Oct. 29, 1929. P. D. FOWLER 1,733,340

THERMOSTATIC GAS CUT-OFF FOR HOT WATER BOILERS

Filed Jan. 20, 1922

Fig. 1.

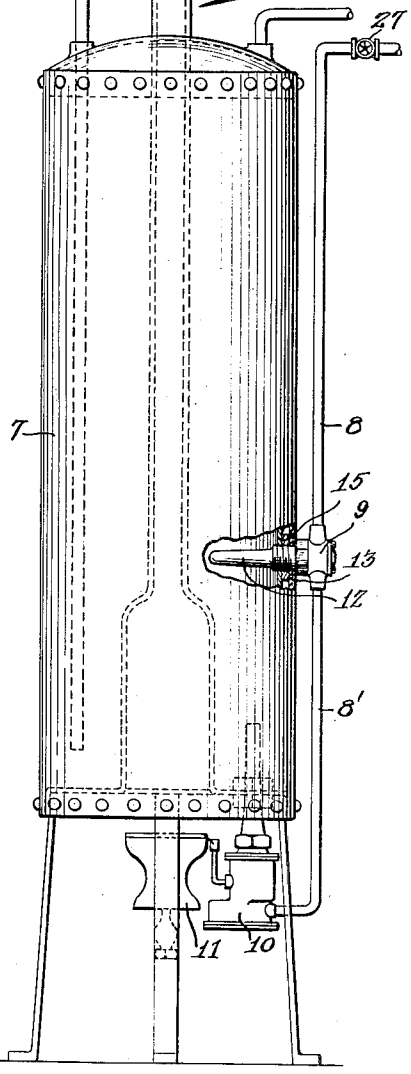


Fig. 2.

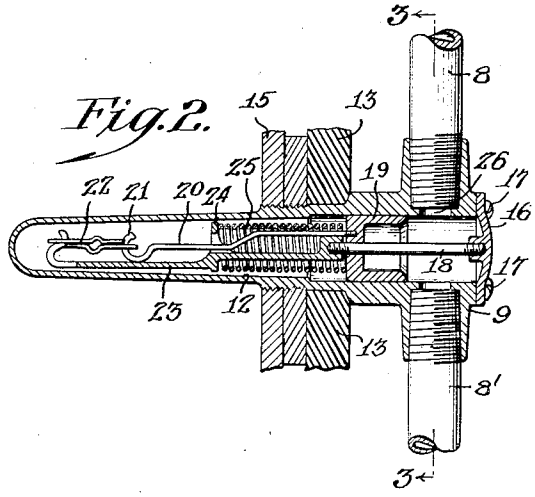


Fig. 3.

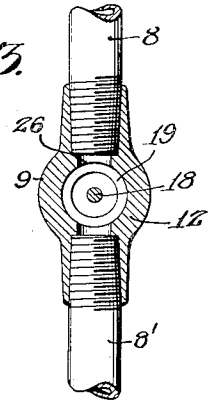


Fig. 4.

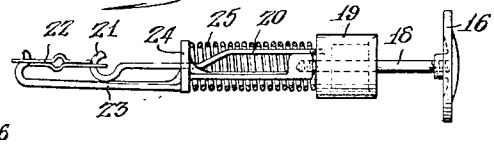
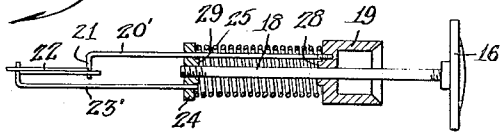


Fig. 5.



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UNITED STATES PATENT OFFICE

PHILIP D. FOWLER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO LOVEKIN WATER HEATER COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

THERMOSTATIC GAS CUT-OFF FOR HOT-WATER BOILERS

Application filed January 20, 1922. Serial No. 530,571.

My invention relates to safety devices for heaters and comprises an automatic fuel cut-off intended to operate if and when the temperature of the water reaches a predetermined point. It is designed specifically for use with domestic water heaters, hot water furnaces, steam generators and other fluid heaters burning gas or oil.

My object is to provide a heater with a fuse cut-off to the fuel supply for limiting the rise in temperature within the heater with the fuse element located so as not to be subjected to direct contact (and consequent possible deterioration) with the water or other fluid within the heater and removable without breaking the connection with the heater.

A further object is to provide a heater with a fuse cut-off to the fuel supply to limit the rise in temperature within the heater, with the fuse element located out of direct contact with the contents of the heater and easily removable and replaceable without in any way disturbing the fuel connections of the heater.

A further object is to provide a heater with a fuse cut-off to the fuel supply to limit the rise in temperature within the heater, with the fuse element located within a well insertible within the heater and having an outer portion within which the cut-off is located.

A further object is to provide a self-contained thermostatically-controlled spring-actuated cut-off element which is removable without affecting the gas and water connections.

A further object is to mount a fuse cut-off by a stem upon the cap of a casing insertible into the heater and controlling a transversely-directed fuel line, the fuse cut-off being removable with the cap without disconnection of the fuel lines.

Further objects of my invention will appear in the specification and claims.

