V. MAUCK & K. HOWIE.

WATER HEATER.

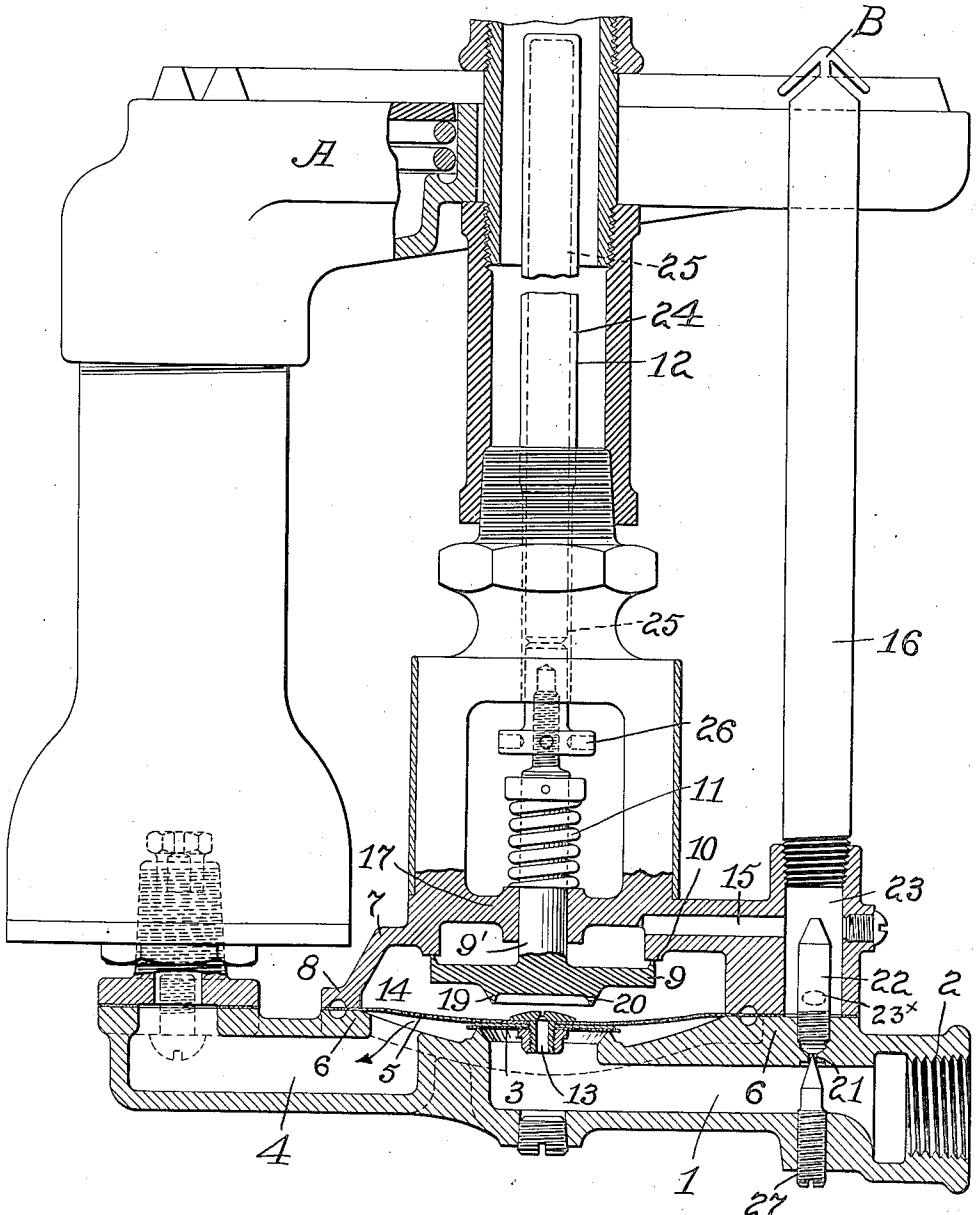
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1,126,248.

Patented Jan. 26, 1915.

2 SHEETS—SHEET 1.

Fig. 1.



