R. E. LOVEKIN.

PROTECTIVE DEVICE FOR FLUID HEATERS.

APPLICATION FILED DEC. 29, 1915.

1,248,143.

Patented Nov. 27, 1917

2 SHEETS—SHEET 1.

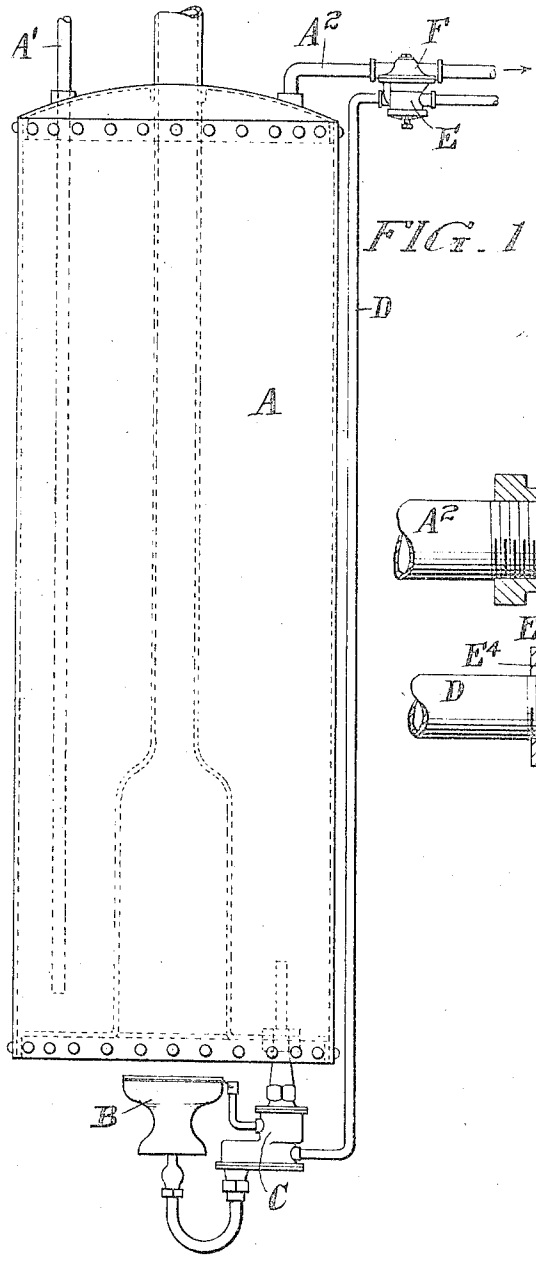
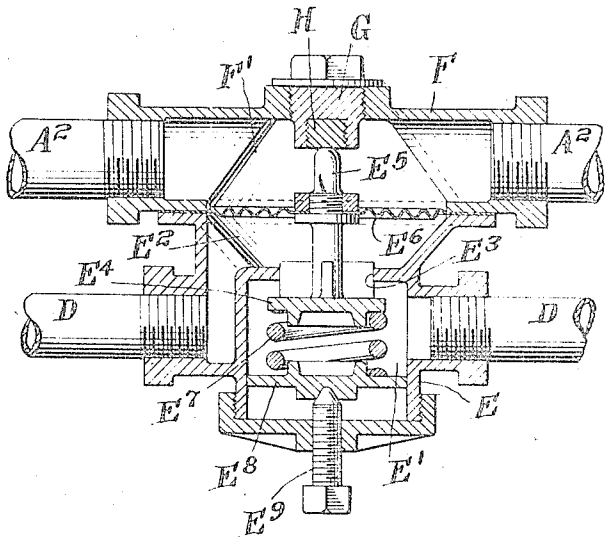


FIG. 1.

FIG. 2.



Witness

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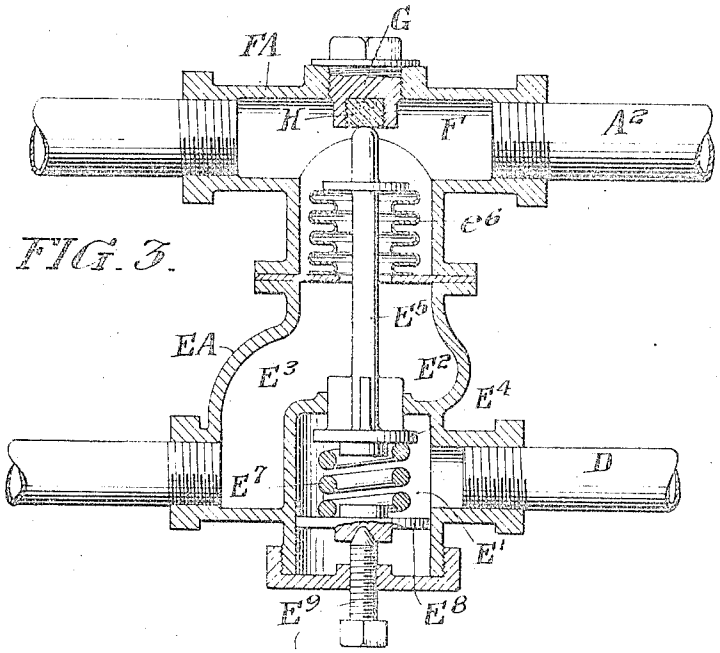

FIG. 3.

