No. 667,356. Patented Feb. 5, 1901.

G. A. F. AHLBERG.

WATER HEATER.

(Application filed Mar. 13, 1900.)

(No Model.)

Fig. 1.

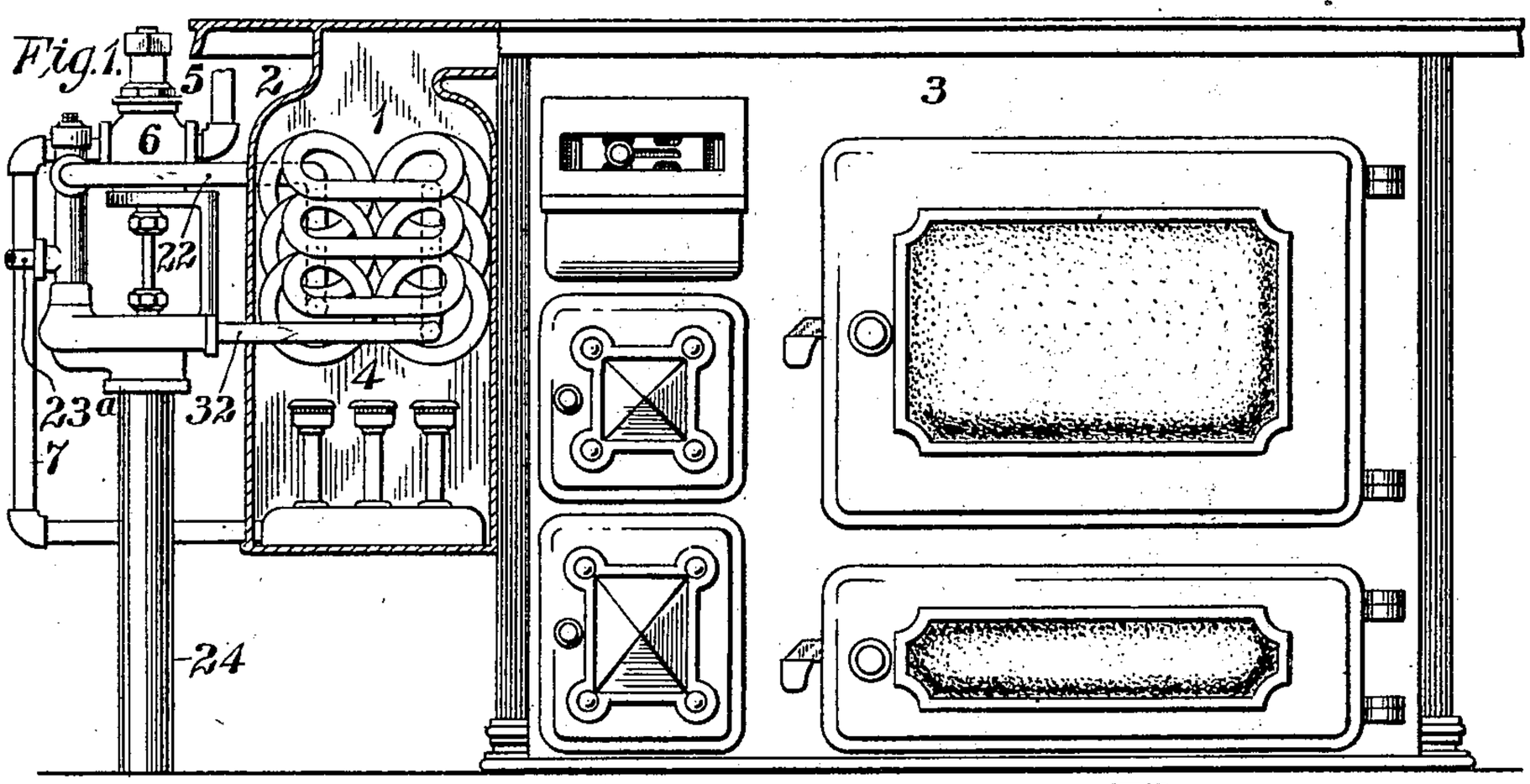


Fig. 2.

