Nov. 12, 1929. W. D. HARVEY 1,735,246

INCUBATOR HEATER

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Fig. 1.

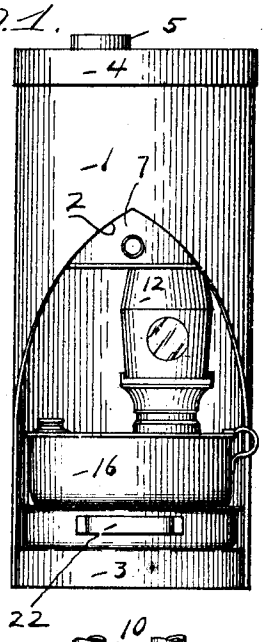


Fig. 2.

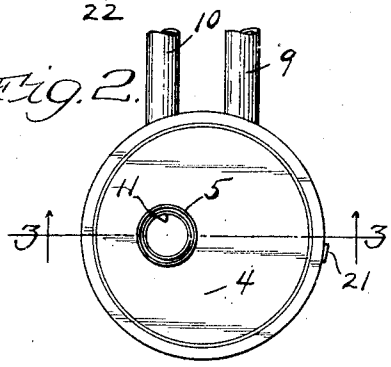


Fig. 4.

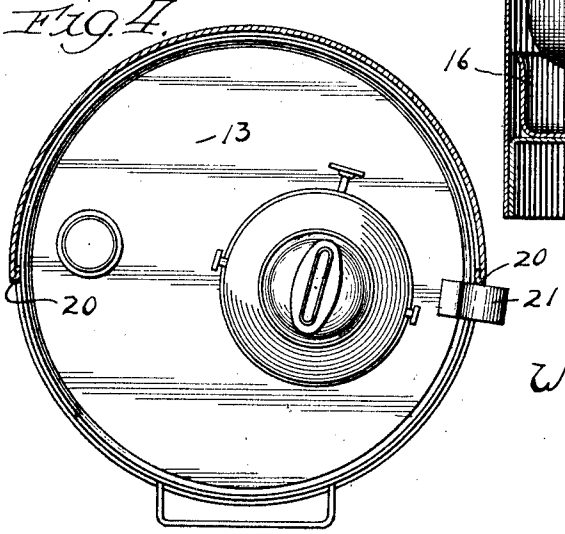
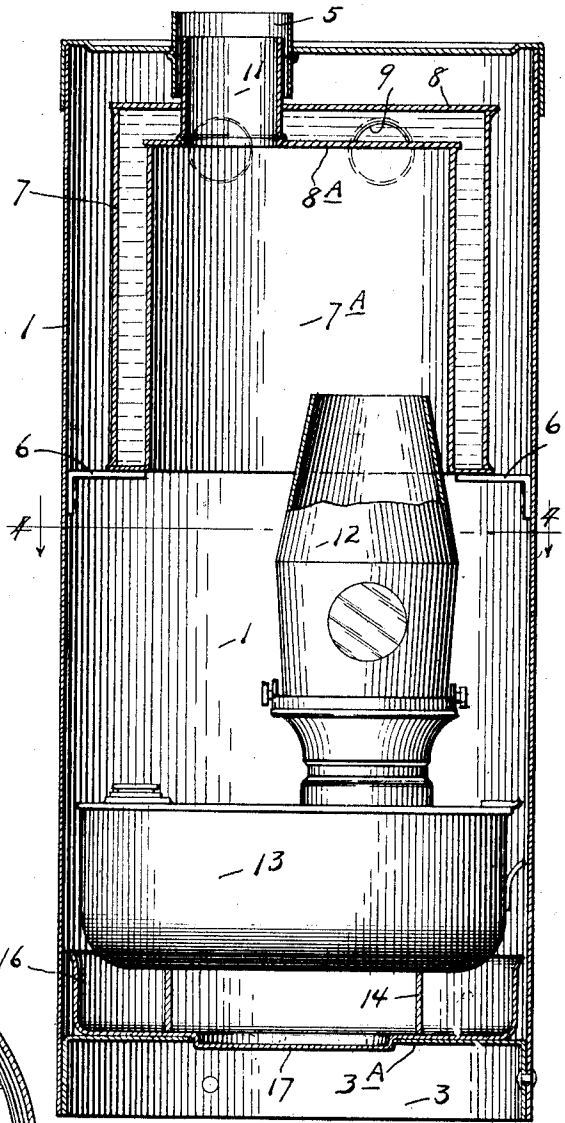


Fig. 3.



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Fig. 7.

