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GAS WATER HEATER.

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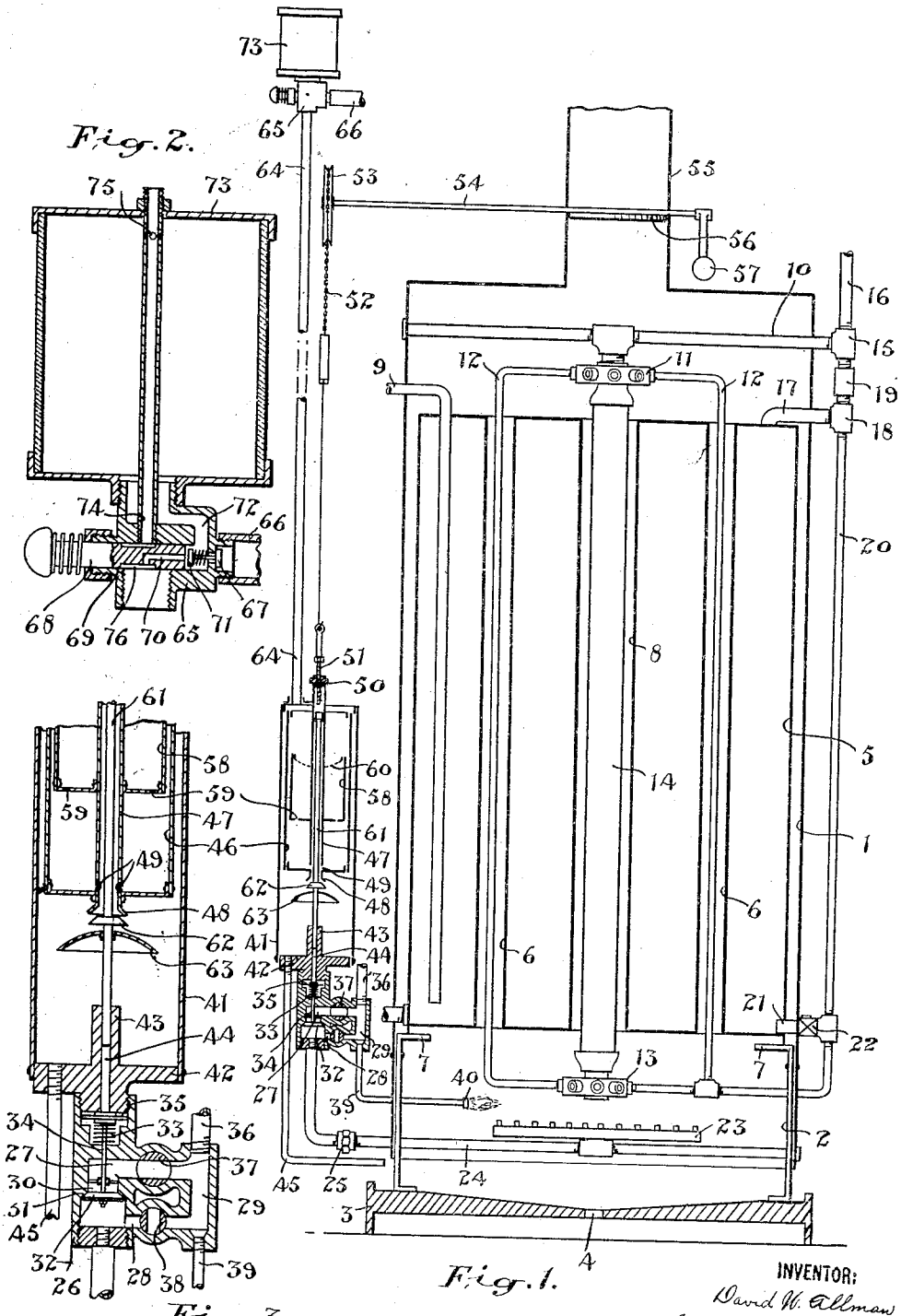


Fig. 1.

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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GAS WATER-HEATER.

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To all whom it may concern:

Be it known that I, DAVID WILLIAM ALLMAN, a subject of the King of Great Britain, and resident of the city of Toronto, county of York, Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Gas Water-Heaters, as described in the following specification and illustrated in the accompanying drawings, that form part of the same.