I have preferred to illustrate my invention by a single form only, selecting a form which has proved to be practical, efficient and reliable and which at the same time well illustrates the principles of my invention.

Figure 1 is a side elevation of my fuse cut-off suitably connected to a domestic water heater, the body of the heater being partially cut away to show the structure;

Figure 2 is a vertical enlarged detail section showing my fuse cut-off and the fuel supply line of the heater;

Figure 3 is a section upon line 3—3 of Figure 2;

Figure 4 is a partial longitudinal section of the removable cut-off element;

Figure 5 is a detail section of a modification, the view being similar to that of Figure 4.

In the drawings similar numerals indicate like parts.

I have illustrated my invention in connection with domestic hot water heater service because of the expectation of its finding its greatest usefulness in this art.

In non-automatic gas heaters for this purpose there is no other control for the burner than hand-operation by the user, and since the relief valves used depend upon pressure for operation, at which time the temperature is already undesirably high, these boilers are dependent for their protection from overheating upon the recollection of the user, who watches the heater and turns off the gas when the water is sufficiently hot.

Relief valves are used in the water connections, but these do not go to the source of the trouble, as they permit the burner to continue in operation. My thermo-static control cuts off the gas supply and affords complete and automatic protection against overheating.

Besides this non-automatic domestic heater use, in which the cut-off affords the only control of the gas supply, my invention is of considerable value in conjunction with all automatic water heaters, whether of instantaneous or of storage type, since the automatic gas-control valves of all of them are subject to interference in their operation by gumming of movable parts or by clogging in partly open position due to foreign matter carried by the gas or by the water (in the case of water control) and deposited or trapped in the path of the valve or plunger so as to maintain the gas valve in partly open position.

When it is considered that many of these valves do not open more than one thirty-second of an inch for full gas flow, the possibilities of trouble from these sources will be evident and such trouble has frequently occurred in use. By reason of the increasing use of automatic heaters I have preferred to illustrate the invention as auxiliary to the automatic control valves of such heaters rather than as the only gas control in non-automatic heaters.

Referring to the drawings,—in Figure 1, 7 is a usual domestic water heater with fuel supply line 8 and 8′, my improved fuse cut-off valve 9, usual thermostatic burner control valve 10 and usual burner 11. In normal operation the fuel supply is controlled by the thermostatic valve 10 so as to maintain any desired temperature within the heater. If, however, for any reason the temperature within the heater mounts to some predetermined limit of safety, then my improved fuse cut-off is intended automatically to shut off all of the fuel, closing down the heater until an attendant has put a new fuse link in place.

The casing 12, which is treated as a well, is adapted for threaded insertion into the heater and serves as a cover for a cut-off valve controlling the fuel supply line 8, 8′. The insulation 13 surrounds the heater shell 15.

The casing cap 16 is fastened to the well 12 by screws 17, and supports a stem 18 extending into the well. The stem carries the automatic fuse cut-off mechanism, comprising a fuse-retained spring-actuated valve. The valve 19 slides upon the stem 18 and carries a tie-rod 20 terminating in a hook 21.

The hook engages one end of a fusible link 22, the other end of which is hooked to an extension member 23 rigid with the stem 18. The member 23 has a flange portion 24 giving an inner bearing to a spiral spring 25, the other end of which spiral bears against the slidable valve 19.

I prefer to use a tubular valve and to have it cut off against the inlet and outlet ports at opposite sides of the casing by which the gas enters and leaves the casing when the valve is open. This gives additional safeguard against flow of gas with a balanced construction and plenty of width within the space occupied by the valve for withdrawal of the entire self-contained valve element including the operating mechanism.

The self-contained element comprises in the illustration the valve, the spring pressing it toward closed position, and the fusible member which restrains the spring; but it will be evident that the parts need not be arranged in the relation shown as the breadth of claim permits considerable variation in their relative setting.

The fusible link 22 may be of any suitable form; in that illustrated, solder fusible at the desired temperature holds together two pieces of metal one of which is hooked to the tie-rod 20 and the other to extension member 23, the position of the tire-rod being then such as to hold the valve 19 back from the ports 26 against the action of the spring 25. The spring is compressed between the flange 24 and the rear face of the valve 19. When the solder fuses the two pieces of metal fly apart and the valve closes the ports 26, shutting down the heater. To again start up the heater an attendant must close the valve 27, take out the cut-off mechanism, replace the fuse link 22, reinsert the cut-off mechanism, again open the valve 27 and light the pilot burner.

In the modification shown in Figure 5, the stem 18 extends to the flange 24 and a separate rod 23′ is turned laterally to hook the fusible link 22. The tie-rod 20, rigidly fastened to the valve 19, passes through a hole in the flange 24 and hooks into the other end of the fusible link 22. Bosses 28 and 29 may be formed upon the bearing faces of the valve 19 and the flange 24, to act as central guides for the spring 25.

It will be obvious to those skilled in the art that the construction of my invention may be varied considerably, to meet particular conditions or to satisfy individual whims, and I purpose including herein all such variations and modifications as fall within the reasonable spirit and scope of my invention.

