

March 10, 1936.

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2,033,336

FUEL CONTROL VALVE

Filed March 23, 1932

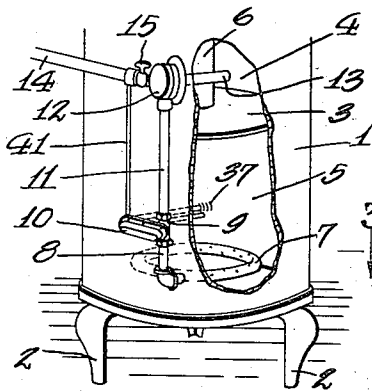


Fig. 1

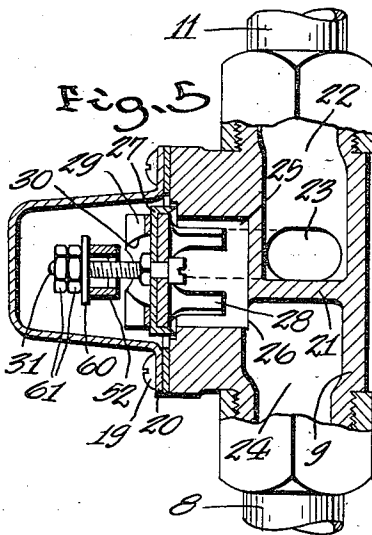
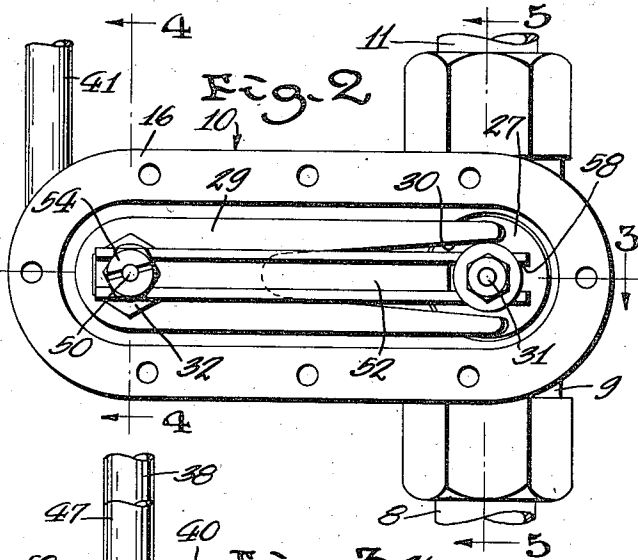


Fig. 3

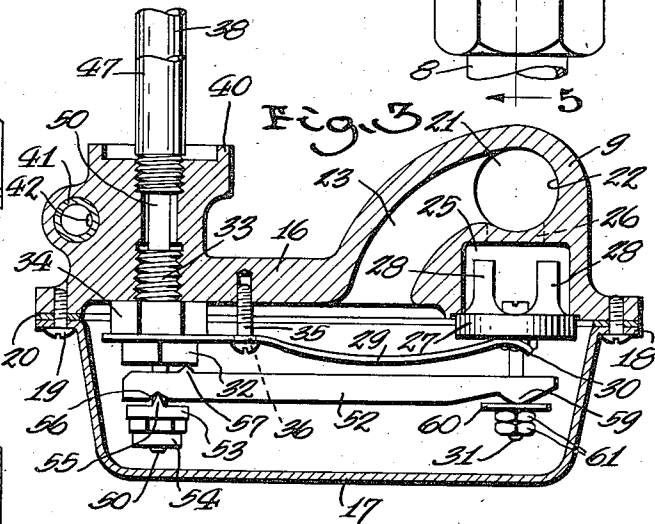
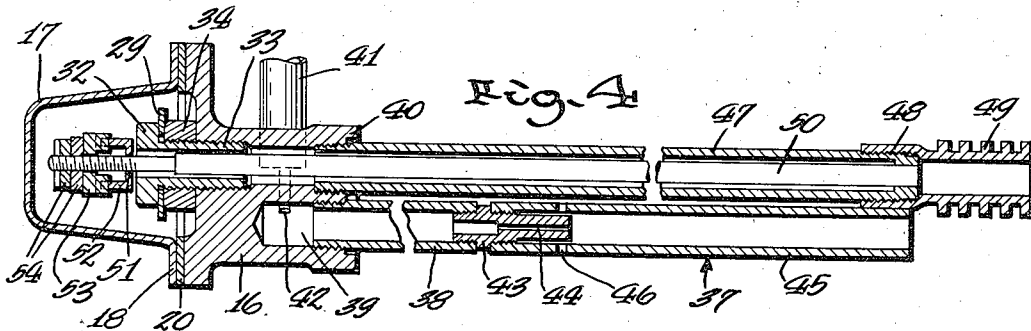


