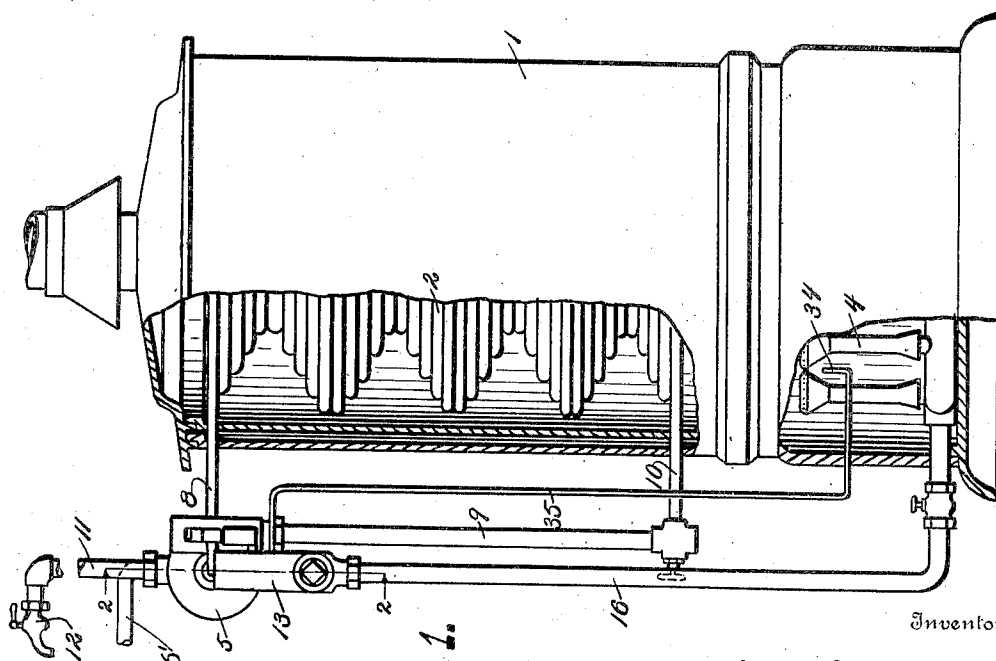
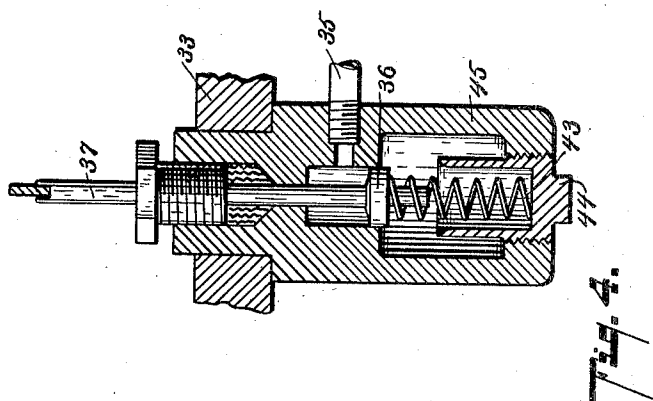


H. S. HUMPHREY.
WATER HEATER.
APPLICATION FILED JAN. 15, 1909.

1,006,556.

Patented Oct. 24, 1911.

5 SHEETS—SHEET 1.



Witnesses

Gertrude Tallman
Clara E. Braden

Fig. 1.

384

Herbert S. Humphrey
Charles Earl

Inventor

Attorney

H. S. HUMPHREY.
WATER HEATER.
APPLICATION FILED JAN. 15, 1909.

1,006,556.

Patented Oct. 24, 1911.

