

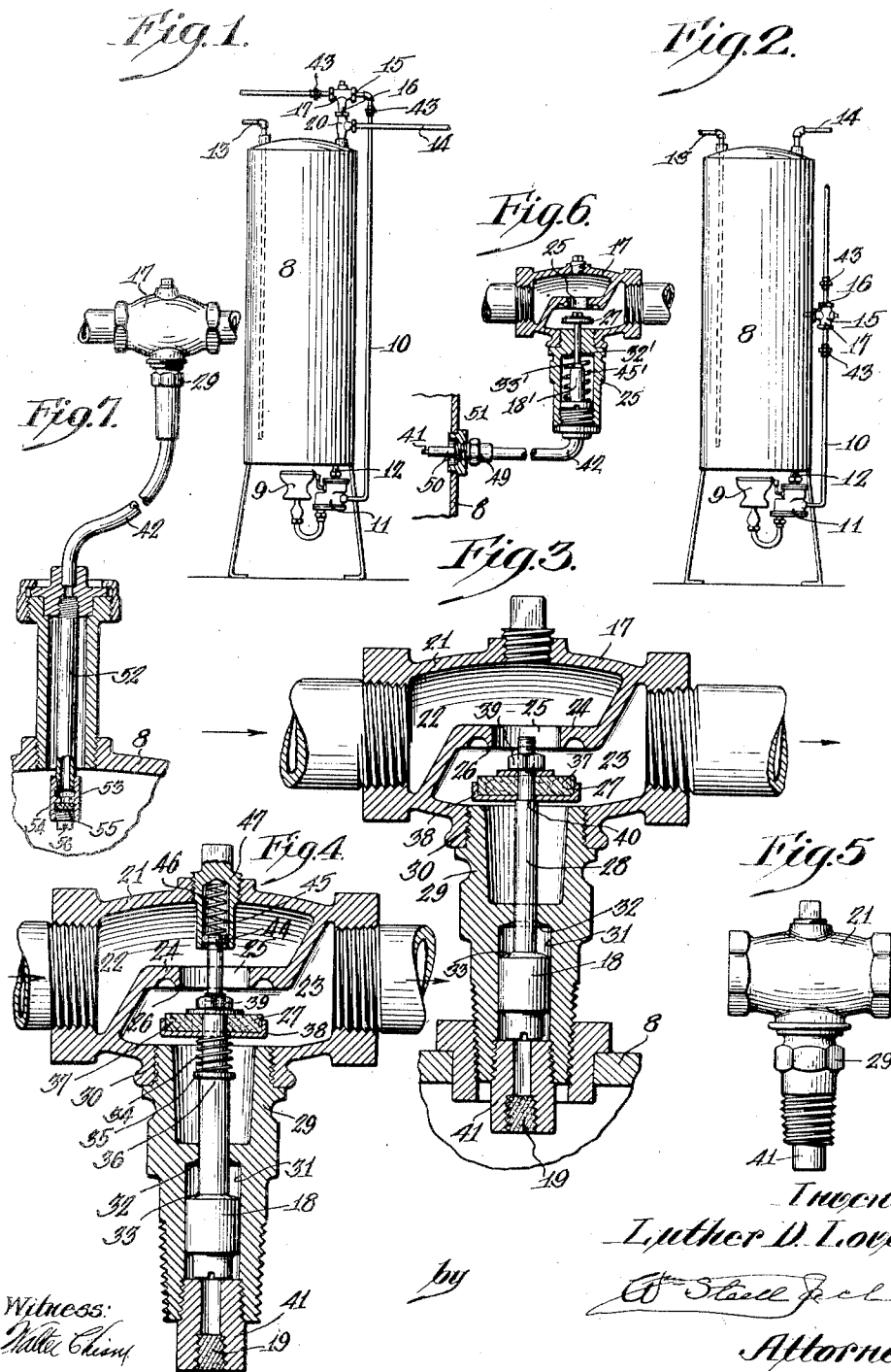
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EMERGENCY WATER OPERATED SHUT OFF VALVE

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EMERGENCY WATER-OPERATED SHUT-OFF VALVE.