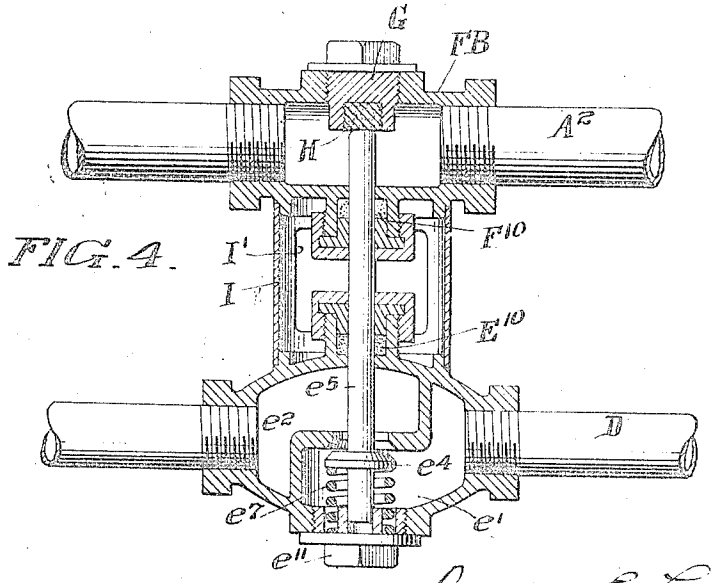

FIG. 4.

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PROTECTIVE DEVICE FOR FLUID-HEATERS.

1,248,143. Specification of Letters Patent. Patented Nov. 27, 1917.

Application filed December 29, 1915. Serial No. 69,151.

To all whom it may concern:

Be it known that I, RAYMOND E. LOVEKIN, a citizen of the United States of America, and resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Protective Devices for Fluid-Heaters, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My present invention is designed for use in connection with domestic water heaters, steam generators and other fluid heaters in which the heat absorbed is derived from the combustion of fluid fuel, and the object of my invention is to provide a simple and effective protective device for closing a valve controlling the fuel supply on a rise in temperature of the fluid heated to a predetermined maximum value.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the advantages possessed by it, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described preferred forms of apparatus embodying my invention.

Of the drawings:

Figure 1 is a view showing a gas heater equipped with my invention;

Fig. 2 is a sectional elevation of the protective mechanism proper employed in Fig. 1;

Fig. 3 is a view taken similarly to Fig. 2 showing a slightly modified construction; and

Fig. 4 is also a view taken similarly to Fig. 2 showing still another modification.

In the domestic water heater shown in Fig. 1 as an example of one of the numerous forms of fluid heaters with which my invention may be advantageously employed, A represents the heater proper; A′ the cold water inlet thereto, and A^2 the hot water outlet therefrom. B represents the gas burner for heating the water; C is a thermostatic valve normally controlling the fuel supply to the burner B through the fuel supply pipe D, and E represents the protective valve placed in the supply pipe D and serving to cut off the supply of fuel to the burner B when the temperature of the water heated reaches a prescribed maximum.

In the form of my invention illustrated in Fig. 2, the valve E is formed with an inlet chamber E′ and an outlet chamber E^2 connected to the inlet chamber by the port E^3. E^4 represents a normally open valve member which closes and obstructs the flow of gas to the burner when the protective device comes into operation. The stem E^5 of the valve member E^4 projects into a chamber F′ receiving the fluid heated by the combustion of the fuel supplied through the valve E. As shown, the chamber F′ is formed in a tubular fitting connected in the hot water outlet pipe A^2 from the heater in close proximity to the latter. The chamber F′ is separated from the outlet chamber E^2 of the gas valve E by a flexible diaphragm E^6 through the center of which the stem E^5 passes. In the construction shown the diaphragm E^6 is rigidly connected to the stem E^5, and in such manner as to prevent leakage between the chambers E^2 and F. The end of the stem E^5 normally abuts against a body of fusible metal H which is advantageously held in a plug G screwed into an aperture in the wall of the member F in line with the stem of the valve E^5.