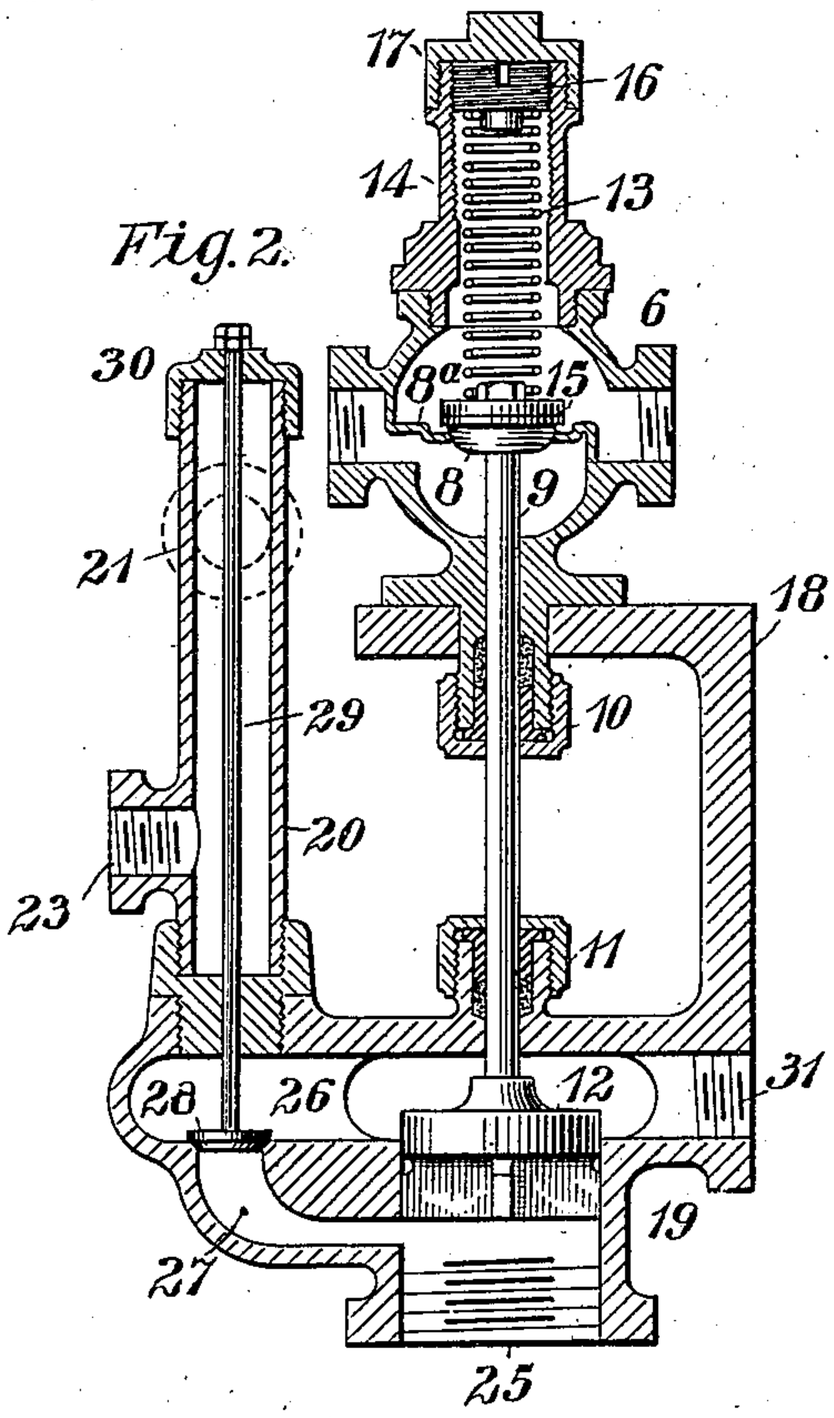