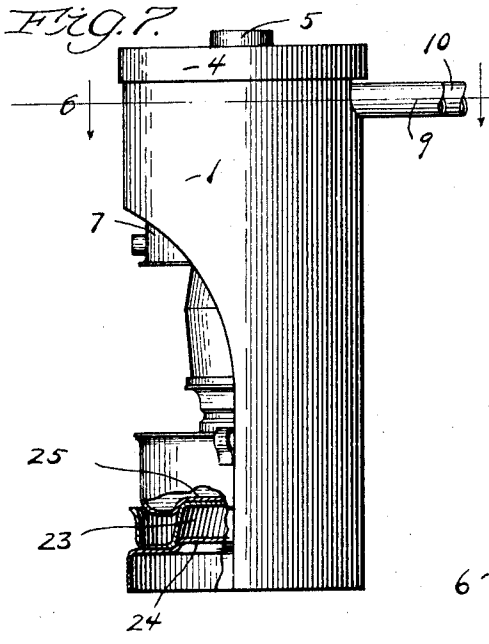


Fig. 5.

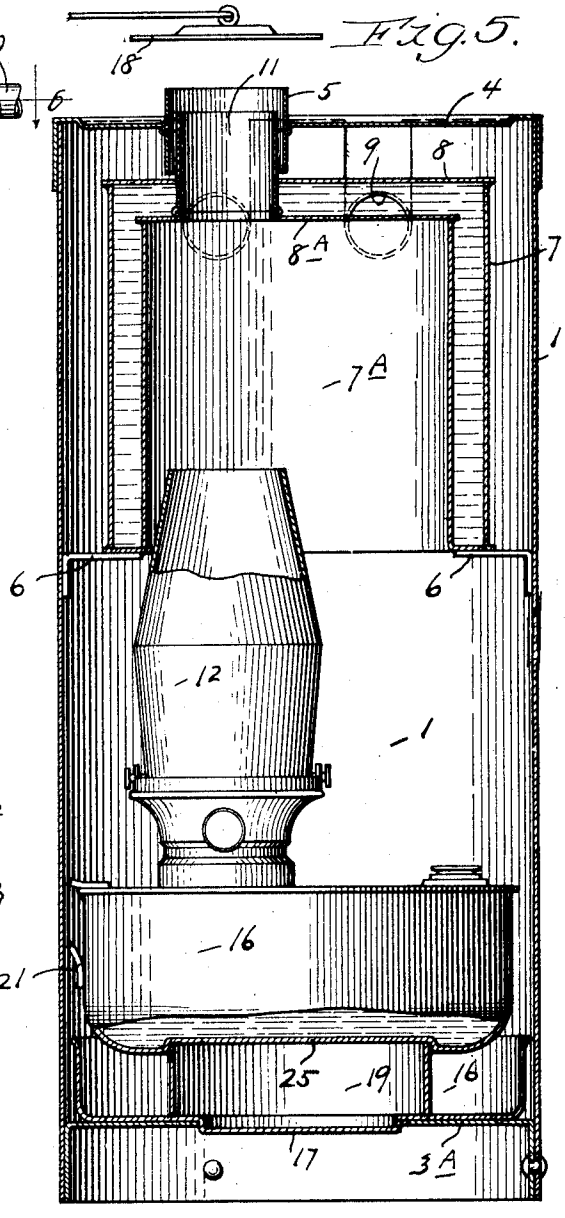


Fig. 6.

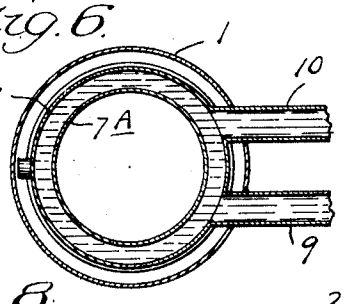
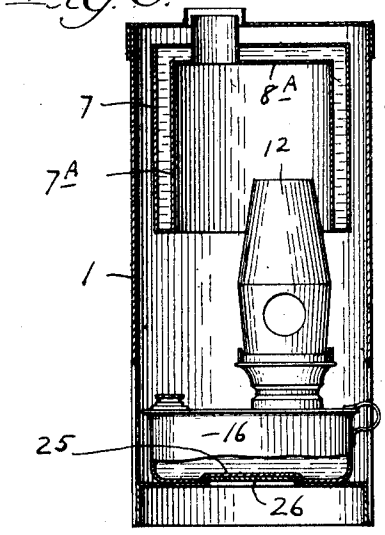


Fig. 8.