The principal objects of the invention are, to obviate the difficulties usually met with in controlling the consumption of fuel in gas water heaters and to eliminate the possibility of fuel being used longer than desired.

A further object is to supply a small quantity of hot water in the quickest possible time and without requiring the heating of the main body of the water to the same temperature.

A still further object is to obstruct the circulation of air around the hot water reservoir when the gas is turned off so as to avoid unnecessary cooling of the water and to devise a heater of very simple and cheap construction which cannot readily get out of order and is easily repaired.

The principal features of the invention consist in the novel construction and arrangement of parts, whereby the water is primarily heated in a reservoir and circulated through a superheater to the draw off connection, and whereby the control of the gas to the burners is effected by a fluid control adapted to open the gas passage to the burner and to automatically close the same and whereby the flue leading from the heater is automatically closed immediately after the extinction of the burners.

In the drawings Figure 1 represents a diagrammatic vertical sectional view of a heater and control apparatus constructed in accordance with this invention.

Fig. 2 is an enlarged vertical mid-sectional view of the "distance control" device.

Fig. 3 is an enlarged vertical mid-sectional view of the control means operated by the "distance control" and the connections thereto.

Referring to the drawings, 1 is a cylindrical casing supported upon suitable legs 2 on a base 3 which base is provided with a tapered bottom and a central vent opening 4 which may be connected to a suitable drain.

5 is a boiler having a plurality of vertical tubes 6 extending from top to bottom, being open at the ends. The boiler rests upon the lugs 7 on the upper ends of the legs and is spaced from the inner wall of the cylindrical casing 1.

8 is a large central tube in the boiler 5 open at the ends.

9 is a water supply pipe leading into the boiler 5 and discharging at a point close to the bottom.

10 is a pipe extending across the upper end of the casing 1 being closed at one end and supporting a manifold 11 to which a plurality of tubes 12 are secured. These tubes extend downwardly through the tubes 6 of the boiler being arranged centrally therein and are connected together at the bottom by a manifold 13.

14 is a large tube arranged within the central tube 8 and connected centrally to the upper and lower manifolds.

The pipe 10 is connected to a T 15 leading to the draw off pipe 16.

17 is a pipe connected to the top of the boiler and having at its outer end a T 18.

19 is a vertical check valve arranged between the T's 15 and 18 adapted to allow water to flow downwardly but checking upward flow.

20 is a pipe leading downwardly from the T 18 and connected at the bottom to a branch 21 leading into the bottom of the boiler, a check valve 22 being arranged in said branch, allowing inflow but preventing outflow from the boiler. The pipe 20 continues downwardly and is connected to the manifold 13.

23 is a burner arranged below the manifold 13 having a gas supply pipe 24 leading thereto, said pipe 24 having a union connection 25 arranged in the horizontal portion.

26 is a valve chamber secured to the upper end of the pipe 24 and formed with the transverse passages 27 and 28 which are interconnected at one end by a passage 29 and at the other end by a passage 30, the latter passage having a valve seat 31 at the under side.

32 is a valve adapted to close upwardly

against the seat 31 being held thereto by a spring 33 encircling the upper end of the stem 34.

35 is a flexible diaphragm arranged at the upper end of the valve stem and sealing the gas valve chamber.

36 is a gas supply pipe connected to the passage 29.

37 is a stop cock in the passage 27 and is adapted to be closed only when it is desired to make repairs.

38 is a stop cock in the passage 28 adapted to be opened only when it is desired to have the main burner burning constantly.

39 is a pipe leading from the passage 29 and carrying a constant burning pilot light 40 at its inner end arranged adjacent to the main burner.

41 is a cylindrical casing rigidly supported upon a head 42 secured to the valve chamber 26 and having its axis centrally arranged above the stem of the gas valve 32 and above the diaphragm 35.

The head 42 is formed with an upwardly projecting stem 43 having a central vertical orifice 44.

45 is a pipe leading from the bottom of the casing 41 and discharging into the base 3.