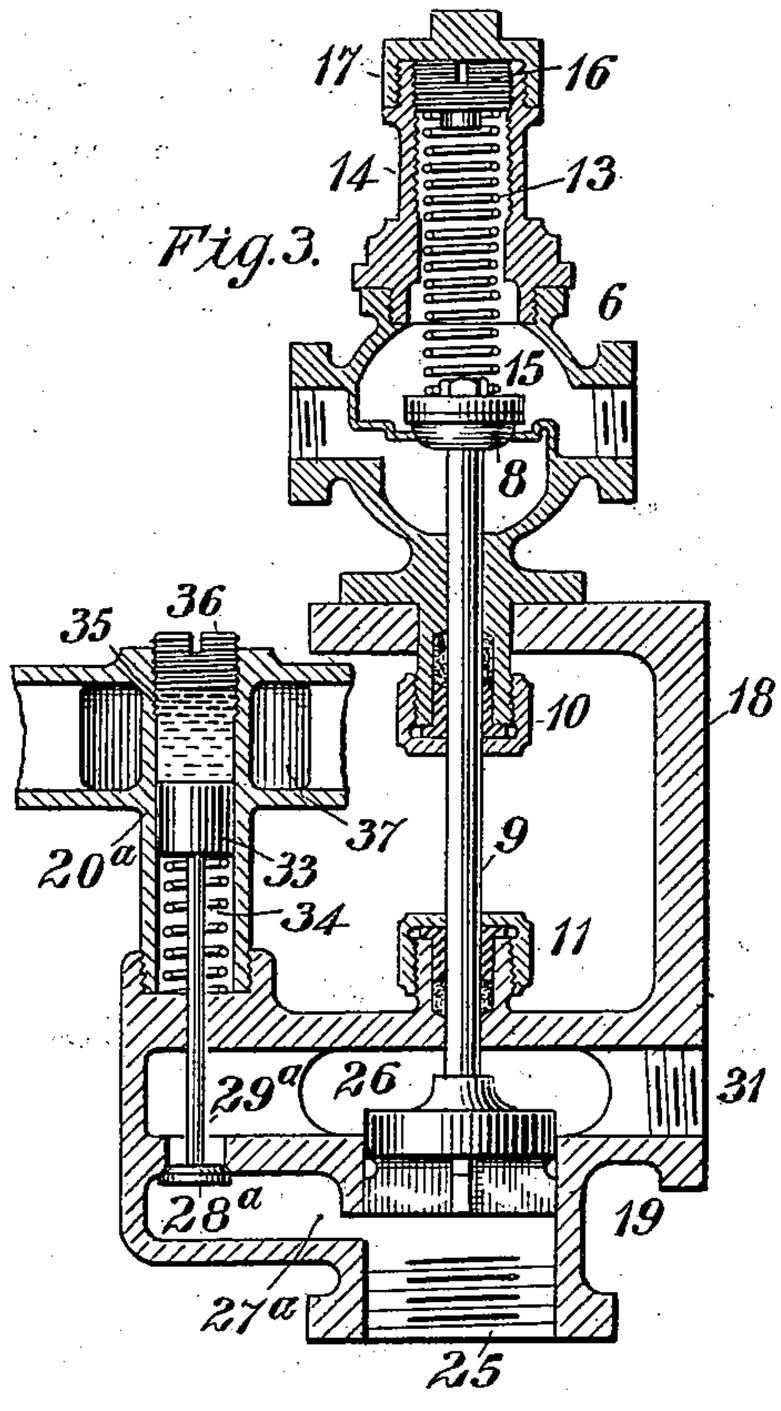


