(No Model.)

W. G. FLANDERS.

WATER HEATER FOR DOMESTIC OR OTHER PURPOSES.

No. 461,867. Patented Oct. 27, 1891.

Fig. 1.

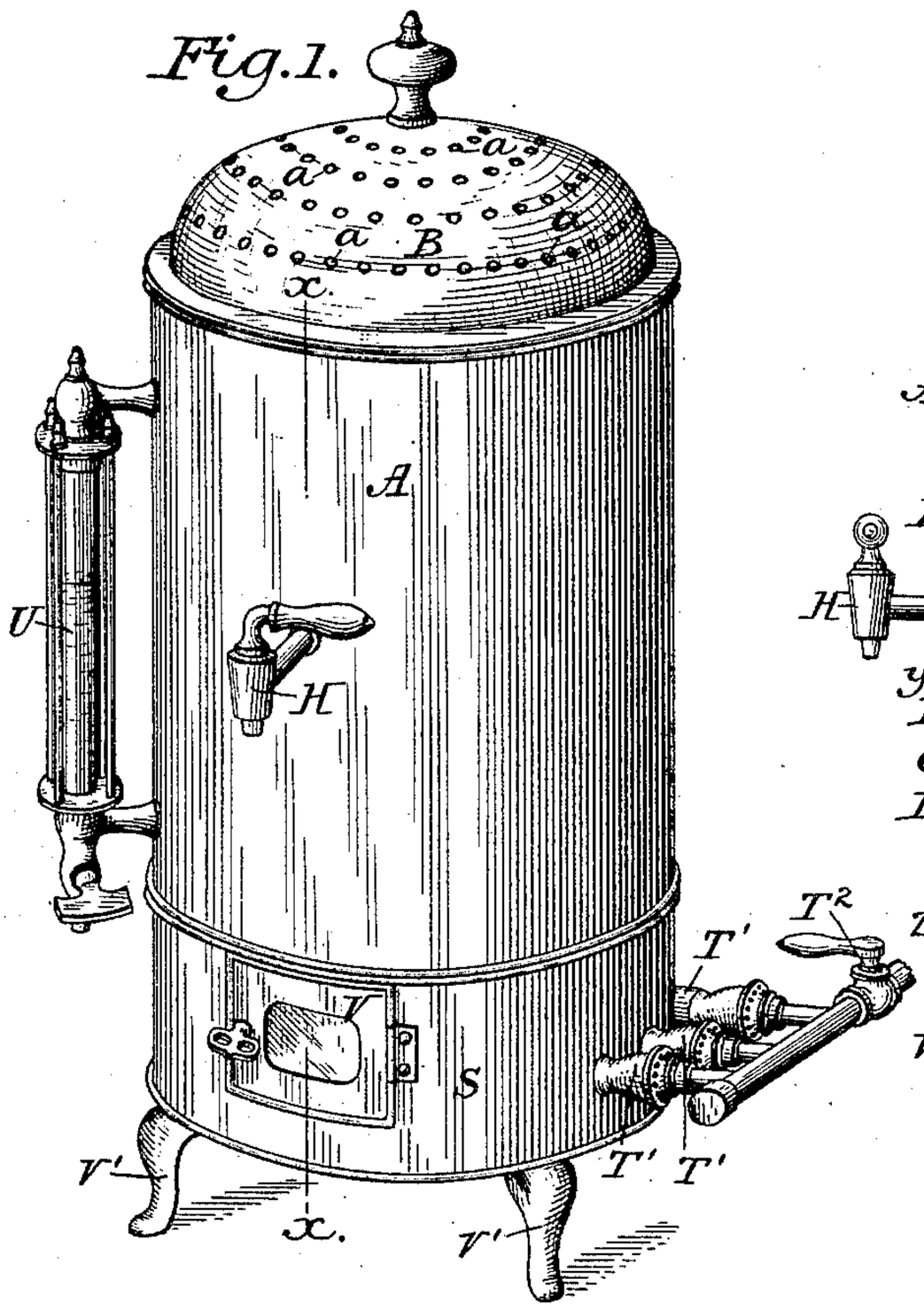


Fig. 2.