46 is a cylindrical casing slidably arranged within the casing 41, closed at its bottom end and open at the top and having a tube 47 extending centrally therethrough and rigidly secured therein. The lower end of the tube 47 extends through the bottom of the casing 46 and is formed with a valve seat 48.

49 are holes arranged in the lower end of the tube 47 communicating with the interior of the casing 46. The upper end of the tube 47 extends through the top of the casing 46.

50 is a nut secured in the upper end of the tube 47 and 51 is a member threaded in said nut and detachably connected to a chain 52 suspended from a chain wheel 53 secured to a spindle 54 journaled in the flue 55 leading from the top of the casing 1, said spindle carrying a damper 56 adapted to close the flue.

57 is a counter-balance secured to the spindle 54 and adapted to swing the damper to the closed position.

58 is a cylindrical bucket surrounding and secured to the tube 47 within the casing 46 and arranged midway of its length, said bucket having drip openings 59 in the bottom of lesser area than the openings 49 in the lower end of the tube. The top of the bucket 58 is covered with wire gauze 60.

61 is a valve rod slidably arranged in the tube 47 and extending downwardly into the orifice 44 in the head 42 of the casing 41 being adapted to engage the upper side of the diaphragm 35.

62 is a valve on the rod 61 adapted to close toward the valve seat at the lower end of the tube 47.

63 is a shield secured on the rod 61 below the valve and adapted to guide the water flowing through the tube 47 clear of the stem 43 of the head 42.

The member 51 is adjusted so that when the bucket is filled and by its weight carries the casing 46 downwardly the upper end of the valve rod 61 engages same and holds the valve 62 a short distance from its seat so that the water will escape slowly from the said casing 46.

64 is a tube leading from the top of the casing 41 and carried to any suitable place from where it may be desired to control the heater.

65 is a valve casing arranged at the upper end of the tube 64 and connected with a water supply pipe 66.

67 is a valve closing the water supply.

68 is a plunger slidably arranged in a cylindrical passage 69 and adapted on being pressed inward to engage and open the valve 67. The plunger is formed with a longitudinal channel 70 through the center discharging into the tube 64. The spindle of the valve 67 is provided with a valve 71 adapted to close the channel 70 when the plunger engages the valve.

72 is a passage leading upwardly from the water inlet.

73 is a glass cylinder secured to the top of the valve casing 65 and open to the passage 72.

74 is a tube extending through the upper end of the passage 72 into and to the top of the cylinder 73, said tube having holes 75 at the top opening within the cylinder. The lower end of the tube 74 leads to the plunger passage 69 and the plunger is formed with an annular groove 76 to allow the water entering the tube to flow to the tube 64.

In the operation of this device when it is desired to heat the water the plunger 68 is pushed inwardly opening the valve 67 allowing the water to flow into the cylinder 73. This cylinder preferably holds just enough water to fill the bucket 58 but may be larger if desired. Upon the release of the plunger the water in the cylinder flows through the channel 70 to the tube 64 and is conveyed thereby to the open ended casing 46 and discharges into the bucket.

As the water flows into the bucket the weight overcomes the counter balance 57 and opens the damper 56. The rod 61 is engaged by the member 51 and the lower end engages the diaphragm 35 and opens the gas valve 32 and the gas flowing to the burner is ignited by the pilot light. The heat from the burner very quickly heats the water in the tubes 12 and 14 connected by the manifolds 13 and 11 and also heats the water in the main boiler.

If a quick supply of hot water is needed it is drawn directly from the small tubes on the opening of the tap. The supply to the tubes is obtained from the top of the boiler through the pipes 17 and 20 so that after the heater has been once put into operation the water supply to the superheater is always warm.

