A. B. CHAPMAN.

AUTOMATIC WATER HEATER.

APPLICATION FILED JUNE 28, 1906.

903,449

Patented Nov. 10, 1908

2 SHEETS—SHEET 1.

Fig. 1.

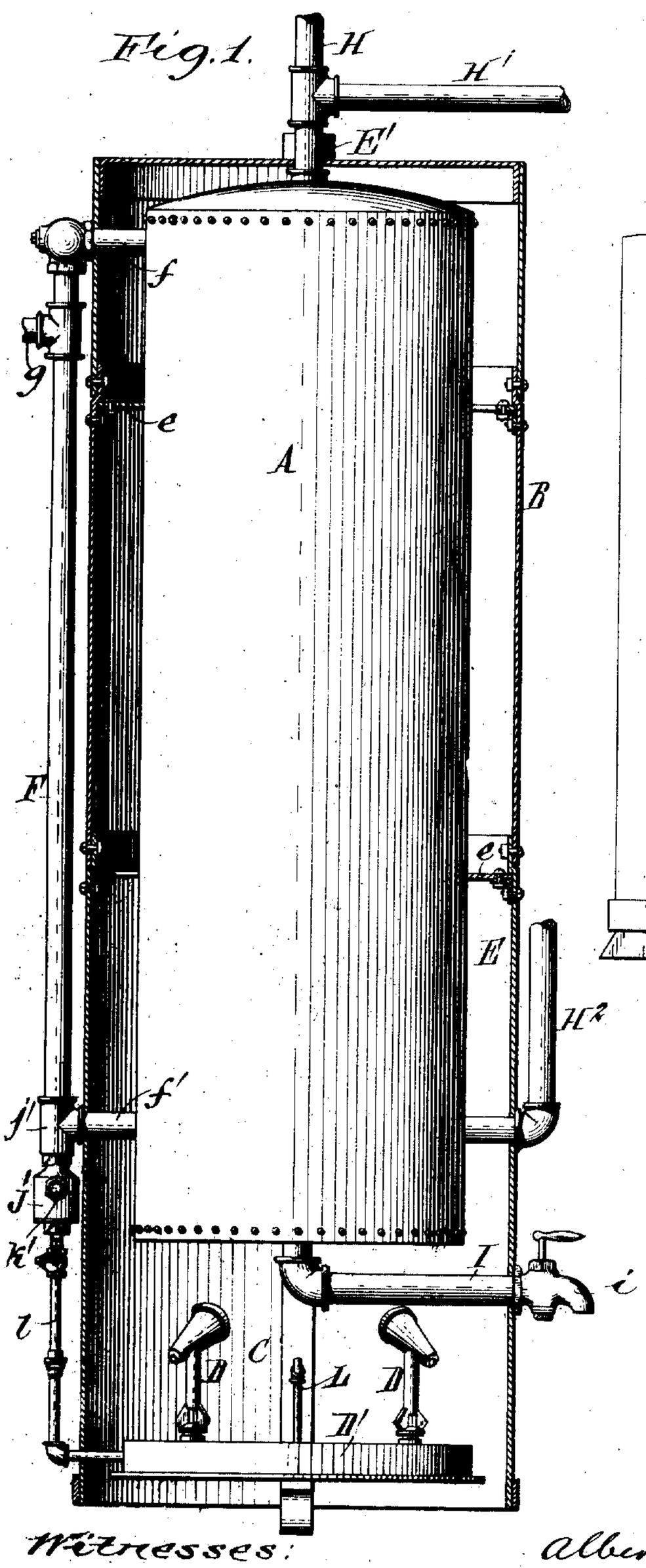
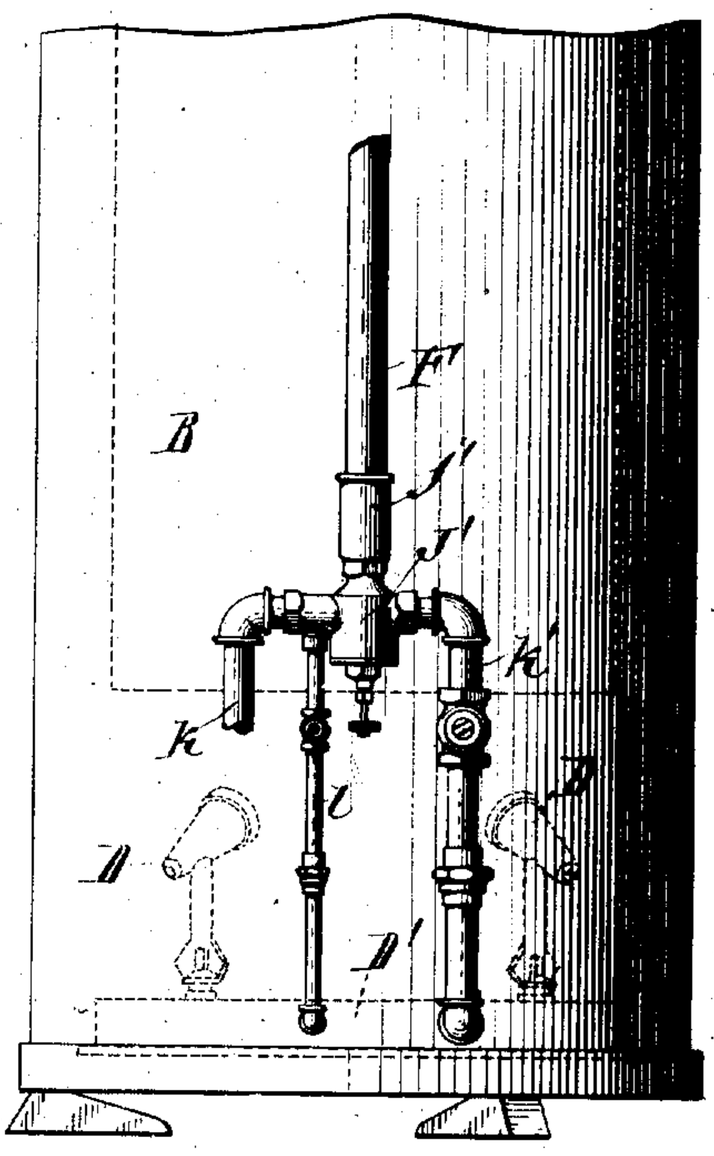