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

1. In a heater or container of heated fluid, connections for fluid fuel, a safety cut-off therefor comprising a member that is simultaneously a well and an outer casing in line with the well to hold a cut-off valve, a cap for the well, a stem secured to the cap, a cut-off valve, a spring adapted to close the valve and a fusible holder for the spring adapted to keep the valve normally open against the pressure of the spring.

2. In a heater or container of heated fluid, connections for fluid fuel, a safety fuel cut-off therefor comprising a member that is simultaneously a well and an outer casing in line with the valve and adapted to hold a cut-off valve, a valve therefor, and a fusible spring retracted retaining member for the valve located within the wall member and closing the valve with release of the spring.

3. In a heater or container of heated fluid, connections for fluid fuel, a safety fuel cut-off therefor comprising a member that is simultaneously a well and an outer casing for a cut-off valve, a slidable valve therefor axially in line with the well, a spring tending to hold the valve closed and a fusible link within the well member determining the position of the cut-off valve.

4. In a heater or container of heated fluid, a fuel cut-off comprising a well and a valve

inside the well, fuel connections for the fuel, fusible link retaining devices inside the well, the fusible link being under tension and the valve and retaining device being removable from the end of the well to replace the fuse.

5. In a heater or container of heated fluid, a well having gas connections and a gas valve seat and a self-contained automatic valve, spring-pressed toward closing position, having a fusible link restraint for said spring considerably under tension and removable from the well for replacement of the link and removable means for retaining the parts within the well.

6. In a heater or container for heated liquid, a well in use normally lying within the container and having exterior connections for the passage of fuel, in combination with a thermally controlled spring-closed valve element removable from the well for replacement of the thermostatic element and free from disconnection of the fuel connections during removal and removable means for retaining the parts within the well.

7. In a heater or container for heated liquid, a well adapted to form a liquid-tight joint with the container, within the container and having connections for fuel passage exterior to the container, in combination with a fuel cut-off normally lying within the well and removable therefrom for replacement of the thermal element free from interference with connections for the gas supply and removable means for retaining the parts within the well.

8. In a heater or container for heated liquid, a container, a well fitting therein and having a valve seat near its outer end, fuel connections on opposite sides of said valve seat, a valve for said valve seat, movable lengthwise of the well, a spring adapted to close the valve against the valve seat, and a thermal element and connections for retaining the valve normally against closure, all removable through the space occupied by the valve and removable means for holding the parts within the well.

9. In a heater or container for heated liquid, a container, a well adapted to fit therein, extending outside the container and having a tubular valve seat near its outer end extending axially of the well, inlet and outlet fuel supply connections on opposite sides of the tubular valve seat, a tubular valve movable lengthwise of the well to close against the valve seat, a spring and connections pressing the valve outwardly and a fusible element and connections normally restraining the spring to hold the valve open, the valve spring and fusible element and connections being removable through the valve seat and removable means for holding the parts within the well.

10. In a heater or container for heated liquid, a container, a well adapted for insertion within the container and having a valve seat, gas connections for the well providing flow through the valve seat, a self-contained thermally-controlled spring-actuated valve for said valve seat normally located within the well and removable through the valve seat while the well is connected and removable means for holding the valve within the well.

11. In a heater or container for heated liquid, a container for water, a well adapted for insertion within the container and having a valve seat, gas connections for the well providing flow through the valve seat and a self-contained thermally-controlled spring-actuated valve for said valve seat removable from the well across the valve seat while the water and gas connections remain in position and removable means for holding the valve within the well.

12. In a heater or container for heated liquid, a well adapted for insertion within the container and having its walls extended to form a cylindrical space in line with the well, inlet and outlet gas connections opening into said space, a cylindrical valve element adapted to close the inlet and outlet connections in one position of the valve element, a spring normally pressing the valve element toward said position and a fusible-link-retained restraining means for said spring mounted in the well.

13. In a heater or container for heated liquid, a well adapted for insertion with the container and having its walls extended to form a cylindrical space in line with the well, inlet and outlet gas connections opening into said space, a cylindrical valve element adapted to close the inlet and outlet connections in one position of the valve element, a spring normally pressing the valve element toward said position, a closure for one end of the cylindrical space, a fusible link, means connected with one end of the link for holding the spring in compression and a mount for the other end of the link supported from the closure and adapting the valve element, spring-compressing member, link and mount for removal when the cover is removed.

14. A container for heated liquids in combination with a well therefor having a cylindrical valve space outside the container, to and from which gas is supplied, a valve element therefor, fusible-link-retained spring closure for said valve removable through the valve space for replacement of the link and removable means for holding the spring closure within the well.

15. In a heater or container for heated liquid, a well adapted to fit within the container and extended outside of the container to form a cylindrical chamber to which gas inlet is supplied and from which gas outlet flows, one of the openings being adapted to be valve closed, in combination with a closure for the end of the space, a valve adapted to fit the

valve chamber, a fusible-link connected at one end with the valve, a support for the other end of the link, a spring pressing the support and valve member in opposite directions and a mount for the support from the cover extending through the valve.

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