Fig. 3.



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WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 667,356, dated February 5, 1901.

Application filed March 13, 1900. Serial No. 8,529. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV A. F. AHLBERG, a subject of the King of Sweden and Norway, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Water-Heaters, of which the following is a specification.

My invention relates to water-heaters, and particularly to devices of this general character in which the water is heated by gas that is automatically turned on by the flow of water caused by opening a faucet at any point of the system and in which the gas is automatically turned off when all the faucets are closed.

The object of my invention is to provide a simple and efficient valve mechanism for use in connection with water-heaters of the general character above indicated which shall automatically control the flow of water in such manner as to insure a supply of water of substantially uniform temperature. With this end in view I have devised the means shown in the accompanying drawings, in which—

Figure 1 is a view, partially in front elevation and partially in section, of a cooking-range provided with a water-heater constructed and arranged in accordance with my invention. Fig. 2 is a sectional view of valve mechanism embodying one form of my invention. Fig. 3 is a view similar to Fig. 2, but showing a modified construction.

Referring now particularly to Figs. 1 and 2 of the drawings, the coil of pipe 1, through which the water flows and in which it is heated during its flow, is shown as mounted in a casing or compartment 2, attached to or forming an integral part of a range 3, which may be otherwise of ordinary or any desired construction. The gas-burners 4, located beneath the coils 1, are also inclosed within the casing 2 and may have the usual construction and arrangement.

The arrangement of the heater as a part of a cooking-range is intended to be illustrative merely, it being understood that the coil and the casing surrounding the same may be given any convenient location other than that indicated, if desired.

The gas for the burners 4 is supplied from the street-main or from a pipe connected thereto through a pipe 5, a valve-casing 6, and a pipe 7. The valve-casing 6 is provided with a downwardly-closing valve 8 and with a valve-seat 8^a therefor. The valve 8 is mounted upon the upper end of a stem 9, which extends downward through suitable stuffing-boxes 10 and 11 and is provided at its lower end with a valve 12, which controls the flow of cold water to the heating-coil 1. A coiled spring 13 is located in a suitable casing 14, mounted upon the top of the valve-casing 6, and is interposed between a disk or plate 15, carried by the upper end of the stem 9 and a screw-plug 16, the latter being covered by a cap 17, screwed on the upper end of the casing 14. It will be readily seen that by removing the cap 17 access may be had to the screw-plug 16 in order to turn it for the purpose of varying the pressure exerted by the spring 13 upon the plate 15.

The parts thus far described may be supported by any suitable means; but I have shown a bracket 18 for this purpose, this bracket being indicated as an integral part of the frame or casing 19, which contains the water-supply-valve mechanism.

Mounted in the casing 19 at one side is a tube 20, preferably formed of brass or some other metal that has a large degree of expansion under the influence of heat. This tube 20 is provided near its upper end with a port 21, to which is connected a pipe 22, leading from the outlet end of the coil 1, and with a port 23 near its lower end, to which is connected the service-pipe 23^a, leading through branch pipes to the various faucets which are to be supplied with hot water from the heating-coil 1.

The cold-water-supply pipe 24 is connected to a port 25, which has two openings into a main chamber 26. One of these openings is controlled by the valve 12 and the other constitutes a by-pass 27, the flow of water through which is controlled by a valve 28, carried by the lower end of a stem 29, formed of steel or other material having a less degree of expansibility when subjected to heat than the material of which the tube 20 is formed. The upper end of the stem 29 is attached to and supported by a cap 30, that is screwed upon

the upper end of the tube 20. The inlet end of the coil 1 is connected to a port 31 of the chamber 26 by a pipe 32.

In the construction shown in Fig. 3 the several parts are the same in construction and operation as in the form of device shown in Fig. 2 except as regards features which will be specifically pointed out, and since the corresponding features have been designated by the same reference-numerals the description heretofore given in connection with Fig. 2 may be read in connection with what is shown in Fig. 3, thus rendering unnecessary a repetition of such description.

The flow of water through the by-pass 27^a in the form shown in Fig. 3 is controlled by a downwardly-opening valve 28^a, the stem 29^a of which is connected at its upper end to a piston 33, that is normally pressed upward by a coiled spring 34 in order to move the valve 28^a toward its seat. The tube 20^a, which constitutes the cylinder for the piston 33 and also the casing for the spring 34, contains above the piston 33 a body of liquid 35 of such character that it expands readily under the influence of heat. This liquid is confined within a comparatively small space in the tube 20^a by means of the piston 33 below and a suitable screw-plug 36 above.

Any suitable packing devices in addition to those shown may obviously be employed if found necessary or desirable.

The hot water from the coil 1 passes through a small chamber 37, which surrounds the portion of the tube 20^a occupied by the liquid 35, and if its temperature is higher than that for which the apparatus is adjusted it causes the liquid 35 to expand sufficiently to move the piston 33 downward against the action of the spring 34, and thus move the valve 28^a away from its seat to a degree that depends upon the temperature of the water and the expansibility of the liquid 35.