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My invention relates to a safety device for stopping the supply of gaseous or liquid fuel to the burner of a boiler or other container of hot fluid heated by combustion of the fuel.

The main purpose of my invention is to provide fusible plug-control, fluid-operated means for shutting off the fuel to a fluid heater if the temperature of the fluid in the heater reaches a predetermined upper limit and to protect against leakage between the fluid and the gas or liquid fuel.

A further purpose is to place a fusible plug between an operating fluid and one side of a piston valve and if the plug melts to protect against flow of the fluid beyond the piston by valve closure at the same time that the fuel supply is cut off by a second valve.

A further purpose is to provide for a spring retraction of a fluid-operated plunger valve which controls a fuel supply.

A further purpose is to make one of the seating members of a tandem valve member resilient in order to make more easy a simultaneous sealing seat at both members. I provide tandem valves on a single stem with resilient seating at one of the seating members, making either the material or the bodily position of one of the valves yieldable with respect to the other.

A further purpose is to provide a member having tandem valves on a common stem with engagement means for valve-grinding located at one end of the stem.

Further purposes will appear in the specification and in the claims.

I prefer to illustrate my invention by one main form only shown in two somewhat variant constructions, selecting a form which is practical, efficient, reliable and inexpensive, and which at the same time well illustrates the principles involved.

Figures 1 and 2 are side elevations of domestic hot water heaters showing my invention in place at the top and at the side respectively of the heaters.

Figures 3 and 4 show somewhat different forms of my invention and are enlarged central longitudinal sections through the inlet and outlet gas connections.

Figure 5 is a side elevation of structure

that may be considered as that shown in either Figure 3 or Figure 4.

Figures 6 and 7 are fragmentary views, partly sectioned, showing somewhat different valve structures and showing the fusible element in each case spaced some distance from the valve member.

In the drawings similar numerals indicate like parts.

Describing in illustration and not in limitation and referring to the drawings:—

The hot water boiler 8 is heated by a burner 9, which is fed with gas by a pipe 10 through a valve 11 normally thermostatically controlled at 12.

The cold water inlet and the hot water outlet to and from the boiler respectively are shown at 13 and 14.

As illustrated my device comprises a safety shut-down that is only operative if the thermostatic control at 12 should for any reason fail to function. If the temperature of the water in the boiler should rise to a point beyond which it is deemed unsafe for the temperature to rise, my device inserted in the gas line at 15 and connected into the boiler at 16, shuts off the gas to the burner 9.

Broadly the invention includes a fuel cut-off valve 17 adapted to be operated by the fluid pressure of the heating water admitted back of an operating piston 18 by the failure of a fusible plug 19 that normally seals the heating liquid from admission to the operating piston.

In Figure 1 the plug end of my safety device threads into the top of the T fitting 20 by which hot water leaves the boiler; while in Figure 2 it is applied directly into the side of the boiler.

In either event, the fusible plug 19 is intended to come into intimate contact with the liquid heated—hereafter conventionally referred to as water. The heat flows to the fusible plug by conduction through the surrounding metal and also directly from the hot water to the plug.

The body 21 of the device is generally similar to that of a globe valve, including inlet and outlet compartments 22 and 23, separated by a diaphragm 24 which is perforated at 25 with a valve seat 26 around the perforation.

A valve 27 adapted to engage the seat to cut off the fuel is mounted upon the inner end of a stem 28 that is mounted in a supporting bonnet member 29 that is threaded at 30 into the body 21.

The outer end of the stem is enlarged to form the piston 18, the outer portion of the bonnet being counterbored at 31 to fit the piston. The inner end 32 of the counterbore forms a seat for the inner sealing end 33 of the piston 18.

There are thus two seats, that at 26 within the body 21 about opening 25 to receive the cut-off valve 27 and the seat 32 within the bonnet to receive the inner end of the operating piston 18.