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1,735,246

UNITED STATES PATENT OFFICE

WILLIAM DOW HARVEY, OF MACOMB, ILLINOIS, ASSIGNOR TO AMERICAN STEEL PRODUCTS CO., OF MACOMB, ILLINOIS, A CORPORATION OF ILLINOIS

INCUBATOR HEATER

Application filed February 15, 1928. Serial No. 254,359.

My invention relates to the class of liquid heaters in which a burner is employed as the source of heat, and in one of its general objects aims to provide a simple and inexpensive arrangement in which the heating effect of the burner can readily be varied independently of any burner adjustment or draft control. My invention also provides a heater including a liquid tank constructed for receiving heat from a chimney or other heating device portion both by lateral radiation and by the upward current of air, the heating arrangement being constructed so that the position of the heating device can readily be changed to vary the heating effect on the tank, and so that the user will readily know when the heating device is respectively in its minimum and maximum effective positions. Furthermore, my invention provides a heater for liquids (or other fluids) in which a simple burner of the chimneyed oil lamp type will suffice as a heating device, in which the heating effect of the burner on the liquid container can readily be varied by rotational movements of the burner on its support, and in which the heating device can readily be inserted and removed without unduly tipping it.

More particularly, my invention provides a liquid heater including a base disposed below a tank of hollow inverted U-shaped diametric section, and a chimneyed oil burning device effectively journaled for rotational movement upon the base and varied in its effectiveness by the changes in position of the chimney of this device with respect to a flue extending through the top of the tank; and my invention also aims to provide a heater of this class in which a removable drip pan interposed between the base and the oil burning device serves in the journaling, catches any oil drip, supports the heating device at an effective height, and serves to reduce tipping of the heating device during its insertion or withdrawal.

In heating incubators, it has long been customary to provide hot water pipes leading from the interior of the incubator to a tank outside the latter, which tank is heated by an oil burning lamp below the tank. In such arrangements, the heated gases commonly escape through a flue and the draft of the lamp can be regulated to a considerable extent by a damper disposed above the flue and controlled by a thermostat within the incubator. However, the resulting regulation has proved insufficient to compensate for decided changes in the temperature of the room in which the incubator is disposed, since the draft through the flue cannot be greatly throttled without causing the lamp to smoke. In one of its immediate commercial applications, my invention provides a liquid heater particularly suitable for use in connection with an incubator and arranged so that the heating effect can be varied (both initially and again later if desired) by mere rotational movements of the lamp, without affecting the usual damper-control regulation in accordance with the temperature in the incubating chamber.

Illustrative of such an embodiment of my invention,

Fig. 1 is a front elevaton of a liquid heater designed for this purpose.

Fig. 2 is a plan view of the same.

Fig. 3 is an enlarged central and vertical section, taken along the line 3—3 of Fig. 2, with the lamp in its most effective position.

Fig. 4 is a horizontal section taken through Fig. 3 along the line 4—4.

Fig. 5 is a vertical section similar to Fig. 3, but with the lamp or heating device in its least effective position.

Fig. 6 is a reduced horizontal section, taken along the line 6—6 of Fig. 7.

Fig. 7 is a side elevation of another embodiment, with portions sectioned to show other suitable constructions of the lamp bottom, the supporting base and the interposed drip pan.

Fig. 8 is a central and vertical section through still another embodiment of my invention, namely one which includes no drip pan.

In the embodiment of Figs. 1 to 6 inclusive, my liquid heater includes an upright casing comprising a cylindrical casing side 1 provided in its lower portion with an opening 2, a base 3 fastened to the bottom end of the tubular casing side 1, and a detachable cover 4 having a flue duct 5 extending through it at

one side of the axis of the casing side. Supported within the upper portion of the casing side, as by brackets 6, is a liquid container comprising a double-walled tubular jacket 7 and a double-walled container top 8, thus affording a liquid chamber of inverted U-shaped diametric section, from which an inlet pipe 9 and an outlet pipe 10 extend through the casing side. A flue 11 extends from the lower wall 8^A of the container top through the upper wall 8 and into the flue duct 5 to provide for the upward passage of hot air from the bore of the double-walled tubular jacket 7.

Extending upwardly into this bore is the chimney 12 of an oil-burning lamp which has its oil font 13 supported by or from the base 3 of the casing in such a manner that the chimney (which has its upper end considerably below the lower wall 8^A of the container top) can be rotated substantially about the axis of the liquid container. For this purpose, Figs. 1 and 3 show the lamp font seated on vertical partitions 14 in a drip pan 16 which is seated on the base of the casing. The horizontal main portion 3^A of this base has a central perforation loosely fitting a downward projection 17 on the bottom of the drip pan, so that the periphery of this projection and the bore of the said perforation constitute interfitting formations for effectively journaling the drip pan on the said base.