The operation of my invention is as follows: When a faucet to which the pipe 23^a leads, either directly or indirectly, is opened, the water flows from the chamber 26 through the coil 1 and the connecting pipes and passages, and thus relieves the upper side of the valve 12 from pressure. The pressure of the cold water entering through the port 25 will therefore raise the valve 12 and at the same time move the gas-valve 8 away from its seat. It being assumed that a pilot-light is continuously burning adjacent to the main burners 4, as is usual in apparatus of this general character, the gas supplied to the burners 4 will be ignited, and the flame will be sufficient to heat the water to the desired temperature as it passes through the coil 1.

The material and the dimensions of the tube 20 or of the body of liquid 35, as the case may be, will be so selected and determined as to insure the maintenance of the valve 28 or the valve 28^a, as the case may be, in such position that the water supplied by the heater will be of the temperature desired. If it happens, by reason of an extreme heat applied to the coil or by reason of the relatively high temperature of the water flowing in at the port 25, that the heat of the water flowing from the coil is greater than is needed or desired, the tube 20 or the liquid 35, as the case may be, will expand sufficiently to move the by-pass valve farther away from its seat, and thus permit more water to flow through the by-pass and into the chamber 26. This flow of water through the by-pass will tend to equalize the pressure on the two sides of the valve 12, and it will therefore be depressed sufficiently to either entirely or partially cut off the supply of gas to the burners 4. As soon as the temperature of the water flowing to the faucets is reduced to the desired degree the by-pass valve will close and the normal flow of water through the port 25 will be resumed.

In case the by-pass valve is so located under normal conditions of working that some water will flow through the by-pass if the temperature of the water flowing from the heater falls below what is desired the thermostatic device will move the valve toward its seat, and thus insure an increased flow of gas and a consequent increase in the temperature of the water supplied by the heater.

The several parts of the apparatus may obviously be so adjusted that the by-pass valve will be either seated or at any desired distance from its seat during normal operation, according to the conditions under which the apparatus is operated. This construction and arrangement of apparatus obviously permits of such an automatic adjustment of the water and gas valves as will insure a supply of hot water of substantially uniform temperature. This is a condition very much to be desired, for the reason that even though variation in the temperature of the hot water supplied is not in itself particularly undesirable the excessive consumption of gas necessary to heat the water to a higher temperature than is needed involves unnecessary expense, and no useful purpose is served by this extra consumption of gas, since if the water is hotter than is needed its temperature must be reduced by the addition of cold water from another faucet. On the other hand, when the temperature of the inflowing water is excessively low or the pressure of the gas falls below the normal my automatic means for increasing the heating effect is extremely desirable.

While I have shown only two forms of thermostatic devices for controlling the temperature of the water supplied by the heater, I desire it to be understood that other forms may be employed, if desired, and that my invention is not limited to any specific thermostatic means or to any particular form or arrangement of valves and coöperating mechanism.

I claim as my invention—

1. In an automatic water-heater, the combination with a water-supply valve and a gas-

supply valve operated thereby, of a thermostatic device acted upon by the heated water to effect adjustment of the position of the water-supply valve.

2. In an automatic water-heater, the combination with a water-supply valve and a gas-supply valve operated thereby, of a by-pass around said water-supply valve, a valve for controlling the flow of water through said by-pass and a thermostatic device acted upon by the heated water and connected to said by-pass valve.

3. In an automatic water-heater, the combination with a water-supply valve and a gas-supply valve operated thereby, of a by-pass around said water-supply valve, a valve for said by-pass and a thermostatic operating device for said by-pass valve located in the hot-water conduit leading from the heater.

4. In an automatic water-heater, the combination with a water-supply valve and a gas-supply valve connected to operate together, of a valve for controlling the pressure exerted upon said supply-valves in opposition to the pressure of the inflowing cold water, and a thermostatic device located in the path of the outflowing hot water and connected to said controlling-valve.

5. In an automatic water-heater, the combination with a water-supply valve and a gas-supply valve connected to operate together, of a thermostatic device located in the path of the outflowing body of water and means actuated by said device to regulate the supply of gas and cold water.

In testimony whereof I have hereunto subscribed my name this 12th day of March, 1900.

GUSTAV A. F. AHLBERG.

Witnesses:
WESLEY G. CARR,
W. SUMNER SEIBERT.