Attest:

Edwd. L. Tolson

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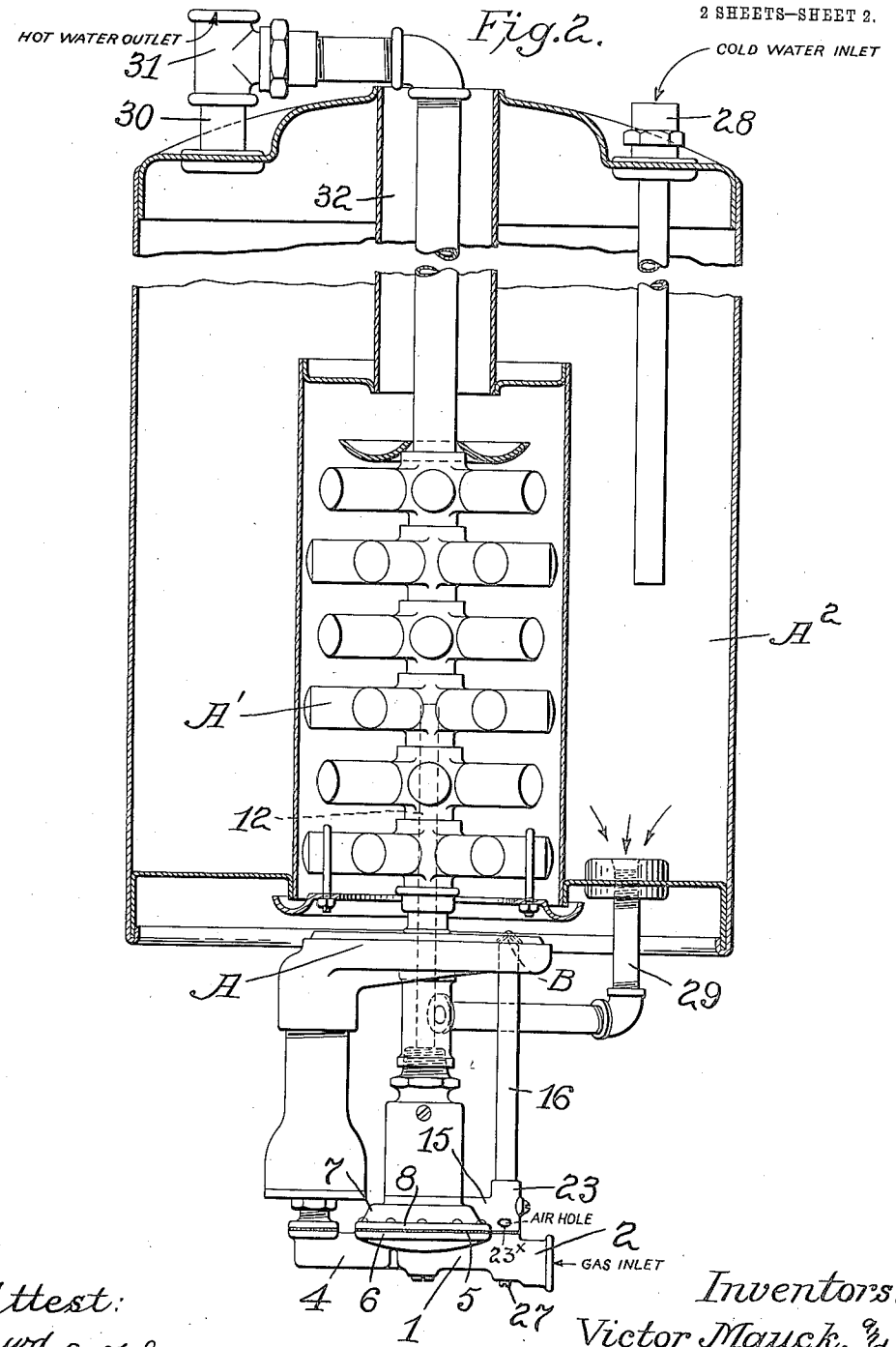
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

VICTOR MAUCK AND KENNETH HOWIE, OF CONSHOHOCKEN, PENNSYLVANIA, ASSIGNORS TO JOHN WOOD MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

WATER-HEATER.

1,126,248. Specification of Letters Patent. Patented Jan. 26, 1915.

Application filed February 21, 1912. Serial No. 679,048.

To all whom it may concern:

Be it known that we, VICTOR MAUCK and KENNETH HOWIE, citizens of the United States, residing at Conshohocken, Pennsylvania, have invented certain new and useful Improvements in Water-Heaters, of which the following is a specification.