When the heater is allowed to burn for any extended period the water circulates through the pipes 17, 20 and 21 as well as through the superheater pipes. Simultaneously with the opening of the gas valve the valve 62 on the rod 61 moves close to the lower end of the tube 47 and the water dripping from the bucket into the casing 46 from where it flows through the holes 49 in the tube and out around the valve 62, escaping from the casing 41 by way of the pipe 45. The weight of the water in the bucket and casing 46 holds the gas valve open a definite period according to the setting of the member 51 and the valve 62. When the predetermined amount of water has escaped from the casing 46 the counter-balance begins to lift the same and first releases the gas valve allowing same to close and the continued upward movement closes the flue, thus preventing a draft of cold air through the heater. The lifting of the casing 46 allows the valve rod 61 to drop and the valve 62 to move farther from the end of the tube 47 thus allowing the quick escape of the remainder of the water which cleans off the valve and thus prevents the fouling of the drip opening. The pilot light remains burning and it is found in practice the heat from this light will be sufficient to maintain the water within the boiler at a constant temperature of approximately 100 degrees. If hot water is required at any time it is merely necessary to operate the plunger in the gage and the main burner will be immediately lighted, thus providing an almost instantaneous supply of hot water from the superheater.

If it is desired to maintain a constant large supply of hot water the stop cock 38 is opened to allow a constant flow of any desired degree to the main burner. This does not interfere in any way with the operation of the control device herein described.

Any desired number of operating gages may be connected with the tube 64 but if more than one of these are operated simultaneously the surplus water merely overflows from the casing 46. The casing 46 is made to contain a greater quantity of water than the gage so that if an extra supply of hot water is desired the gage may be filled two or three times in succession to fill the said casing 46.

In the event of the plunger 68 being held open over long the water will escape through the tube 74.

It will be readily understood from this description that unnecessary and a prolonged burning of gas is absolutely prevented and the consequent loss and danger is avoided.

What I claim as my invention is:—

1. In a gas water heater the combination with a self closing gas valve, of a fluid container arranged to open said gas valve by gravity pressure of the weight of fluid contained therein, said containers being adapted to automatically discharge the fluid therefrom so that when the weight is discharged the gas valve is released and allowed to close, and manually operated means for placing operating fluid in said container in predetermined quantity.

2. In a gas water heater, the combination with a self closing gas valve, of a fluid container vertically suspended from a counter balance and adapted upon receiving a predetermined quantity of fluid to open said gas valve, said container being adapted to gradually discharge the fluid automatically and ultimately release the gas valve allowing it to close, and manually operated means for placing a predetermined quantity of fluid in said container.

3. In a gas water heater, the combination with a self closing gas valve, of a fluid container suspended from a counter balance and adapted upon receiving a predetermined quantity of fluid to open said gas valve, said container having an opening in the bottom adapted to discharge the fluid, a valve rod slidably supported in said container adapted to engage and operate the gas valve, a valve on said rod adapted to restrict the flow of fluid from said container when the gas valve is open and to open wide the port upon the release of a predetermined quantity of fluid, means for adjusting said valve rod and valve, and means for placing a predetermined quantity of fluid in said container.

4. In a gas water heater, the combination with a self closing gas valve, of a fluid container arranged to operate said gas valve by gravity pressure and adapted to automatically discharge the fluid and ultimately release the gas valve and allow it to close, a rigid fluid receptacle connected with a fluid supply, a tube leading from said receptacle to said movable fluid container, and a manually operated valve adapted to be operated to allow a desired quantity of fluid to flow into said receptacle and to then deliver the fluid to said tube.

5. In a gas water heater, the combination with a self closing gas valve of a fluid container arranged to operate said gas valve by gravity pressure and adapted to automatically discharge the fluid and ultimately release the gas valve and allow it to close, a rigid fluid receptacle connected with a fluid

supply and adapted to show the quantity of fluid therein, a tube leading from said receptacle to said container, and a manually operated valve adapted to open the receptacle to the fluid supply, and upon closing said supply to open said receptacle to said tube.

6. In a gas water heater, a burner, a valve controlling the supply of gas to said burner, a fluid container arranged to operate said gas valve by gravity pressure and adapted to automatically discharge the fluid and ultimately release the gas valve and allow it to close, a tube discharging into said container, a gage casing arranged at the upper end of said tube and connected with a fluid supply, a valve closing the fluid supply, a plunger adapted to open said valve to allow the entrance of the fluid to the gage casing, and a passage in said plunger adapted to allow the escape of the fluid from said casing to the tube leading to the container.

7. In a gas water heater, the combination with the gas valve, the boiler and the flue leading therefrom, of a counterbalanced damper rotatably arranged in said flue, fluid controlled means for controlling the valve suspended from said counterbalanced damper.

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