No. 683,995. Patented Oct. 8, 1901.

R. SCHLUMBERGER.

WATER HEATER.

(Application filed Aug. 6, 1900.)

(No Model.)

Fig. 1.

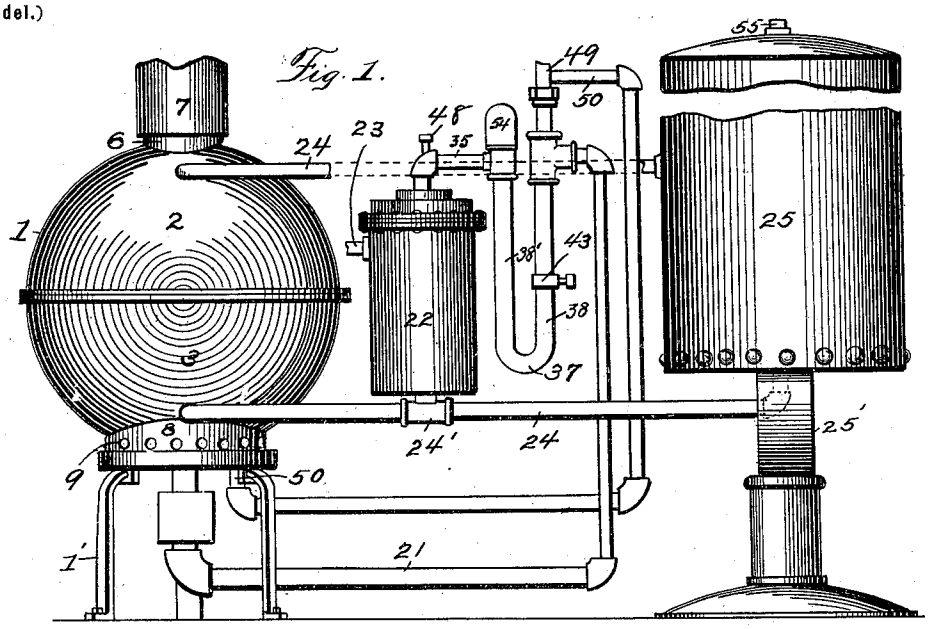


Fig. 4.

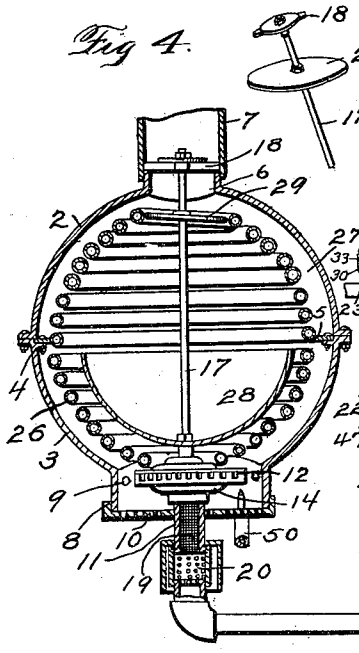


Fig. 2.

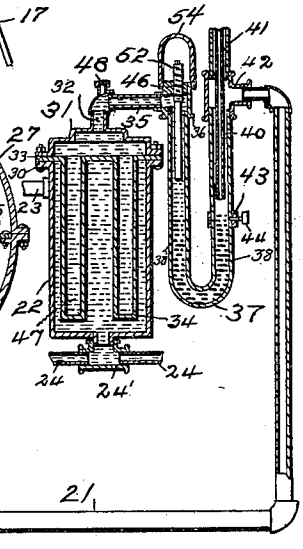
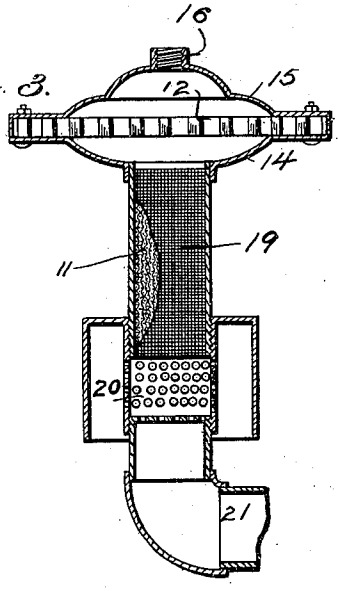


Fig. 3.



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UNITED STATES PATENT OFFICE.

ROBERT SCHLUMBERGER, OF ALLEGHENY, PENNSYLVANIA.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 683,995, dated October 8, 1901.

Application filed August 6, 1900. Serial No. 26,042. (No model.)