Fig. 2.



Witnesses:

Louis W. Gratz.

Richard Sommer.

Albert B. Chapman, Inventor

by Geyer & Popp

Attorneys

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2 SHEETS—SHEET 2.

Fig. 3.

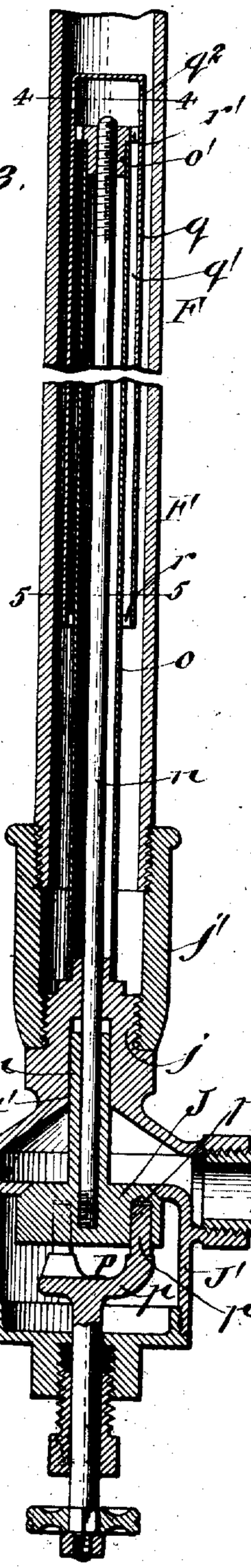


Fig. 4.

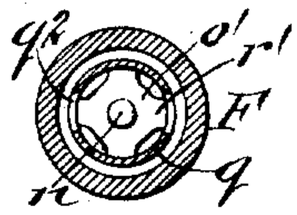


Fig. 6.

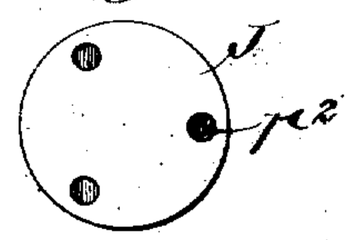


Fig. 5.

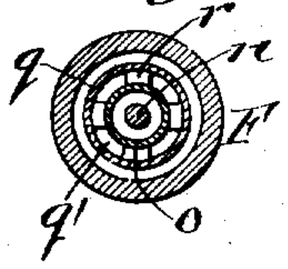
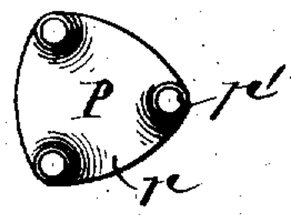


Fig. 7.



Witnesses:

Louis W. Gratz.

Richard Sommer.

Albert B. Chapman, Inventor

by Keyes & Popp

Attorneys

UNITED STATES PATENT OFFICE.