6 SHEETS-SHEET 2.

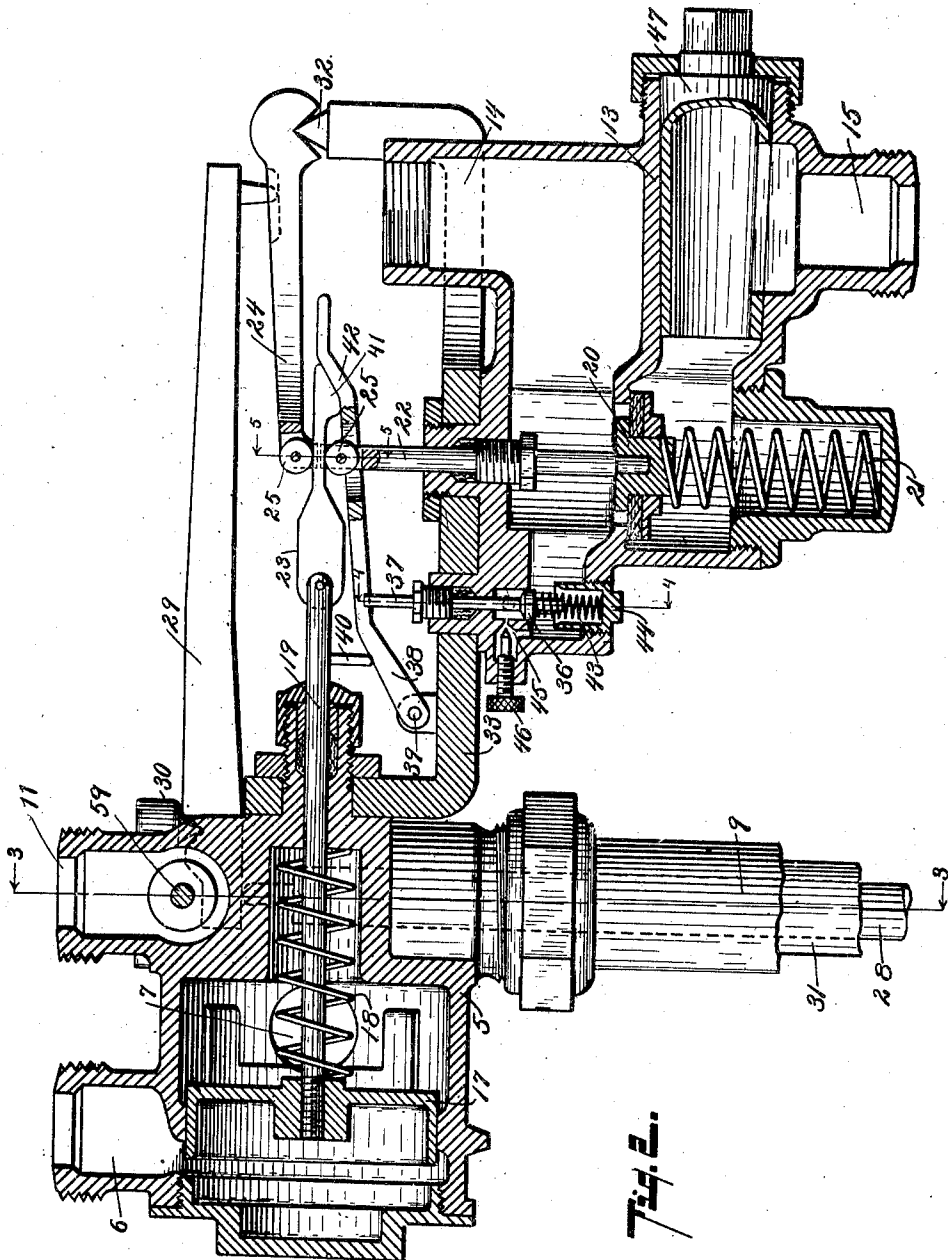


Fig. 2.

Inventor

Herbert S. Humphrey
Chapman & Co.

Attorneys

Witnesses

Gertrude Tallman
Clara E. Braden

By

H. S. HUMPHREY.
WATER HEATER.
APPLICATION FILED JAN. 15, 1909.

1,006,556.

Patented Oct. 24, 1911.

6 SHEETS—SHEET 3.

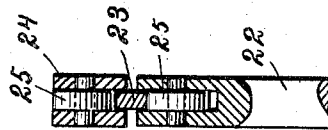


Fig. 5.