To all whom it may concern:

Be it known that I, ROBERT SCHLUMBERGER, a citizen of the United States of America, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Water-Heaters, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in water-heaters, and while it may be termed as relating particularly to that class of water-heaters known to the trade as "instantaneous" heaters it has a further object than that accomplished by instantaneous heaters in that while providing means for "instantaneously" (as the term is used in connection with heaters of this class) heating the water it is also the object of my invention to store this heated water and to provide means interposed between the heater and the hot-water-storage tank or reservoir for automatically opening the gas-valve of the heater upon the decreasing of the amount of hot water in the hot-water reservoir or the cooling of the water held by such reservoir below the predetermined point.

In the class of water-heaters known to the trade as "instantaneous" heaters the general practice has heretofore been to provide a thermostat or other gas-controlling means in the flow-line, to which the spigot is connected, and upon opening the spigot the thermostat or like device automatically operates to open the gas-supply at the burner and permit the gas to ignite and heat the water in the coil or series of coils which are connected to the flow-line. In these devices, however, the water must be heated as it flows through the coil or coils and is immediately discharged from the spigot. No means is provided whereby the heated water may be stored and the temperature to which it has been heated retained, so that a large quantity of heated water may be obtained when desired, and as this stored heated water is being drained off or used the valve will be automatically opened, so as to turn on the gas at the heater and continue to supply heated water to the reservoir, and when the spigot is closed the heater will remain in operation until such time as the reservoir or storage-tank has been again filled with heated water, when the valve will automatically close the supply of gas to the burner.

Briefly described, my invention comprises the heater, which consists of a shell having the water-heating coil arranged therein. This coil is made in the form of a sphere or ball with a semispherical deflector arranged within the lower half of the coil and a partition arranged between the shell and the coil midway of the latter, so that the gas-flame as it arises from the burner located underneath the coil will be prevented from passing upward around the exterior of the same farther than the midway line of the coil, and the deflector, being in close proximity to the coil or coils inside thereof, causes the flame to be held within close proximity to the coils, so as to obtain the greatest efficiency possible.

Various other features enter into the invention and will be hereinafter more specifically pointed out, and in describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, wherein like numerals of reference indicate corresponding parts throughout the several views, and in which—

Figure 1 is a side elevation of my improved water-heater connected up to the storage tank or reservoir. Fig. 2 is a vertical sectional view of the heater and thermostat, showing the latter connected up to the heater. Fig. 3 is a vertical sectional view of the burner removed from the heater. Fig. 4 is a detail perspective view of the sealing-disk for the top of the spherical coil of pipe, showing a part of the deflector-supporting rod and the suspending-spider.

In describing the invention in detail I will first refer specifically to the heater, which comprises a casing 1, made in two sections flanged so that they may be securely riveted or bolted together. In practice I have found a spherical or ball shaped casing to be especially adapted to attaining the desired results, and I have herein shown a casing of this form, though I do not desire to confine myself to this spherical or ball shape in this casing. When made in the two semispherical sections, as shown, the upper section 2 is provided with an outwardly-extending annular flange at its lower edge, which rests upon and is bolted or riveted to the outwardly-extend-

ing flange at the upper edge of the lower section 3, this lower section being also provided at a point at or very near to its upper end with an interior annular flange 4, upon which is rigidly secured, by bolting, riveting, or other desired means, an annular band 5, forming a partition, for a purpose as will be hereinafter clearly designated and explained. The section 2 terminates at its top or apex in a neck 6, to which the flue 7 may be conveniently secured, and the section 3 terminates at its lower end in an annular neck 8, which is provided with a series of apertures 9 in order that air may be admitted into the ball or casing to increase combustion at the burner. The annular neck 8 at the lower end of the casing has secured thereto a cap or base-plate 10, which is also provided with apertures to admit air into the casing and has the sleeve or pipe section 11 of the burner 12 passing centrally through the same. This burner may be of suitable form, though that herein shown has been found practical and consists of two bowed plates bolted together, the lower plate 14 having the sleeve or pipe section 11 secured thereto and the upper plate 15 being flanged and provided with a series of apertures to permit the escape of the gas. This upper plate of the burner is provided with circumferential ridges on its upper face, so that the lower coil of the pipe contained within the casing will fit and rest neatly thereon, and the plate also is provided at its apex with a threaded socket 16 to receive the supporting-rod 17, which passes upwardly through the interior of the casing, centrally of the heating-coils arranged in said casing, and carries on its upper end a spider or like device 18, which rests on the top of the annular neck 6 of the section of the casing. The sleeve or pipe section 11 has arranged therein a filling of wire-gauze 19 to prevent the flashing of the gas downwardly into the tube or sleeve. This tube or sleeve has a suitable air-mixer 20 connected to its lower end, to which the gas-supply pipe 21 is attached.