Our invention relates to water heating apparatus, and particularly to apparatus intended to be heated from a gas burner, the heating element being connected with a storage drum or reservoir.

Our present improvement concerns particularly a valve arranged for controlling the gas supply, and it consists in the features and combination and arrangement of parts hereinafter described and particularly set forth in the appended claims.

The invention is shown in the accompanying drawings, in which—

Figure 1 is a view of the main and pilot burners and the gas valve mechanism, parts being shown in section and parts in elevation. Fig. 2 is a view of the complete apparatus, some of the parts being shown in section and others in elevation.

In these drawings, A indicates generally a burner the flame from which is adapted to act upon the heating element A′, which is connected with the storage drum or reservoir A^2. The gas is supplied to this burner through the passage 1 in the valve casing, which casing is threaded at 2 to receive the supply pipe. From the passage 1 the gas passes to a valve 3, and when this is open it reaches the burner through the passage 4. The valve 3 is of disk form, and is associated or combined with a diaphragm 5 held at its edges between the main base portion 6 of the casing which contains the passages 1 and 4, and a superimposed casing 7 which has a flange or portion at 8 between which and a suitable rim or surface on the main casing 6 the edge of the diaphragm 5 is clamped. The casing 7 is arranged coaxially above the valve 3, and it contains a supplemental valve 9 of disk form having its edge adapted to rest upon a suitable seat, and as one embodiment of this part of our invention we show a valve as closing upwardly upon its seat 10, which consists of a shoulder on the interior of the casing 7. This valve is normally pressed upon its seat by a spring 11, and it is further controlled by a thermostatic element 12 which extends into the heater of the reservoir or storage chamber to be acted upon by the temperature of the water therein. The main valve 3 is provided with a leakage orifice 13 extending therethrough so that a small portion of the gas may pass from the under side of the diaphragm to the chamber 14, on the upper side thereof, and the supplemental valve 9 above described controls the escape of this leakage, the escape passage being indicated at 15 connecting with a suitable discharge pipe 16 which preferably extends to a pilot burner B which is suitably associated with the main burner A to light the same when the main gas supply reaches this main burner. The spring 11, at its lower end, rests upon a cross piece or cover portion 17 which has an opening centrally thereof to receive the stem 9′ of the said supplemental valve to guide the same. On the under side of the supplemental valve a depending lip or flange 19 is provided against which the diaphragm or main valve seats itself when the same is raised, to open the passages 1 and 4. This depending rim or flange 19 forms within it an escapement chamber to receive the gas which leaks through the small port 13 in the main valve, and from this escapement chamber there is a small outlet 20 of smaller diameter than the leakage orifice 13. From the arrangement described, while the burner is in operation the main valve is, of course, open and the diaphragm is bearing against the flange 19 to close the escapement chamber within said flange. A small quantity of the gas is passing through the leakage orifice 13 into this escapement chamber, and thence to the pilot burner past the supplemental valve 9, which is now open. When the temperature of the water in the storage chamber rises to the desired degree, the supplemental valve 9 closes upon its seat, due to the combined control of the thermostatic element and the spring 11, and therefore pressure will be built up in the chamber 14 on the upper side of the diaphragm, and this diaphragm will be forced downwardly by this built up pressure, together with the valve, so that the valve will close and cut off the gas supply from the main burner. When, on the other hand, the temperature of the water in the storage chamber or reservoir falls to a

predetermined degree, the valve 9 will be opened and this will relieve the pressure in the chamber 14 on the upper side of the diaphragm 5, so that the pressure of the gas from the main will at once open the main valve and allow the gas to pass the same and thence, by way of the passage 4, to the main burner, where it will be lighted by the pilot light. This pilot light is supplied through a port 21 connecting with the passage 1, passing thence through a nipple 22 into the chamber 23, from which the pipe 16 extends to the pilot light, the said chamber 23 also receiving the leakage gas through the passage 15.

It will be understood that we do not limit ourselves to the precise way of operating the valve, and our present invention concerns among other features the relative arrangement of the main and supplemental valve in the one casing, and coaxially of each other and of the escapement chamber. The main valve is of such a character that it will be always fully opened or fully closed, so that the supply of gas for the main burner will be quickly and completely cut off or quickly and completely turned on.