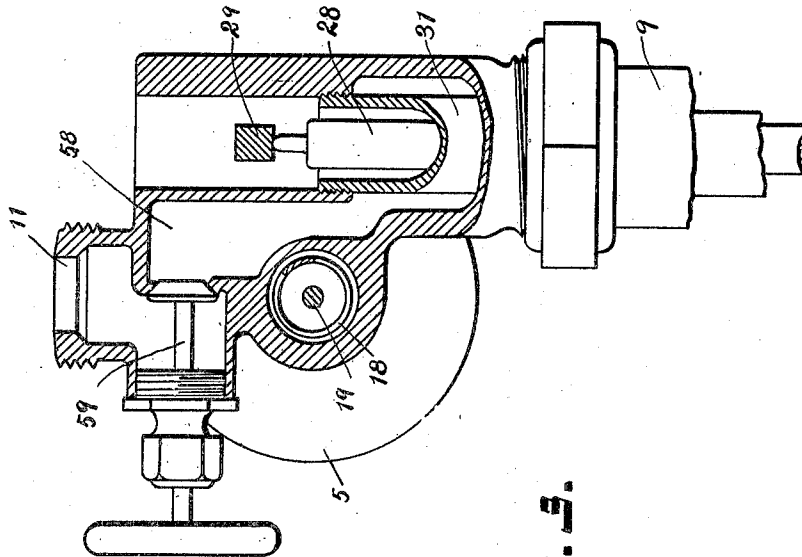


Fig. 3.

Inventor

Witnesses

Gertrude Tallman,
Clara E. Praden

Herbert S. Humphrey
By L. H. Appleton

Attorneys

H. S. HUMPHREY.
WATER HEATER.
APPLICATION FILED JAN. 15, 1909.

1,006,556.

Patented Oct. 24, 1911.