The water-feed line 23 is connected to a cylinder or receptacle 22, sealed at its upper end and having communication at its lower end with a union 24′ in the water-flow line 24. This water-flow line extends from the cylinder or receptacle 22 to the storage tank or reservoir 25 and also extends into the casing 1 near the lower end of the section 3, where it is wound in a spherical or ball shaped coil or series of coils 26, in which the water is heated during its circulation. This flow-line extends outwardly through the casing near the top of the section 2 and across into communication with the storage tank or reservoir, connecting therewith at any desired or convenient point. The coils 26 of this flow-line being in a spherical form and this sphere being of less diameter than the casing 1, an air-space 27 is formed entirely encircling the coil, which air-space is divided at the central line of the casing by the partition 5, heretofore described, mounted upon the rod 17. Within the sphere is a semispherical deflector 28, the outer wall of which is in close proximity to the inner surface of the coils of the lower half of the sphere, and this rod 17 also carries a plate or disk 29, which is so placed upon the rod as to lie within the upper coil of the series and close the sphere at its top.

In order to illustrate and describe the operation of my improved heater, I have shown in connection therewith a form of thermostat the parts of which are described only in so far as it is necessary to show the operation of the heater.

The cylinder or receptacle 22, into which the feed-water line connects, is provided at its upper end with an annular flange 30, upon which is secured a cap or cover 31, having an outlet 32. Between the flange of this cap or cover and the flange 30 is secured a plate 33, in which is circumferentially arranged a series of oil-receiving tubes 34, which extend downwardly into the cylinder or water-receptacle 22 to a point near the bottom of the latter, said tubes being open at their top and closed at their ends. A branch pipe 35 connects with the neck 32 at its one end and at its other end carries a union 36, to which is connected the one end of the U-shaped pipe 37, the lower part of which pipe is adapted to form the mercury-reservoir. The leg 38 of this U-shaped pipe carries on its upper end a union or casing 39, in which the gas-supply pipe 40 is secured by means of the threaded sleeve 41. This pipe extends some distance downwardly into the leg 38 and is of considerably less diameter than the bore of the leg 38, so that when the gas is discharged from the end of the pipe 40 it is permitted to pass upwardly between the said pipe 40 and the leg 38 and discharge through the port 42, to which the gas-supply pipe 21 is connected. I preferably provide the leg 38 of the thermostat with a gage which consists of a sleeve 43, surrounding the leg and held thereon by the screw 44, which also seals the aperture in the leg when in position. In filling the thermostat this screw is removed from engagement with the aperture in the leg 38 and together with the sleeve or collar 43 is elevated or lowered on the leg, so that the mercury 45 will discharge through the opening when it reaches that point, at which time the screw may be inserted in the aperture to close the same, as will be readily understood. Access to the leg 38′ is had by removing a plug 46, arranged in the union 36, and in this plug is placed a regulator comprising a rod 52, threaded into the plug and protected by a cap 54, removably placed on a union 36. A vent 48 is also provided to prevent accumulation of air within the body of the thermostat. A less quantity of mercury will be required, as the rod or pin is screwed downwardly into the leg 38′, as by so doing the mercury will be forced upward in the leg 38, as will be readily apparent. The gas-supply pipe 49 is connected with the sleeve 41,

and the pilot-light branch 50 connects with the gas-supply pipe beyond the sleeve 41 and with the pilot-light 51, the burner or tip of which may be supported in the perforations 10 below the burner. The reservoir or storage-tank 25 is supported by a suitable stand 25', and the heater is or may be supported by suitable standards or legs.