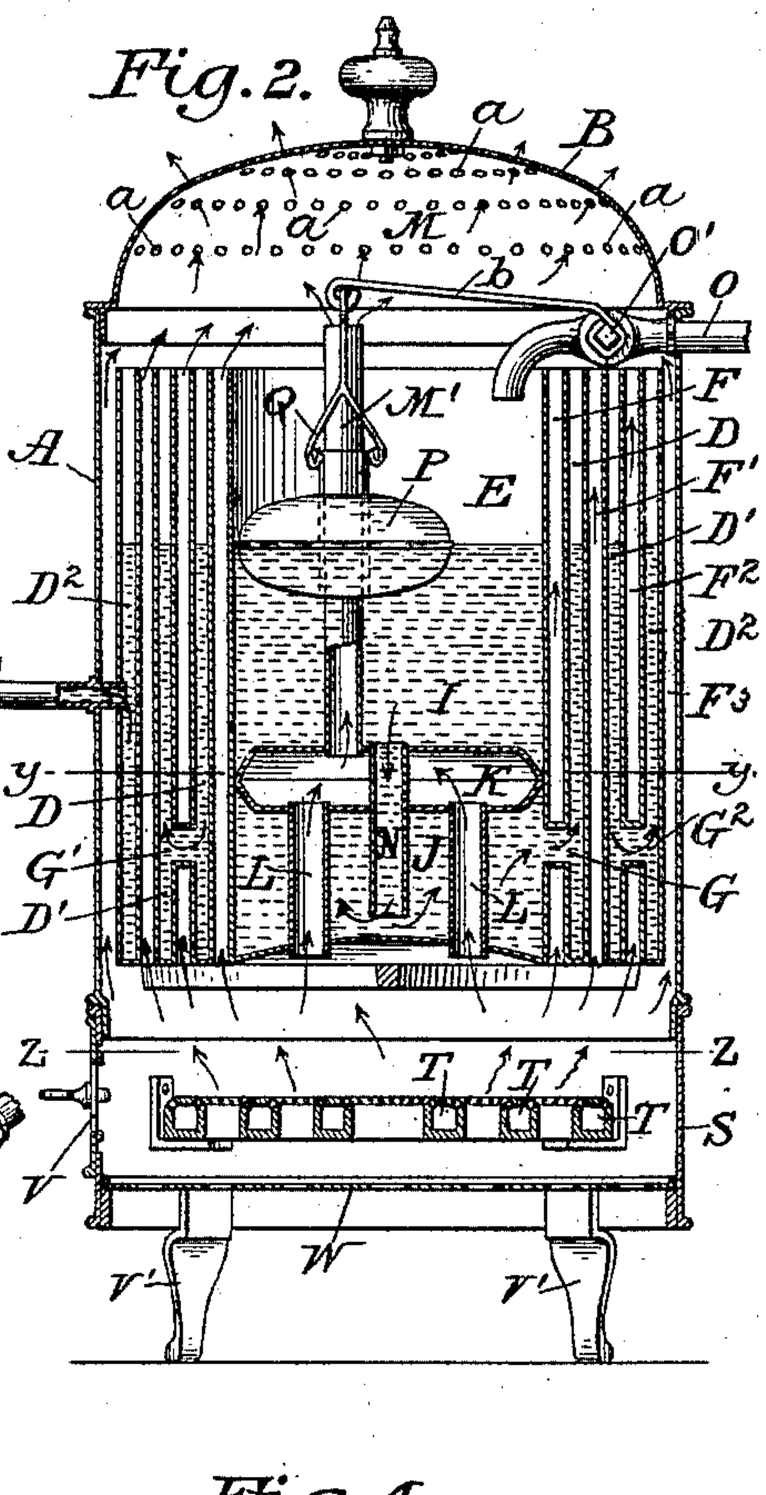


Fig. 3.