5 SHEETS—SHEET 4.

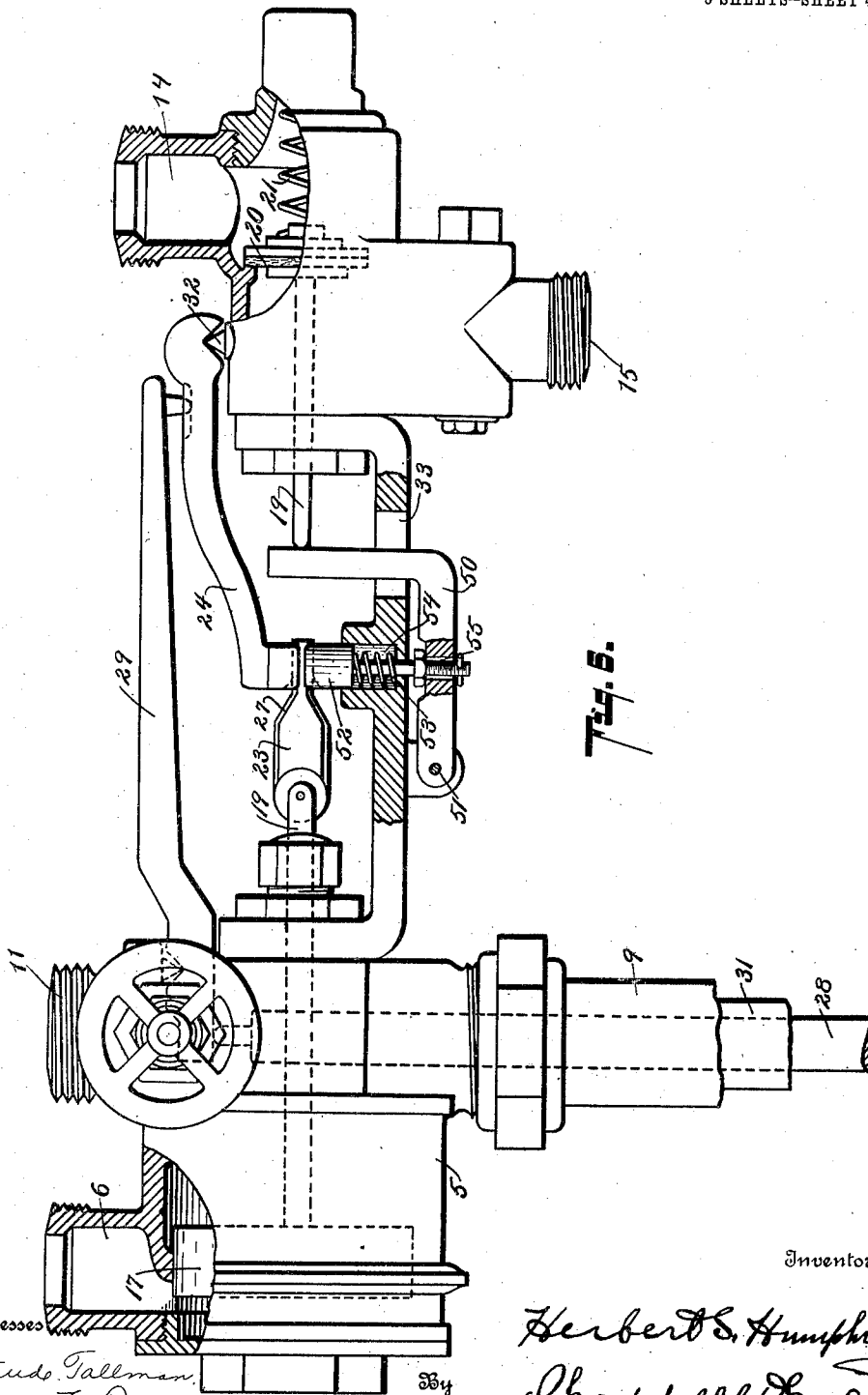


Fig. 5.

Witnesses

Gertrude Tallman
Clara E. Braden

By

Inventor

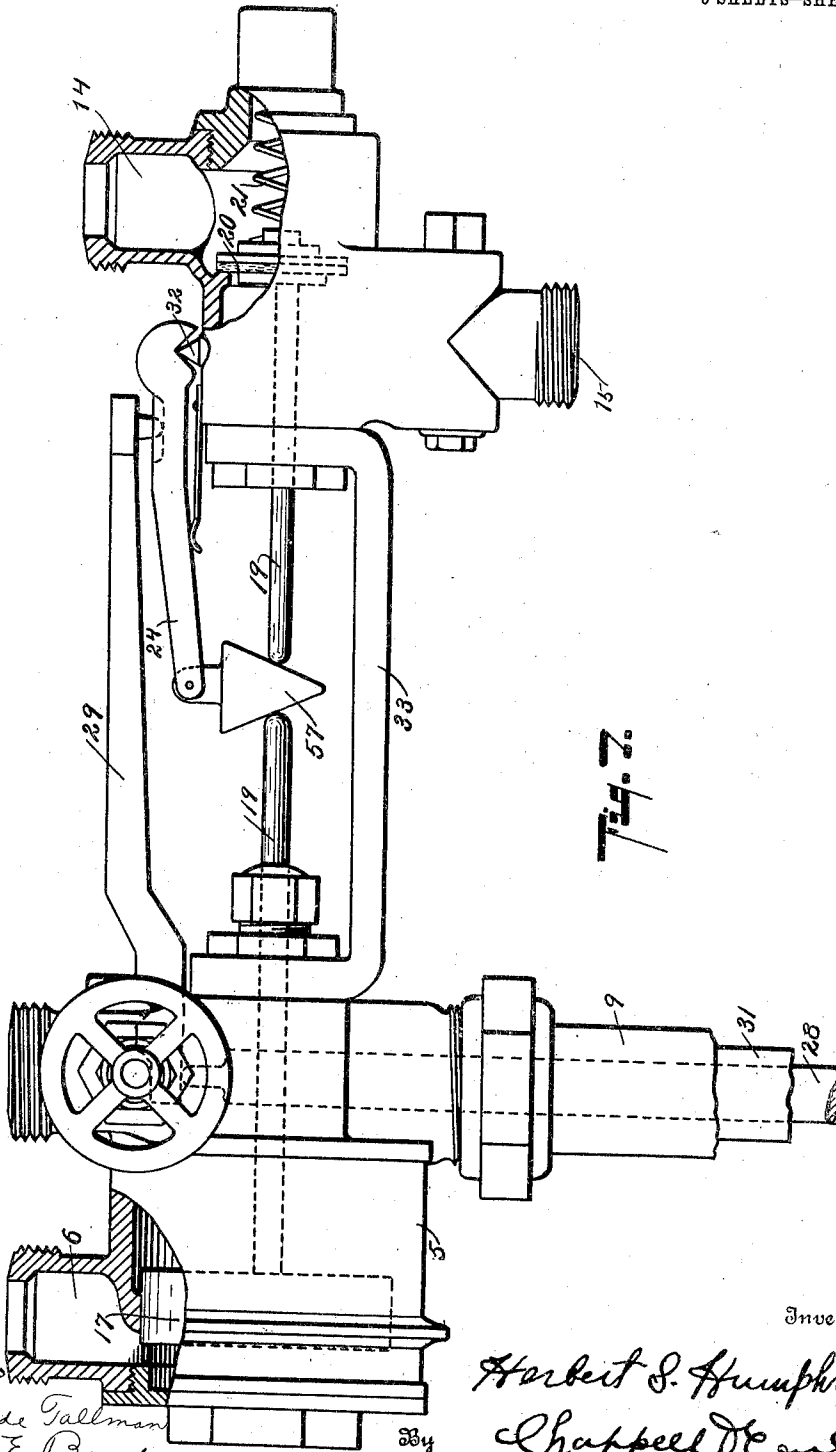
Herbert S. Humphrey
Chapell & Co.
Attorneys

