said valve casing having a conduit portion comprising material fusible upon being subjected to a predetermined temperature, a stop carried with the conduit portion on the opposite side of the fusible portion from the valve and engaging the valve to hold said valve in valve open position and a tubular shield adapted to conduct fluid out of contact with the conduit portion.

15. A safety device of the character described comprising a valve casing having a valve seat, a valve normally tending to move into engagement with said seat, said valve casing having a conduit portion comprising material fusible upon being subjected to a predetermined temperature and a portion destructible upon being subjected to a predetermined strain and a stop carried with the conduit portion on the opposite side of the fusible portion and the destructible portion from the valve and engaging the valve to hold said valve in valve open position.

16. A safety device of the character described comprising a valve casing having a valve seat, a valve normally tending to move into engagement with said seat, said valve casing having a conduit portion comprising material fusible upon being subjected to a predetermined temperature and a portion destructible upon being subjected to a predetermined strain and a stop carried with the conduit portion on the opposite side of the fusible portion and the destructible portion from the valve and engaging the valve to hold said valve in valve open position and a severable tubular shield within the conduit portion and serving to conduct the fluid flowing therethrough out of contact with the conduit portion.

BJORNULF JOHNSEN.