The burner is made in the shape of a horse shoe, the thermostat and pilot tube going through the opening therein.

In the drawing, one side of the burner has been removed to show the position of the thermostat and pilot.

The thermostat 12 consists of a copper tube 24 closed at the upper end, in which is placed a carbon rod 25.

The copper has a large co-efficient of expansion whereas the carbon has a co-efficient of near zero. When the copper tube is cooled, it contracts, forcing the carbon rod against the valve stem and opening the supplemental valve against the spring. When the temperature of the copper tube is raised, it expands, allowing the spring to push up the carbon rod and so close the valve against its seat.

When the burner is out, the leather diaphragm is down against the valve seat, and the supplemental valve is closed. As the water cools off, the thermostat opens the supplemental valve, allowing the gas that has accumulated in the space above the main valve to pass under the supplemental valve, and out through the passage to the pilot where it is burned. As the hole 13 in the valve (3) is very small, the opening of the supplemental valve causes the pressure on the upper side of the diaphragm to fall and the gas pressure forces it up, allowing the gas to flow to the main burner.

At 26 is an adjusting nut.

27 is a set screw to adjust the length of the pilot frame.

The cold water inlet to the storage tank is indicated at 28. The connection from the storage tank to the lower part of the heater is shown at 29, and the connection between the top of the heater and the upper part of the storage tank at 30 while the hot water outlet is at 31.

It will be observed that the thermostat, burner, water heater, and storage tank are arranged substantially coaxially in the same structure or within the limits of the tank. The water heater is, in fact, together with the thermostat inclosed within the walls of the tank, being located in a chamber or recess formed in the tank. From this recess a flue 32 extends upwardly through the tank. By this arrangement not only is the structure rendered compact, requiring less room than the other heating systems, but the heat of the burner is conserved, the flame acting upon not only the water heater coil but its heat being absorbed by the storage tank and any heat radiating from the water heater also acts on the storage tank.

The pilot light gives a blue flame, an air supply opening being shown at 23^{x}. This blue flame acts upon the water-heater.

It will be noticed that the pilot burner has a hood, and the function of this is to prevent sediment of any kind from lodging in the pipe of the pilot burner and also to serve as a protection to the blue flame which issues from the pilot burner directly adjacent the main burner. This hood will prevent the blue flame from being blown out. Should the blue flame blow out the gas will escape unlighted from the main burner when the main valve opens, but with the protecting hood the blowing out of the pilot burner will not occur. The air inlet for the blue flame is provided by an opening 23^{x}, one of these openings being formed on each side of the wall of the chamber 23, only one of said openings being illustrated in dotted lines in Fig. 1. These openings are arranged below the end of the nipple 22, so that the gas issuing from the nipple creates an injector action to draw in the air. An advantage arises from this arrangement over one in which the gas inlet is below the air opening, for the reason that the incoming air will not blow the gas aside and dissipate it into the atmosphere.

We claim as our invention:—

1. In combination in apparatus of the class described, a main burner, a valve casing, a diaphragm main valve therein, having a leakage orifice therethrough, a supplemental valve within the casing arranged coaxially with the main valve and of disk form a thermostat acting on the supplemental valve, said supplemental valve controlling the building up or escape of the leakage gas on the upper side of the main valve, and having a depending flange forming an escapement chamber when the main valve rises against it, the said escapement chamber hav-

ing an orifice for the passage of the gas of smaller diameter than the orifice of the main valve, substantially as described.

2. In combination a burner a main valve, a casing, a diaphragm carrying the said main valve, the said valve casing having an inlet for the gas to act on one side of the diaphragm and means of communication between said inlet and the other side of the diaphragm to build up a closing pressure, a supplemental valve controlling the closing pressure and arranged in a closing pressure chamber on the side of the main valve, opposite the main inlet, said supplemental valve being co-axially arranged in respect to the main valve, a stem for the supplemental valve, a cross piece in which the stem of the supplemental valve is guided said cross piece forming a part of the valve casing, a spring above said cross piece a collar on the valve stem on which the spring bears to seat the valve by upward pressure, and a co-axially arranged thermostat acting on the valve stem, substantially as described.

In testimony whereof, we affix our signatures in presence of two witnesses.

VICTOR MAUCK.
KENNETH HOWIE.

Witnesses:
JOHN R. HENDRICKS,
MADELINE R. DALY.