H. S. HUMPHREY.
WATER HEATER.
APPLICATION FILED JAN. 15, 1909.

1,006,556.

Patented Oct. 24, 1911.

5 SHEETS—SHEET 5.



Witnesses
Gertrude Tallman
Clara E. Braden

Inventor
Herbert S. Humphrey
Chapman & Co.

Attorney

UNITED STATES PATENT OFFICE.

HERBERT S. HUMPHREY, OF KALAMAZOO, MICHIGAN.

WATER-HEATER.

1,006,556.

Specification of Letters Patent.

Patented Oct. 24, 1911.

Application filed January 15, 1909. Serial No. 472,462.

To all whom it may concern:

Be it known that I, HERBERT S. HUMPHREY, a citizen of the United States, residing at the city of Kalamazoo, county of Kalamazoo, and State of Michigan, have invented certain new and useful Improvements in Water-Heaters, of which the following is a specification.

This invention relates to improvements in water heaters.

The main objects of this invention are: First, to provide in a water heater an improved control mechanism whereby the fuel valve is automatically controlled by the water and by the thermostat coacting the one with the other. Second, to provide in a water heater an improved valve mechanism for automatically controlling the temperature of the water while the water is being drawn. Third, to provide in a water heater an improved pilot flashing means. Fourth, to provide in a water heater an improved automatic control means which is very simple and efficient and not likely to get out of repair in use.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawing, forming a part of this specification, in which:

Figure 1 is a detail elevation of a structure embodying the features of my invention, a portion of the heater casing being broken away to better show the arrangement of the parts. Fig. 2 is an enlarged detail vertical section through the valve mechanism taken on a line corresponding to line 2—2 of Fig. 1. Fig. 3 is an enlarged detail partially in section, on a line corresponding to line 3—3 of Fig. 2. Fig. 4 is an enlarged detail partially in section on a line corresponding to line 4—4 of Fig. 2. Fig. 5 is an enlarged detail partially in sec-

tion on a line corresponding to line 5—5 of Fig. 2. Fig. 6 is a detail side elevation of a modified form of the valve mechanism. Fig. 7 is a detail side elevation of another modification of the valve mechanism.

In the drawings, similar reference numerals refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the drawings, the heater 1 illustrated is of the coil type, the same being provided with a plurality of coils 2, arranged in a vertical series. The casing of the heater is preferably double walled, to prevent radiation. The burners 4 are arranged in the base of the heater below the coils. The water supply is connected to the heater through the valve casing 5, which is provided with a water inlet 6, which is connected to a supply pipe as 6' and with a discharge 7, which is connected to the heater through the inlet pipe 8 at the upper end of the coil.

The thermostat tube 9 is connected to the heater discharge or outlet pipe 10, the tube being in effect a part of the discharge or draw-off pipe. The house system, or draw-off 11, is connected to the upper end of the thermostat preferably through the valve casing, an outlet or draw-off faucet as 12, being shown in the accompanying drawing. The fuel is supplied to the burners 4 through the valve casing 13, which is provided with an inlet 14, connected to the source of supply, the connection not being here illustrated, and with an outlet 15, connected to the burners through the pipe 16.

In the water valve casing 5 is a water inlet valve 17, which is adapted to automatically operate on the opening of the faucet 12 or the drawing of water from the heater. This valve is held normally in its closed position, by means of the spring 18, which is arranged on the stem 19 of the valve.