In the normal condition of the apparatus the fusible metal H positively holds the valve member E^4 in its wide open position. The fusible metal H is so chosen that it will melt or soften when exposed to the predetermined maximum temperature of the fluid heated at which the protective device should come into operation. When the fusible material H melts or softens under the temperature to which it is to respond, the valve E^4 immediately closes under the action of the spring E^7 which is under sufficient tension to overcome the effective pressure exerted against the diaphragm E^6 with the maximum fluid pressure in the chamber F′. An abutment E^8, and adjusting screw E^9 forms a means for adjusting the tension of the spring E^7.

After the valve E has closed in the manner described, it remains closed until the protective device is again put into its normal condition. This is readily accomplished by replacing the plug G, by a similar plug with solid fusible material H in place. The operation of securing the replacing plug G into place, automatically operates to force the valve member E^4 into its open position.

Those skilled in the art will understand that many changes may be made in the form of the apparatus shown without departing from the spirit of the invention set forth in the annexed claims. For example, in such a construction as is shown in Fig. 2, the diaphragm E^6 may well be replaced, in some cases, by a bellows as shown in the construction illustrated in Fig. 3 where the gas valve EA and the fitting FA differ from the valve E and fitting F of Fig. 2 only in the changes in form and proportion resulting from the use of a bellows e^6 in lieu of the diaphragm E^6 of Fig. 2. The use of the bellows in place of the somewhat simpler and less expensive diaphragm construction will ordinarily permit the use of a somewhat less powerful spring E^7.

The use of either the diaphragm or the bellows makes stuffing box provisions unnecessary to prevent leakage through the apertures through which the valve stem projects from the valve casing into the chamber containing the heated fluid. Stuffing boxes may be employed with advantage in some cases, however, and in Fig. 4 I have illustrated a construction in which one stuffing box, F^{10}, is employed to prevent leakage through the aperture for the valve stem e^5 in the fitting FB, and another stuffing box E^{10} is employed to prevent leakage of gas out of the valve casing EB. In the construction shown in Fig. 4, the fitting FB is shown as mechanically connected to the valve casing EB by the sleeve I which is sweated at its ends to the casing and fitting, and is cut away as indicated at I' to facilitate the adjustment of the stuffing box glands. The use of the stuffing boxes has the advantage that the force due to the pressure on the heated fluid against the valve stem e^5 is comparatively small, and hence the spring e^7 acting between the valve member e^4 and the valve casing cup member e^{11} may be a considerably weaker spring than would be needed if either of the constructions shown in Figs. 2 and 3 were employed. In the construction shown in Fig. 4 as in the other constructions illustrated, the body of fusible metal is in direct contact with the heated fluid, and the act of replacing a holder G in which a body of fusible metal has been softened, by another holder with the fusible metal in proper condition serves to force the valve member into its wide open position. It will be understood, of course, that the holder G for a body of fusible metal H which has melted or been deformed, may be put in condition for use again by pouring molten fusible metal into the cavity provided in the holder and allowing the metal to solidify.

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

1. A protective device for a fluid heater comprising a casing including a chamber receiving the heated fluid and formed with two apertures, a holder detachably secured to said casing and closing one of said apertures, a body of fusible material held by said holder at its inner side, and a valve mechanism controlling the fuel supply to the heater and including a valve operating member projecting into said chamber through the second of said apertures into engagement with said body of fusible material and normally held thereby in its valve open position, said valve mechanism also including provisions closing the valve when said fusible body is heated to the softening point.

2. A protective device for a fluid heater comprising a casing including a chamber receiving the heated fluid and formed with two apertures, a holder detachably secured to said casing and closing one of said apertures, a body of fusible material held by said holder at its inner side, a valve mechanism controlling the fuel supply to the heater and including a valve operating member projecting into said chamber through the second of said apertures into engagement with said body of fusible material and normally held thereby in its valve open position, said valve mechanism also including provisions for closing the valve when said fusible body is heated to the softening point, and a flexible element connected to said casing and said member and uniting with the latter to close said second aperture.

3. A protective device for a fluid heater comprising an inclosure formed with a chamber receiving the heated fluid and a valve chamber for the fuel supplied to the heater, and with apertures in the opposite walls of the first mentioned chamber and an alined aperture in the wall of the valve chamber adjacent thereto, a valve member in said valve chamber controlling the flow therethrough and having an operating stem projecting into the first mentioned chamber through the corresponding apertures, means coöperating with said valve stem to prevent leakage out of either of said chambers through the apertures traversed by the valve stem, a holder detachably secured to said inclosure and closing the second aperture in the first mentioned chamber, and a body of fusible metal carried at the inner side of said holder and normally engaging said valve stem to hold the valve in its open position.

RAYMOND E. LOVEKIN.