The valve 27 and piston 18 are carried upon opposite ends of the stem 28 and close simultaneously upon these seats.

I preferably make the face of the cut-off valve somewhat yieldable in order to insure perfect seating at both the valve and piston. The distance between the seating faces of the valve and piston before they seat is made slightly greater than that between the seats so that one sealing member (preferably the cut-off valve) engages its seat slightly ahead of the other and compresses or slides until the other sealing member seats.

Usually I obtain this adaptation to slight yielding by making the valve 27 of compressible material, but may also, as illustrated in Figure 4 make the valve 27 bodily movable upon its stem, or both, showing in Figure 4 a spring 34 compressed between the back of the slidable valve 27 and a washer 35 that is supported against an enlarged portion 36 of the stem.

The stem and piston engage the body to guide the stem against lateral movement.

The counterbore 31 provides a cylinder within which the plunger piston 18 moves inwardly to close both the valve and piston sealing face under pressure of fluid from the heater 8 if the plug 19 be melted.

The cut-off valve comprises a disk 37 within a metal holder 38. The disk and holder are mounted upon a reduced portion of the stem 28 and are prevented from moving toward the inner end of the stem by a suitable nut and washer 39. In Figure 3 the valve and its casing or shell are clamped to place against a shoulder 40 while in Figure 4 the rear of the disk holder is supported by the spring 34 as already explained.

The fusible plug element includes a longitudinally bored plug 41 having the fusible material 19 in a preferably threaded portion of the bore.

In Figures 1 to 5 the plug element is threaded into the outer end of the bonnet 29 which in turn threads into the heater so as to present the plug to the hot water of the heater. In Figure 6 the plug element is at

any desired distance from the valve, a preferably flexible connection 42 of any desired length being provided between plug and valve.

The fusible plug is presented into the hot liquid of the heater by one end of the connection 42 which connects at the other end into the counterbore 31 back of the piston 18.

Preferably suitable unions 43 are provided at the ends of the pressure connection 41.

In the form shown in Figure 3 gravity is depended on to keep the valve open, the use of springs being dispensed with. Very usually the plug is inserted as shown in Figure 1 with the valve stem vertical and below its position for cut off. In this event I have found it unnecessary to spring-press the valve toward its open position.

In Figures 4 and 6 I illustrate the valve spring-pressed toward opening, which is preferable in certain cases, as when the valve is to be placed in such a way that there may be danger of its closing wholly or partially without a failure of the fuse plug.

In Figure 4 the stem of the valve is extended upwardly through the opening in the valve and presents a head portion 44 to the inner end of a spring 45 carried in the bore 46 of a plug 47 that is inserted into the inlet side of the valve in line with the stem.

I prefer to provide a plug 47 alined with the stem also in the form shown in Figure 3, in that it provides a convenient inlet for inspection of the valve.

In Figure 6 the spring 45' is placed in the bonnet around the enlarged portion of the stem back of the sealing end 33' of the piston 18'. The seat is here shown at 32'.

Even where the valve stem is to be placed horizontally in use as illustrated in Figure 2, it will many times be unnecessary to use a spring to press the valve toward opening as the valve is initially set open when the plug is inserted and any opening tendency is partially or wholly prevented by a dash pot effect of the piston 18 and the closed conduit between the fuse plug and piston.

However, when the piston valve is open the seal of the piston is usually not perfectly tight, and while there will normally be no tendency for the valve to close after it has been set open I prefer to spring-press it toward open position unless the valve is to be set so that it is definitely held open by its own weight as in Figure 1.

Figures 6 and 7 illustrate that the connection between the interior of the fluid heater and the rear end of the operating plunger 18 may be of any desired length, thus adapting the cut-off valve to be located at any desired distance from the heater and making the location of the valve independent of the location of the heater.

In these figures conduit connection 42, preferably flexible, extends from the rear

end of the bonnet member into the heater.

This adapts the heat element to be inserted or replaced without interfering with the structure at the valve.

5 In Figure 6 upon opening union 49 a plug member 50 carrying the fuse insert 41 at its inner end may be unscrewed from a bushing 51 in the side of the boiler.