The fuel valve 20 is held normally against its seat by means of the spring 21. The stem 22 of the fuel valve is, in the structure illustrated, in Figs. 1 to 4, arranged at right

angles to the stem 19 of the water valve, and operating connections for the water valve to the fuel valve are provided so that the fuel valve is automatically opened on the opening of the water valve to admit the inlet water to the heater. This operating connection preferably consists of a movable member 23 pivotally mounted on the stem of the water-actuated valve or member. This member 23 is arranged to reciprocate between the valve stem 22 of the fuel valve and the thermostat lever 24, the valve stem and the lever being preferably provided with friction rollers 25, as clearly appears from Fig. 2 of the drawings.

The thermostat lever 24 is connected to the thermostat member 28 by means of the lever 29 which is fulcrumed at 30 and arranged to rest on the upper end of the thermostat member 28. This thermostat member is arranged within a tubular thermostat member 31, and in its turn is arranged in the thermostat tube 9. The arrangement of the thermostat members 28 and 31 will be readily understood, the one being of a material having a greater degree of expansibility than the other.

The lever 24 is fulcrumed at 32, on an upwardly projecting arm on the yoke 33, by which the water and the fuel valve casings are connected. This affords a convenient arrangement of the parts. By this means it will be obvious that the fuel valve is controlled by the joint action of the inlet valve or the water-actuated member and the thermostat. When the outlet to the heater is open, the inlet valve 17 is automatically opened, and this, through the connection described opens the fuel valve.

The parts in the structure illustrated are so adjusted and arranged that the fuel valve will remain closed until opened by the joint action of the water inlet valve and the thermostat. The parts may be so adapted that the thermostat will act upon the gas valve to open the same when the temperature of the water in the thermostat falls below the predetermined point. When water is not being drawn from the heater and the structure illustrated in this application or in my Patent No. 928,311 is adjusted as above indicated the thermostat will actuate the gas valve to maintain the water at a comparatively constant temperature.

The burners are provided with a pilot 34 which is connected to the gas or fuel valve casing 13 by means of the pipe 35. When the pilot valve 36 is open, the pilot is flashed. This valve is provided with a stem 37 which is engaged by lever 38, pivoted at 39 on the yoke 33. On the stem 19 of the water valve is a trip 40, which is arranged to engage this lever on the opening movement of the inlet valve, thereby flashing the pilot. This trip is so arranged relative to the engaging

member 27 on the movable member 23 that the pilot is flashed before the burner valve is opened. The lever 38 is also preferably arranged to be engaged by the movable member 23, so that the pilot is actuated through the thermostat. To accomplish this, I provide the member 23 with a cam member 41, arranged to engage the cam portion 42 on the lever 38. This also secures the opening of the gas valve, without the aid of the trip 40, unless the thermostat should be in such a condition or position as to allow the lever 24 to swing up, thus allowing the member 23 to be lifted, instead of opening the gas or fuel valve. The trip 40, however, insures the opening of the pilot valve before the opening of the main valve, when the water inlet valve is opened. This is especially desirable where the structure is adapted to normally maintain the water in the heater at a constant temperature.

The water-actuated member 17 is preferably arranged as the water inlet valve for the heater. It might, however, be arranged in various other relations and accomplish the purpose of actuating the fuel valve by the drawing of water from the heater, thereby making the structure entirely automatic.

The pilot valve is held in a normally closed position by means of the spring 43, which is, in the structure illustrated, seated in the plug 44. A by-pass passage 45 is provided for the pilot and this is controlled by a suitable adjusting valve 46.

The valve casing 13 is preferably provided with a cut-off valve 47 which can be used when it is desired to cut off the gas entirely from the burners.

The hot water discharge passage 58 of the valve casing 5 is preferably provided with a regulating valve 59 for regulating the passage of water through the heater.

In the modified construction shown in Fig. 6 the relation of the fuel valve to the water inlet valve is changed, the stem of the fuel valve being substantially in alignment with the stem of the water inlet valve, instead of being at right angles thereto as is shown in the structure illustrated in detail in Fig. 1. In this construction the fuel valve is operated through the lever 50, which is pivoted at 51 on the connecting yoke for the valve casing, and a lever engaging plunger 52 which is arranged to be engaged by the member 23. This plunger is held normally upward by means of a spring 53, which is arranged in a seat 54, provided therefor, in the valve connecting yoke. The stem 55 of the plunger is preferably arranged through the lever so that the lever is held normally upward by the spring 53.