Fig. 4



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2,033,336

FUEL CONTROL VALVE

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Application March 23, 1932, Serial No. 600,592

4 Claims. (Cl. 158—117.1)

This invention relates to fuel control devices and particularly to devices for controlling the supply of fuel to a gas burner, and a principal object of my invention is to provide a new and improved device of this type.

In the drawing accompanying this specification and forming a part of this application, I have shown, for the purpose of illustration, one form which my invention may assume, and in this drawing:

Figure 1 is a perspective view, with parts broken away, of a heater embodying my invention,

Figure 2 is an elevational view of valve mechanism for controlling the supply of fuel to the burner of the heater,

Figure 3 is a horizontal sectional view taken on the line 3—3 of Figure 2,

Figure 4 is a vertical sectional view taken on the line 4—4 of Figure 2, while

Figure 5 is a vertical transverse sectional view taken on the line 5—5 of Figure 2.

Referring to the drawing, and particularly to Figure 1 thereof, my invention is shown as being embodied in a hot water heater comprising a cylindrical casing 1 supported by legs 2 and divided by means of a partition 3 into an upper water chamber 4 and a lower combustion chamber 5. A substantially tubular centrally disposed pipe or flue 6 communicates with the combustion chamber 5 and extends vertically through the water chamber 4 for permitting the products of combustion, generated in the combustion chamber 5, to escape to the outer atmosphere.

A substantially annular burner 7 is provided in the combustion chamber 5 and is supplied with fuel, such as gas, through a vertically extending pipe 8 which communicates at its upper end with a substantially T-shaped connection 9 of a valve device 10. A pipe 11 establishes communication between the upper end of the connection 9 and the lower end of a valve 12 which is controlled by a thermally responsive device 13 extending into the water chamber 4. This valve is normally maintained in an open position and is only closed when the temperature of the water in the chamber 4 reaches a predetermined maximum. A pipe 14, leading to a source of fuel supply, communicates with the pipe 11 through the valve 12, and the passage of fuel through the pipe 14 is also controlled by a manually operated valve 15.

The valve device 10 preferably comprises a casting 16 formed integrally with the T-connection 9 and carries a removable housing 17 pro-

vided with a flange 18, adapted to be secured to the casting 16 by means of screws 19 with an interposed packing 20, the housing containing the valve mechanism hereinafter to be described. The T-connection 9 is provided with a transversely extending partition 21 which divides the interior thereof into an upper or inlet chamber 22, which communicates with the interior of the housing 17 through a passage 23, and a lower or outlet chamber 24, which communicates with the interior of the housing 17 through a valve chamber 25, and an opening 26. The passage of fuel through the opening 26 is controlled by means of a valve member 27 which is provided with a plurality of spaced guiding lugs 28 for sliding engagement with the walls of the valve chamber 25. The valve member 27 is normally urged toward a closed position by means of a leaf spring 29, one end of which is bifurcated as at 30, for engagement with the valve member 27 on opposite sides of a valve stem 31 carried thereby. The other end of the leaf spring 29 is secured between the head 32 of a nipple 33, which is threaded into the casting 16, and a lock nut 34, which is threaded onto the nipple for abutting engagement with the casting 16. The tension of a leaf spring 29 may be regulated by means of an adjusting screw 35 which extends through a slot 36 provided in the leaf spring 29 and which is threaded into the casting 16.