ALBERT B. CHAPMAN, OF SILVER CREEK, NEW YORK, ASSIGNOR TO HAMMOND-HOMBURGER COMPANY, OF SILVER CREEK, NEW YORK, A CORPORATION OF NEW YORK.

AUTOMATIC WATER-HEATER.

No. 903,449. Specification of Letters Patent. Patented Nov. 10, 1908.

Application filed June 28, 1906. Serial No. 323,764.

To all whom it may concern:

Be it known that I, ALBERT B. CHAPMAN, a citizen of the United States, residing at Silver Creek, in the county of Chautauqua and State of New York, have invented a new and useful Improvement in Automatic Water-Heaters, of which the following is a specification.

This invention relates to the class of water heaters having a thermostatic regulator or governor for automatically controlling the supply of gas to the burner.

One of the objects of the invention is to improve the construction of the thermostatic regulator with a view of facilitating the adjustment of the gas valve.

A further object is to provide simple means for equalizing the temperature of different portions of the thermostatic member, so as to prevent premature closing of the gas valve which occurs when one end of the thermostatic member is exposed to a higher temperature than the other.

In the accompanying drawings consisting of 2 sheets: Figure 1 is a sectional elevation of a water heater embodying the invention. Fig. 2 is a side elevation of the lower portion thereof, at right angles to Fig. 1. Fig. 3 is a longitudinal section, on an enlarged scale, of the thermostatic regulator and the gas valve. Figs. 4 and 5 are cross sections in lines 4—4 and 5—5, Fig. 3. Fig. 6 is a bottom plan view of the gas valve. Fig. 7 is a top plan view of the adjusting device of said valve.

Similar letters of reference indicate corresponding parts throughout the several views.

A is the boiler and B the inclosing jacket or casing which extends a short distance below the same to form the fire chamber C. In this chamber is placed a gas burner of any suitable construction, that shown in the drawings comprising a plurality of burner heads D mounted on and supplied by an annular manifold D^1. The casing is sufficiently larger in diameter than the boiler to leave an intervening passage E between these parts for the products of combustion, which latter escape into the chimney through a flue E^1 leading from the closed top of the casing.

Horizontal baffle rings *e* may be arranged at intervals in the space between the boiler and the jacket. Each of these rings is provided with an opening for the passage of the products of combustion, the openings being arranged alternately on opposite sides of the boiler to compel such products to circulate around the same before escaping at the top of the jacket.

In the construction shown in the drawings, the water in the boiler is caused to circulate through an external upright pipe F having its ends connected with the top and the lower portion of the boiler by horizontal pipes *f*, f^1. To the upper portion of this circulating pipe is connected the cold water inlet or branch *g*.

H is the hot water discharge pipe leading from the top of the boiler, and H^1, H^2 are direct and return pipes for hot water connected respectively with the pipe H and the lower portion of the boiler and with which a radiator or other apparatus, not shown, may be connected.

I indicates a drain or cleaning pipe connected with the bottom of the boiler and extending outside of the casing B where it is provided with a faucet *i*.

J is the gas-regulating valve and J^1 its case which is provided at its upper end with a threaded stem *j* which is screwed into the lower end of the T-fitting j^1 connecting the pipes F, f^1. *k* is a gas supply pipe connected with the inlet of the valve-case and k^1 a delivery pipe leading from the outlet of the valve-case to the manifold D^1 of the main burner. An auxiliary supply pipe *l* leads from the inlet branch of the valve case to the customary pilot light or supplemental burner L for constantly supplying the latter.

The gas valve J closes upwardly against its seat and is preferably provided with a hollow guide stem *m* which is fitted in an axial bore or socket m^1 formed in the top or bonnet of the valve case. This valve has a main rod or stem *n* which passes upwardly through the valve case and through a thermostatic tube *o* arranged within the circulating pipe F and resting upon the top of said case. To the free upper end of this thermostatic tube is secured a head or plug o^1 having a screw threaded bore with which the threaded upper end of the valve rod *n* engages, thus compelling said rod to move with the tube as it expands and contracts and closing or opening the gas valve accordingly. The lower end of the rod *n* is

rigidly secured to the valve by a screw-threaded joint, as shown, or any other suitable fastening, so that upon turning the valve said rod is screwed up or down in the stationary plug o^1, thereby adjusting the valve toward or from its seat. This construction permits the valve to be adjusted to close at the desired maximum temperature of the water in the boiler. This adjustment is effected from the exterior of the valve case by a rotary spindle P passing through a stuffing box in the bottom of the case and provided at its outer end with a hand wheel for turning it. At its inner end the spindle is provided with a head p having upwardly projecting pins or projections p^1 which enter sockets p^2 formed in the back or underside of the gas valve and compel the latter to turn with the spindle. These pins are of the proper length to remain in engagement with the valve in all positions thereof.