In the modified construction shown in

Fig. 7, the movable member 57 is carried by the thermostat lever 24, it being pivoted thereon to depend between the stems of the fuel and water inlet valves, the movable member being tapered or wedge shaped, so that it is withdrawn from or forced into position to be engaged by the valve stems.

These modifications have been shown to illustrate the general nature of my invention, and other modifications will readily suggest themselves to those skilled in the art to which this invention relates.

I have illustrated and described my invention in detail in the form preferred by me on account of structural simplicity and economy, and the stability of the device when in use. I am, however, aware that it is, as stated, capable of great variation in structural details without departing from my invention, and desire to be understood as claiming the same broadly.

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

1. The combination with a water heater of a burner therefor, and an automatic water inlet valve; a fuel valve; stems for said valves; a thermostat connected to said heater; a lever actuated by said thermostat; a member pivoted on said water valve stem and arranged to reciprocate between said lever and fuel valve stem, said pivoted member being provided with an enlargement; a pilot; a pilot valve; a pivoted lever arranged to engage said pilot valve; and trips on said water inlet valve stem and on said member pivoted thereto arranged to engage said pilot valve lever.

2. The combination with a water heater of a burner therefor, and an automatic water inlet valve; a fuel valve; stems for said valves; a thermostat connected to said heater; a lever actuated by said thermostat; a member pivoted on said water valve stem and arranged to reciprocate between said lever and fuel valve stem, said pivoted member being provided with an enlargement; a pilot; a pilot valve; a pivoted lever arranged to engage said pilot valve; and a trip on said water inlet valve stem arranged to engage said pilot valve lever.

3. The combination with a water heater of a burner therefor, and an automatic water inlet valve; a fuel valve; stems for said valves; a thermostat connected to said heater; a lever actuated by said thermostat; a member pivoted on said water valve stem and arranged to reciprocate between said lever and fuel valve stem, said pivoted member being provided with an enlargement; a pilot; a pilot valve; and a pivoted lever arranged to engage said pilot valve, and a trip on said member pivoted to said inlet valve stem, arranged to engage said pilot valve lever.

4. The combination with a water heater of a burner therefor, and an automatic water inlet valve; a fuel valve; stems for said valves; a thermostat connected to said heater; a lever actuated by said thermostat; a member pivoted on said water valve stem and arranged to engage said lever and fuel valve stems; a pilot; a pilot valve; and operating connections from said water valve and said member mounted thereon, to said pilot valve, whereby said pilot valve is actuated by said water valve and said thermostat.

5. The combination with a water heater of a burner therefor, and an automatic water inlet valve; a fuel valve; stems for said valves; a thermostat connected to said heater; a lever actuated by said thermostat; a member pivoted on said water valve stem and arranged to engage said lever and fuel valve stems so that said fuel valve is opened by the joint action of said inlet valve and thermostat lever; a pilot; a pilot valve; and operating connections for said member on said water valve stem and said pilot valve.

6. The combination with a water heater of a burner therefor, and an automatic water inlet valve; a fuel valve; stems for said valves; a thermostat connected to said heater; a lever actuated by said thermostat; a member pivoted on said water valve stem and arranged to engage said lever and fuel valve stem; a pilot; a pilot valve; and operating connections for said member pivoted to said valve stem to said pilot valve.

7. The combination with a water heater of a burner therefor; a fuel valve; a water-actuated member; a thermostat; a movable member through which said thermostat and said water-actuated member coact in controlling said fuel valves; a pilot; a pilot valve; a pivoted lever arranged to engage said pilot valve; and trips on said water-actuated member and on said movable member arranged to engage said pilot valve lever.

8. The combination with a water heater of a burner therefor; a fuel valve; a water-actuated member; a thermostat; a movable member through which said thermostat and said water-actuated member coact in controlling said fuel valve; a pilot; a pilot valve; a pivoted lever arranged to engage said pilot valve; and a trip on said movable member, arranged to engage said pilot valve lever.

9. The combination with a water heater of a burner therefor; a fuel valve; a water-actuated member; a thermostat; a movable member through which said thermostat and said water-actuated member coact in controlling said fuel valve; a pilot; a pilot valve; and operating connections for said water-actuated member, and said movable member, to said pilot valve.