The lateral displacement of the axes of the lamp chimney and the flue 11 from the axis of the liquid container are substantially equal, so that the top of the chimney alines with this flue when in one position but is out of alinement with the flue in another position. Since gravity will hold the lamp on the drip pan, the lamp readily rotates with the latter, and in the unalined position of Fig. 3 underhangs a solid portion of the top of the liquid container, so that the liquid in the latter will be heated both by the upwardly passing hot gases and by lateral heat radiation from the chimney. However, when the lamp is disposed so that its chimney alines with the container flue 11, the hot gases will largely pass upward through this flue without heating the container top, thus greatly reducing the heating effect for the same burner adjustment and the same position of the usual damper 18, while various intermediate heating efficiencies can be obtained by rotationally moving the lamp so that the chimney alines only partially and to varying extents with the flue.

When the drip pan is interposed between the base of the casing and the lamp, a slight raising of the lamp will permit the drip pan to be withdrawn from the casing, after which the lamp can be lowered close to the base before also removing it from the casing. Consequently, I can readily use a chimney which normally projects for a considerable distance into the bore of the inverted cup-shaped hollow liquid container, and can have the total height of the lamp greater than the distance between the base 3 and the lower end of the container without being obliged to tilt the lamp unduly when withdrawing or replacing it.

The drip pan preferably is larger in diameter than the font 13 of the lamp, so that it will catch any drip oil left on the font after a refilling, and the font may closely approach the bore of the casing so that the latter will aid in keeping the lamp font coaxial with the casing. However, I may also provide interfitting formations on the drip pan and the base of the lamp to journal the lamp on the drip pan, as by providing the bottom of the font with a central and upwardly directed boss fitting over a tubular and central partition 19 in the drip pan, as shown in Fig. 5.

The opening 2 in the tubular casing side desirably extends about half way around the casing and presents upright edges 20 adapted to engage the usual narrow handle 21 of the lamp so as to limit the rotational movement of the lamp. With these stop edges 20 suitably disposed in relation to the position of the flue 11, the engagement of one of these edges 20 by the handle (as in Fig. 4) will place the lamp substantially in its maximum heating position, while a movement of the lamp to its permissible extent until the handle 21 engages the other edge 20 will dispose the lamp in its least effective heating position of Fig. 5. Consequently, the user can readily judge of the effectiveness of the lamp from the position of its handle. However, the stopping may also be done by engagement of the said edges 20 with the handle 22 of the drip pan.

So also, many changes may obviously be made without departing either from the spirit of my invention or from the appended claims. For example, Fig. 7 shows an embodiment in which a central embossed portion of the base of the drip pan 23 has its lower end engaging a raised boss 24 on the base of the casing, and has its upper end fitting a raised boss 25 in the bottom of the lamp font.

Moreover, I do not wish to be limited to the inclusion of a drip pan disposed under the heating device and effectively forming part of the removable heating member. For example, Fig. 8 shows an embodiment in which the lamp seats directly on the casing base 26, and in which this base has an upwardly directed boss fitting a corresponding boss 25 in the bottom of the lamp font. Nor do I wish to be limited to the employment of my invention in connection with an incubator.

In all of the illustrated embodiments, the inverted hollow cup shape of the liquid container greatly increases the amount of heat-receiving surface (in proportion to the liquid capacity of the container) over that of heaters in which only a horizontal portion re-

ceives the heat. Furthermore, the relatively large bore surface of the liquid container effectively receives lateral heat radiation from the upper portion of the chimney and also abstracts heat from the air which passes upward through this bore 7A after being warmed through the lower parts of the chimney. Consequently, my heater is unusually efficient in proportion to the amount of heat supplied by the burning oil and is also unusually speedy in the initial heating of the liquid.

I claim as my invention:

1. A liquid heater comprising a liquid container including a top portion and an annular portion deepnding from the top portion, a vertical flue extending from the bore of the said annular portion upwardly through the top portion at one side of the axis of the annular portion, a heating member including a heat-emitting portion disposed within the said bore at one side of the axis of the bore, and a support on which the heating member is rotatable about the axis of the bore to bring its heat-emitting portion into and out of alinement with the flue while continually maintaining this heat-emitting portion in vertical alinement with a part of the said bore.