The guide stem m insures an accurate and reliable seating of the gas-valve, in case the screw threaded bore of the valve which receives the rod n should not be absolutely straight or true.

In the upper portion of the boiler the temperature of the water is higher than in its lower portion and when the thermostatic tube o is equally and directly exposed throughout its length to the water in the circulating pipe F the upper portion of the tube becomes hotter than its lower portion, causing the gas valve to be closed prematurely or before the entire contents of the boiler are heated to the desired maximum temperature. To overcome this objection, the upper portion of the thermostatic tube is inclosed by a hood, shield or guard q of tinned brass or other suitable material, whereby the temperature of the upper portion of the tube is reduced and practically equalized with that of its lower portion, thus insuring the heating of the entire contents to the proper degree before the supply of gas to the main burner is shut off.

The shield q is preferably of tubular form and closed at its upper end, as shown in Fig. 3. It is somewhat larger in diameter than the thermostatic tube o to leave an intervening passage q^1 through which the water circulates, and is provided near its upper end with air-escape openings q^2. The shield is centered on the thermostatic tube at its lower end by radial lugs or webs r formed on one of said parts and at its upper end by similar lugs r^1 formed on the plug o^1. The thermostatic tube and its protecting shield o preferably terminate at or near the cold water inlet g.

In the operation of the thermostatic regulator, as the temperature of the water in the boiler rises, the thermostatic tube expands or elongates, drawing the gas valve J closer to its seat and gradually reducing the gas supply to the burner until the maximum temperature is reached when the valve is fully closed. When the temperature falls by the drawing off of hot water from the boiler and the admission of cold water, the thermostatic tube contracts or shortens, opening the gas valve more or less in a manner common to this class of devices.

As the adjusting device of the gas-valve is accessible from the outer side of the valve case, the adjustment can be quickly and conveniently effected without the necessity of removing and replacing parts as required in valves where the adjusting device is wholly within the case.

I claim as my invention:

1. The combination of a water heater, a thermostatic member, a valve case containing a reciprocating gas-valve, a screw-threaded connection between the front side of said valve and the thermostatic member operating to adjust the valve by a rotary movement thereof, and a rotary adjusting device separate from said valve extending through the rear side of the valve-case, said device having means engaging the gas-valve and permitting longitudinal movement thereof relative thereto, substantially as set forth.

2. The combination of a water heater, a pipe or conduit connected therewith, a thermostatic member arranged in said pipe, a valve-case containing a gas-valve provided with a socket, a screw threaded connection between said valve and the thermostatic member operating to adjust the valve relatively to its seat by a rotary movement of the valve, and a rotary adjusting spindle extending outwardly through the valve case and provided within the same with a pin arranged out of line with the spindle and engaging said socket, substantially as set forth.

3. The combination of a water heater having a cold-water inlet, a thermostatic member under the influence of the liquid in the heater, a gas valve controlled by said member, and means for shielding said member against the direct action of the incoming cold water and the hot water in the upper portion of the heater, substantially as set forth.

4. The combination of a water heater, a pipe or conduit connected therewith, a thermostatic member arranged in said pipe, a gas valve controlled by said member, and an equalizing shield arranged to protect the upper portion of said member from the direct thermal action of the water in the upper part of the heater, substantially as set forth.

5. The combination of a water heater, a pipe or conduit connected therewith, a thermostatic member arranged in said pipe, a gas valve controlled by said member, and an equalizing shield inclosing the upper por-

tion of said member and separated therefrom by an intervening space, substantially as set forth.

6. The combination of a water heater, a circulating pipe external to the heater and connected with the upper and lower portions thereof, a thermostatic member arranged lengthwise in said pipe, a gas valve controlled by said member, an equalizing shield inclosing the upper portion of said member, and a cold-water inlet connected with said external pipe, substantially as set forth.

7. The combination of a water heater, a circulating pipe external to the heater and connected with the upper and lower portions thereof, a thermostatic member arranged lengthwise in said pipe, a gas valve controlled by said member, and a tubular shield inclosing the upper portion of said member and separated therefrom, said shield being closed at its upper end and provided in its upper portion with openings, substantially as set forth.

Witness my hand this 21st day of June, 1906.

ALBERT B. CHAPMAN.

Witnesses:
THEO. L. POPP,
C. F. GEYER.