10. The combination with a water heater, of a burner therefor; a fuel valve; a pilot;

a pilot valve; a water-actuated member; a thermostat; a movable member through which said thermostat and said water-actuated member coact in controlling said fuel valve; and operating connections for said movable member to said pilot valve.

11. The combination with a water heater, of a burner therefor and an automatic water inlet valve, a fuel valve, stems for said valves, a member pivoted on said water valve stem, arranged to slidably engage said fuel valve stem, a pilot, a pilot valve, operating connections from said water valve and said member on said water valve stem to said pilot valve, a thermostat connected to said heater, and a lever actuated by said thermostat, arranged to act on said member on said water valve stem, all coacting as specified.

12. The combination with a water heater, of a burner therefor and an automatic water inlet valve, a fuel valve, stems for said valves, a member pivoted on said water valve stem, arranged to slidably engage said fuel valve stem, a pilot, a pilot valve, operating connections from said member on said water valve stem to said pilot valve, a thermostat connected to said heater, and a lever actuated by said thermostat, arranged to act on said member on said water valve stem, all coacting as specified.

13. The combination with a water heater, of a burner therefor, a pilot, a fuel valve, a pilot valve, a water actuated member, a thermostat, and a member through which both said water actuated member and thermostat act in controlling said fuel and pilot valves.

14. The combination with a water heater, of a burner; a pilot, a fuel valve, a pilot valve, a water actuated member arranged to act on both of said valves, and a thermostat arranged to act on both of said valves.

15. The combination with a water heater, of a fuel valve, a member actuated by the delivery of water to the heater, a movable member through which said water actuated member acts on said fuel valve, and a thermostat actuated member arranged to support said movable member in its valve operating position, so that said fuel valve is opened by the actuation of said water actuated member when the temperature of the water drawn from the heater is below a predetermined point.

16. The combination with a water heater, of heating means therefor, comprising a fuel valve, and means for operating said fuel valve, comprising a member arranged to be actuated by the delivery of water to the heater, and a thermostat connected to said heater and arranged to support said water actuated member in its actuating relation to said fuel valve.

17. The combination with a water heater, of a fuel valve, a water actuated member controlled by variations of the water pressure, a movable member carried by said water actuated member and arranged to engage said fuel valve, a thermostat, and a member actuated by said thermostat, arranged to support said movable member in position to act on said fuel valve when actuated by said water actuated member.

18. The combination with a water heater, of a fuel valve, a water actuated member controlled by variations of the water pressure, a movable member carried by said water actuated member and arranged to engage said fuel valve, a thermostat, and a member actuated by said thermostat, arranged to support said movable member in position to act on said valve.

19. The combination with a water heater, of a fuel valve, a water actuated member controlled by variations of the water pressure, a thermostat, and means for controlling said fuel valve comprising a member actuated by said water actuated member, and a member actuated by said thermostat, said member actuated by said thermostat being adapted to serve as a support for said member actuated by said water actuated member whereby the fuel valve is opened by the joint action of the thermostat and water actuated members.

20. The combination with a water heater, of an automatic water inlet valve, a fuel valve, stems for said valves, a thermostat connected to said heater, a lever actuated by said thermostat, and a member pivoted on said water valve stem and arranged to reciprocate between said lever and fuel valve stems, said pivoted member being provided with an enlargement which engages said thermostat lever and fuel valve stems when said water valve is fully opened.

21. The combination with a water heater, of a water actuated member, a thermostat connected to said heater, a fuel valve, and operating connections for said thermostat and water actuated member to the said fuel valve including a tapered member carried by said water actuated member and arranged to act on said fuel valve, and a thermostat member arranged to act on said tapered member to support it in its operative relation to said valve.

22. The combination with a water heater of a fuel valve, a water actuated member, a thermostat connected to said heater, a thermostat actuated member, a member interposed between said thermostat actuated member and said fuel valve, to be supported laterally thereby, said interposed member being connected to said water actuated member to be moved longitudinally thereby.

23. The combination of a water heater of

a water actuated member, a thermostat connected to said heater, a fuel valve, a thermostat actuated member, a tapered member interposed to reciprocate between said thermostat actuated member and said fuel valve, said tapered member being connected to said water actuated member.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

HERBERT S. HUMPHREY. [L. S.]

Witnesses:

CLORA E. BRADEN,
PHINA WOODRUFF.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."