The burner 7 has associated therewith a pilot burner, indicated in its entirety at 37, and comprising a tubular section 38 which is threaded into a bore 39 provided in a boss 40 formed integrally with the casting 16. Fuel is supplied to the burner 37 through a vertically extending bypass pipe 41 communicating at its upper end with the pipe 14 in advance of the valve 15, and at its lower end with a passage 42 which is provided in the boss 40 and which communicates with the bore 39. A nipple 43 is threaded into the inner end of the section 38 and is provided with an axial bore 44. This nipple has a screw-threaded engagement with and projects into one end of a burner tip 45 which is provided with a plurality of air inlet openings 46 at a point just to the rear of the end of the nipple 43 for admitting air into the tip 45 for mixture with the gas in the usual manner.

Also threaded into the boss 40 and extending parallel to the pilot burner 37 in relatively close proximity thereto is a tube 47 of copper, or other metal having a high coefficient of expansion when subjected to heat. The inner end of the tube 47 is provided with a terminal member 48

which is threaded thereon and which has a plurality of circumferential fins 49 in order to provide a relatively large surface area in comparison to its over all dimensions. The tip 48 is formed of a metal having a relatively high coefficient of thermal conductivity and is located adjacent to the end of the burner 37 and at a point directly above the pilot flame.

A rod 50, constructed of a metal having a relatively low coefficient of expansion when subjected to heat, such as invar, is secured at its inner end to the tube 47 and extends entirely through the tube 47, the boss 40, the nipple 33, and projects into the housing 17. The outer end of the rod 50 extends through an opening 51 provided in one end of a lever 52 of channel-construction, and carries a collar 53 which is maintained against displacement by means of a plurality of lock nuts 54 which are threaded onto the outer extremity of the rod 50. The collar 53 is provided with diametrically extending knife bearing surfaces 55 for engagement with notches 56 provided in one side of the lever 52. The lever 52 is mounted for horizontal swinging movement about a knife bearing surface 57 formed on the lever for engagement with the head 32 of the nipple 33. The other end of the lever 52 is bifurcated, as indicated at 58 in Figure 2, and straddles the valve stem 31 and is formed with rounded bearing surfaces 59 for rocking engagement with a washer 60 which is carried by the valve stem 31 and which is maintained against displacement thereon by means of a plurality of lock nuts 61.

It will be apparent from the foregoing that the pilot burner is directly supplied with fuel and maintains a constant pilot flame for igniting gas whenever it issues from the burner 7 as a result of the operation of the valve 12. This pilot heats the terminal member 48 and heat is thereby transmitted to the tube 47 by conduction, causing the tube 47 to elongate and draw the rod 50 inwardly through the tube 47. This movement of the rod 50 swings the lever 52 in a clockwise direction about its fulcrum 57, as viewed in Figure 3, thus maintaining the valve 27 open against the action of the leaf spring 29, and permitting uninterrupted passage of the fuel to the burner 7. If, however, the flame at the pilot burner 37 should become extinguished through any cause, the member 48 and tube 47 will cool, causing the tube 47 to contract and permit the lever 52 to swing in a counter-clockwise direction, as viewed in Figure 3 to permit the valve member 27 to close under the influence of the leaf spring 29, interrupting the flow of fuel to the burner 7 regardless of the operation of the valve 12.

Fuel is thus prevented from escaping from the burner 7 so long as the pilot light is extinguished, but when the pilot light is ignited, the tube 47 will expand and open the valve member 27, restoring the supply of fuel to the burner 7, as hereinabove described.

It will be noted from an inspection of Figure 3 of the drawing, that the length of the lever arms of the lever 52 is such that the valve member 27 is moved a relatively great extent in proportion to the movement of the rod 50, thus enabling a relatively small movement of the tube 47 to affect a relatively great movement of the valve member 27 and afford free passage of gas to the burner 7.