In operation the valve, in case there be one on the feed-line 23, being normally open, the water enters through said feed-line into the cylinder or receptacle 22, entirely filling the space within the same around the oil-receiving tubes 34, and is discharged from the cylinder or receptacle toward the storage tank or reservoir 25 and also into the heating-coils within the casing 1. The entrance of this cool water into the cylinder or receptacle 22 causes the contraction of the oil contained in the tubes 34, thus allowing the oil which is within the cap 31, branch 35, and leg 38' to recede and allowing the mercury 45 to also lower or contract, so as to open or unseal the end of the gas-pipe 40, permitting the gas to pass between said pipe 40 and the leg 38 through the outlet 42 and supply-pipe 21 to the burner 12, where it is ignited by the pilot-light 51. The flames from the burner are in direct contact with the coils comprising the lower half of the sphere, there being substantially no draft outside of the coils by reason of the partition 5, said partition obstructing the draft which would otherwise be created within the air-space 27 and causing the flame to be drawn inwardly toward the center of the heating-sphere or the lower end thereof. As it is thus drawn inwardly between the coils this flame is deflected by the cup-shaped deflector 28 and forced upwardly until the central line of the sphere is reached, at which time by reason of the sphere being sealed at its top by the disk or plate 29 the flame is drawn outwardly between the coils into the air-space 27 above the partition 5, from which point the draft is uninterrupted to the flue. This peculiar construction enables me to have the coils of the lower half of this heating-sphere practically surrounded by the flame and also enables me to obtain greater efficiency in heating the coils comprising the upper portion of the sphere by reason of the draft being outwardly between these coils. During the time the gas-inlet is open a circulation will be maintained through the heating-coils and through the pipe connections to the storage-tank, the heated water being of less density than the cool water and rising to the top of the storage-tank, this circulation continuing until such time as the temperature has reached a predetermined point controlled by the thermostat, at which the mercury closes the inlet to the gas-supply pipe 41 by the action of the expanding oil against the mercury, causing the latter to rise in the leg 38 and seal the outlet of pipe 40. The storage tank or reservoir has a pipe 55 leading to the faucet or spigot, (not shown,) and when this faucet or spigot is open and a part of the heated water drawn from the storage tank or reservoir it will be observed that such action will permit the entrance of cool water into the cylinder or receptacle 22, decreasing the temperature of the water therein in the line 24 and also of the heated water which is within the tank or reservoir, causing the expansible oil to again contract, permitting the mercury to recede in the leg 38 and unsealing the gas-inlet, so as to allow the flow of gas to the burner, where it is again ignited, and the water is heated as it passes through the heating-coils to restore the water in the tank to the desired temperature. In practice I have found that when the storage tank or reservoir has been filled, the water being heated to the predetermined temperature and the gas-supply being automatically shut off, the pilot-light is sufficient to maintain this temperature of the water until such time as a quantity of the same is drawn off from the tank, when of course, owing to the entrance of the cool water into the flow-line and the circulation of this water through the flow-line into the tank, the oil in the tubes within the receptacle 22 is contracted owing to the entrance of cooler water into the receptacle, and the mercury in the leg 38 recedes, opening the inlet for the gas-supply and igniting the gas at the burner, so as to restore the water to the desired temperature, at which time the oil operates to expand the mercury and again close the gas-inlet, which operation it is believed will be readily understood.

It will be noted that various changes may be made in the details of construction without departing from the general spirit of my invention.

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

1. In a water-heater, the combination of a substantially spherical casing, a water-heating coil of corresponding form, situated within the casing and spaced from the walls thereof, the convolutions of the coil being separated from one another, a horizontal partition dividing the space between the coil and the casing, and a burner in communication with the space below said partition.

2. In a water-heater, the combination of a substantially spherical casing, a water-heating coil of corresponding form, situated within the casing and spaced from the walls thereof, the convolutions of the coil being separated from one another, a horizontal partition dividing the space between the coil and the casing, a burner in communication with the space below said partition, and means for deflecting the heated gases into the space below said partition.

3. In a water-heater, the combination of a substantially spherical casing, a water-heating coil of corresponding form, situated within the casing and spaced from the wall thereof, the convolutions of the coil being sepa-

rated from one another, a horizontal partition dividing the space between the coil and the casing, a burner in communication with the space below said partition, means for deflecting the heated gases into the space below said partition, and means situated at the upper portion of the coil and adapted to deflect the heated gas between the convolutions of the coil into the space above the partition.

4. In a water-heater, the combination of a substantially spherical casing, a water-heating coil of corresponding form, situated within the casing and spaced from the walls thereof, the convolutions of the coil being separated from one another, a partition dividing the space between the coils and the casing, a burner in communication with the space below said partition, and a deflector located within the coil below the partition for deflecting the heated gases into the space below said partition.

5. In a water-heater, the combination of a substantially spherical casing, a water-heating coil of corresponding form, situated within the casing and spaced from the walls thereof, the convolutions of the coil being separated from one another, a horizontal partition dividing the space between the coil and the casing, a burner in communication with the space below said partition, means for deflecting the heated gases into the space below the partition, and a deflector situated at the upper portion of the coil and adapted to deflect the heated gases between the convolutions of the coil into the space above the partition.

6. In a water-heater, the combination of a casing, a water-heating coil of corresponding form to the casing, situated within the casing and spaced from the walls thereof, the convolutions of the coil being separated from one another, a horizontal partition dividing the space between the coil and the casing, a burner in communication with the space below said partition, a deflector suspended within the coil below the partition and adapted to deflect the heated gases into the space below said partition, and deflector situated at the upper portion of the coil and adapted to deflect the heated gases between the convolutions of the coil into the space above the partition, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

ROBERT SCHLUMBERGER.

Witnesses:
JOHN NOLAND,
A. M. WILSON.