2. A liquid heater as per claim 1, in which the support and the heating member have interengageable portions disposed for limiting the rotational movement of the heating member to positions in which the said heat-emitting portion is respectively in and out of alinement with the flue.

3. A liquid heater comprising an elevated liquid container including a top portion and an annular portion depending from the top portion, a flue extending from the bore of the said annular portion upwardly through the top portion at one side of the axis of the annular portion, a heating member including a heat-emitting portion continuously disposed within the said bore at one side of the axis of the bore, and a support rigidly spaced from the container and on which the heating member is rotatable about the axis of the bore, the support and the heating member having interfitting portions to journal the heating member on the axis of the said bore.

4. A heater comprising an upright casing, a liquid container mounted in an elevated portion of the casing and including an upright annular container portion and a hollow top extending across the bore of the annular container portion; a flue extending through the said top and laterally displaced from the axis of the annular container portion, and an oil-burning device supported in the casing below and coaxial with the said container portion, the said device having its burner at one side of the said axis and continuously in vertical alinement with the bore of the annular container portion, the said device being rotatable about the said axis, the lateral displacements of the flue and burner from the said axis being substantially equal.

5. A heater as per claim 4, in which the oil burning device includes an upright chimney having its upper end continuously disposed within the bore of the annular container portion regardless of the position to which the said device may be rotated.

6. A liquid heater as per claim 4, in which the casing and the oil-burning device have interengaging portions disposed for halting rotational movement of the said device in two positions in which the burner respectively underhangs the flue and underhangs a container top portion laterally spaced from the flue.

7. A heater comprising an upright casing including a stationary bottom, a liquid container mounted in an elevated portion of the casing and including an upright annular container portion and a hollow top extending across the bore of the annular container portion, a flue extending vertically through the said hollow top at one side of the axis of the annular container portion; and an oil-burning heating member seated on the said bottom and including a chimney having its upper end disposed within the bore of the annular container portion at one side of the axis of the latter, the casing having means for guiding the heating member for rotation about the said axis, and the casing having a lateral opening above the bottom and below the annular container portion through which the heating member can be inserted and removed.

8. A heater comprising an upright casing, a liquid container mounted in an elevated portion of the casing and including an upright annular container portion and a hollow top extending across the bore of the annular container portion; a flue extending through the said top and laterally displaced from the axis of the annular container portion, the casing having a rigid base spaced downwardly from the bottom of the liquid container; a drip pan removably seated upon the base, the base and drip pan having interengaging portions effectively journaling the drip pan for rotational movement about the axis of the container; and an oil-burning device seated upon the drip pan and having its heat-emitting portion laterally displaced from the said axis to substantially the same distance as the flue.

9. A heater comprising an upright casing, a liquid container mounted in an elevated portion of the casing and including an upright annular container portion and a hollow top extending across the bore of the annular container portion; a flue extending through the said top and laterally displaced from the

axis of the annular container portion, the casing having a rigid base spaced downwardly from the bottom of the liquid container; a drip pan removably seated upon the base, the base and drip pan having interengaging portions effectively journaling the drip pan for rotational movement about the axis of the container; and an oil-burning device seated upon the drip pan and having its heat-emitting portion laterally displaced from the said axis to substantially the same distance as the flue, the said interengaging portions being of such limited height as to permit the removal of the drip pan when the said device is raised.

10. A heater comprising a liquid container including a top portion and an annular side portion depending from the top portion, a flue extending from the bore of the annular side portion through the top portion at one side of the axis of the said side portion; a base rigidly spaced downwardly from the container, a drip pan removably seated on the base and journaled on the base for rotation about the said axis, and an oil burning device removably seated on the drip pan and including a chimney extending upwardly into the bore of the annular container side portion at one side of the said axis; the joint height of the drip pan and the oil burning device being only slightly greater than the height of the bottom of the container above the base, thereby permitting the successive withdrawal of the drip pan and the oil-burning device with a relatively small tilting of the latter.

11. A liquid heater comprising an inverted and double-walled cup-shaped liquid container; a casing freely housing the said container and having a lateral opening below the container; a flue extending upwardly through the double-walled top of the container and through the top of the casing at one side of the vertical axis of the casing; a heating device supported within the casing and having a heat-emitting portion extending upwardly into the bore of the double-walled lateral wall of the liquid container, and means associated with the casing for guiding the heating device; the said device being rotatable with respect to the casing to bring its heat-emitting portion into or out of vertical alinement with the flue, the heating device being insertible in its said disposition within the casing through the said lateral opening in the casing.

Signed at Chicago, Illinois, February 13th, 1928.

WILLIAM DOW HARVEY.