A somewhat different construction shown in Figure 7 avoids the necessity for unscrewing the plug portion of the union after opening the union, the fuse element being carried at the inner end of a tube 52 which is carried upon the removable portion of the union.

With this structure loosening the union permits the nipple carrying the fuse element to be withdrawn while still connected to the flexible connection.

20 The fuse element in Figure 7 is shown held to place against an inward flange 53 of a coupling 54 by an interior sleeve member 55 threaded into the open end of the coupling. This sleeve or threaded ferrule is provided with suitable slots 56 at opposite sides of its outer end for engagement by a screw-driver.

Removal of the bonnet member affords easy access to the parts for cleaning purposes.

30 In operation the automatic valve member permits passage of gas through the globe valve freely at all times until the temperature of the water to be heated rises beyond the temperature at which the fusible plug is intended to melt.

At this danger temperature the plug melts out and the water under pressure within the heater flows in against the plunger, forcing the plunger away from the plug into position to shut off the gas supply.

The coincident closure of the water valve prevents passage of water from the boiler into the gas system.

45 The end of the plunger is slotted at 58 to permit the use of a screw-driver for the purpose of oscillating the valve 37 upon its seat 32 so as to grind the valve into its seat.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

55 Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A piston operated normally open fuel cut-off valve adapted to be closed by the pressure of liquid upon the piston from within a heater and a fuse element normally preventing admission of the liquid in the

heater to the piston and upon failure of which the closure takes place.

2. A piston operated normally open fuel cut-off valve spring-pressed open and adapted to be closed by the pressure of liquid upon the piston from within a heater and a fuse element normally preventing admission of liquid in the heater to the piston and upon failure of which closure takes place.

3. In a fuel cut-off valve for operation by the liquid pressure of a heater, a globe valve body in combination with a bonnet unit, a valve stem longitudinally movable in the unit, a normally open disc valve upon the inner end of the stem adapted to close upon a valve seat in the body, conduit connection between the outer end of the bonnet and the heating fluid in the heater and a fusible plug in the conduit adapted to fail when the temperature reaches the desired upper limit permitting the fluid within the heater to reach the outer end of the stem to close the valve.

4. In a normally open fuel cut-off valve for operation by the liquid pressure of a heater, a globe valve body in combination with a bonnet unit, a stem longitudinally slidable in the bonnet, a valve seat in the body, a second seat in the bonnet coaxial with the first, tandem sealing members upon the stem having faces adapted to respectively engage the seats simultaneously, conduit connection between the outer end of the bonnet and the heating fluid in the heater, and a fusible plug in the conduit presented to the heat of the heater.

5. In a normally open fuel cut-off valve for operation by the liquid pressure of a heater, a globe valve body in combination with a bonnet unit, a stem longitudinally slidable in the bonnet, a valve seat in the body, a second seat in the bonnet coaxial with the first, tandem sealing members upon the stem having faces adapted to respectively engage the seats simultaneously with one of the faces yieldable with respect to the other and normally at a slightly greater distance from the other than the distance between the seats, conduit connection between the outer end of the bonnet and the heating fluid in the heater, and a fusible plug in the conduit presented to the heat of the heater.

6. In a normally open fuel cut-off valve for operation with a heater fed with fuel through the valve, a piston adapted to close the valve, a cylinder within which the piston operates, conduit connection between the cylinder and fluid inside the heater and a fuse element in the conduit at the heater normally sealing the fluid in the heater from the piston.

7. In a valve cut-off device for insertion in the fuel supply line to a fluid-heater, inlet and outlet compartments, a wall between

these compartments perforated and having a seat around the perforation, a normally open valve element adapted to engage the seat to close communication between the 5 compartments, a stem carrying the valve, a piston on the stem, a cylinder slidably supporting the piston, conduit connection between the cylinder at the rear end of the piston and fluid inside the heater and a fuse element in the connection at the heater nor- 10 mally sealing the liquid in the heater from the piston.

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