Furthermore, it will be appreciated that the rounded bearing surfaces 59 of the lever 52 may

rock upon the washer 60 to compensate for the pivotal movement of the lever 52, and the position of the washer 60 may be adjusted by manipulation of the lock nuts 61, thereby enabling cooperative relation between the lever 52, and valve 27 to be accurately adjusted. Likewise the lock nuts 54 may be manipulated to obtain accurate adjustment of the bearings 55 and 57 and thus accurately correlate the movements of the rod 50 and lever 52.

The tension exerted by the spring 29 upon the valve member 27 may be accurately regulated by manipulation of the adjusting screw 35. In this way the tension of the spring can accurately be adjusted so that it will hold the valve 27 tightly closed when it should be closed, and prevent possibility of leakage, yet not hold the valve 27 so tightly closed as to offer undue resistance to the movement of the thermostatic elements operating to open the valve 27.

It will be apparent to those skilled in the art that the invention herein disclosed accomplishes at least the principal object of the invention, and further that uses and advantages other than those herein referred to are inherent in the construction, and that various changes and modifications may be made in said embodiment without departing from the spirit of the invention, and accordingly the embodiment herein disclosed is illustrative only, and the invention is not limited thereto.

I claim:

1. A fuel control device for a burner having a fuel supply conduit, comprising: a housing interposed in said conduit; a valve in said housing mounted for opening and closing movements; an elongated spring having an end portion bearing upon said valve and urging the same closed; means for anchoring said spring adjacent its opposite end including a hollow headed nipple threaded into said housing and having a lock nut thereon between which and the head of said nipple the end of the spring is clamped; an operating member extending into said housing through said nipple; and means for transmitting movement of said operating member to effect opening movement of said valve.

2. A fuel control device for a burner having a fuel supply conduit, comprising: a housing interposed in said conduit; a valve in said housing mounted for opening and closing movements; an elongated spring having an end portion bearing upon said valve and urging the same closed; means for anchoring said spring adjacent its opposite end including a hollow headed nipple threaded into said housing and having a lock nut thereon between which and the head of said nipple the end of the spring is clamped; an operating member extending into said housing through said nipple; and means for transmitting movement of said operating member to effect opening movement of said valve, said transmitting means comprising a lever pivotally supported by said operating member, provided with a fulcrum portion engageable with the head of said nipple, and having its working end operatively connected to said valve.

3. A fuel control device for a burner having a fuel supply conduit, comprising: a housing interposed in said conduit; a valve in said housing mounted for opening and closing movements, and carrying an abutment thereon; an elongated spring having an end portion bearing upon said valve and urging the same closed; means for anchoring said spring adjacent its opposite

end including a hollow headed nipple threaded into said housing and having a lock nut thereon between which and the head of said nipple the end of the spring is clamped; an operating member extending into said housing through said nipple; and means for transmitting movement of said operating member to effect opening movement of said valve, said transmitting means comprising a lever pivotally supported by said operating member, provided with a fulcrum portion engageable with the head of said nipple, having its working end extending to a point adjacent to said valve, and provided at said working end with rounded engaging surfaces engageable with the abutment carried by said valve.

4. A device of the character described, comprising: a member having a fuel inlet and a fuel outlet and provided with a valve seat affording communication between said inlet and said outlet; valve mechanism disposed outwardly of said

member and comprising a valve cooperable with said seat and having a portion disposed outwardly of said member, an elongated spring having an end portion bearing upon said valve and urging the same to seating engagement with said seat, means for anchoring said spring adjacent its opposite end including a hollow-headed nipple threaded into said member and having a lock nut thereon between which and the head of said nipple the end of said spring is clamped, thermally responsive means having a portion secured to said member and provided with an operating member extending through said nipple, lever means connected at one point to said operating member, and at a spaced point to said valve portion; and a cover affixed to said member and normally enclosing said valve mechanism, said cover being removable to provide ready access to said valve mechanism.

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