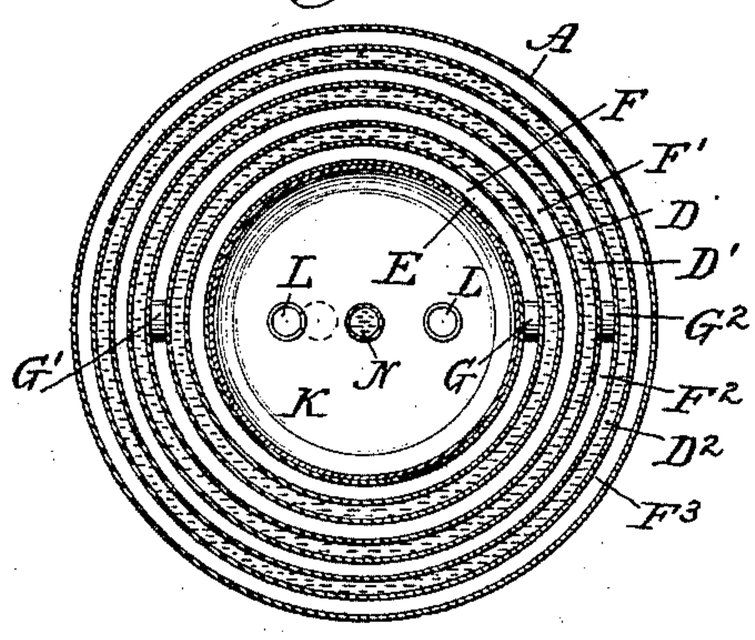
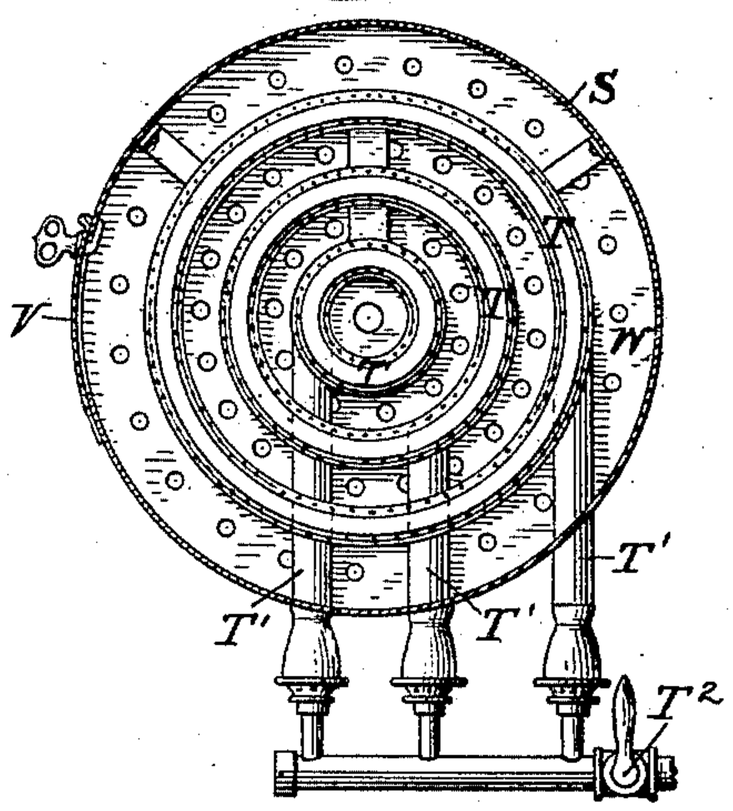


Fig. 4.



Attest:
A. N. Jesbera.
E. M. Watson

Inventor:
William G. Flanders
By David A. Burr
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM G. FLANDERS, OF NEW YORK, N. Y.

WATER-HEATER FOR DOMESTIC OR OTHER PURPOSES.

SPECIFICATION forming part of Letters Patent No. 461,867, dated October 27, 1891.

Application filed November 10, 1890. Serial No. 370,924. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. FLANDERS, of the city, county, and State of New York, have invented certain new and useful Improvements in Water-Heaters for Domestic or other Purposes; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

My invention relates to improvements in apparatus for rapidly heating water for domestic purposes, and has for its obect to simplify the same and render it more effective.

The invention consists in an improved construction and arrangement, substantially as hereinafter described and claimed, of water-heating compartments and flues within an inclosing casing, and in the combination of suitable burners therewith.

In the accompanying drawings, Figure 1 is an elevation in perspective of my improved domestic water-heater; Fig. 2, a central vertical section thereof in line $x\,x$ of Fig. 1; Fig. 3, a cross-section in line $y\,y$ of Fig. 2, illustrating the concentric water-chambers; and Fig. 4, a cross-section in line $z\,z$ of the same figure, illustrating the arrangement of the burners and flame-guard.

Similar letters indicate like parts in all of the figures.

A represents in the drawings the outer shell or case of the heater, preferably made of sheet metal, cylindrical in form, and surmounted by a perforated dome-shaped cover B. The boiler or water-heater inclosed by the casing A is constructed of a central cylindrical vessel or water-compartment E, closed at the bottom and open at the top, encircled by a concentric series of very narrow annular vessels or water-compartments D D′ D², uniform in width and of a uniform height corresponding with that of the central compartment. Each of said annular compartments is constructed of two concentric walls of sheet metal, united at their lower ends by a suitable bottom plate and left open at the top. These concentric water-compartments D D′ D² are severally so proportioned in diameter and so disposed as to leave between them annular open-ended spaces or flues F F′ F², of uniform width, their width being preferably made to correspond with that of the compartments. A corresponding space or flue F³ is left between the outermost compartment D² and the inclosing casing A. The number of these annular compartments may be varied in proportion to their width and to the size of the heater. Communication is established between the central compartment E and the next or first encircling compartment D at a point a short distance above the bottom thereof by means of a single short tube G, (see Figs. 2 and 3,) spanning the intervening open space or flue F. This first annular compartment D communicates in turn with the second D′ by a corresponding short connecting-tube G′, spanning the next intervening space or flue F′ at a point diametrically opposite the tube G, and this in turn with the third D² by a corresponding opposite tube G². By this means the water supplied to the central compartment E and delivered thence to the annular compartments D D′ D² will be made to circulate from the one side to the other of each in succession until the outer compartment is reached, from which it may be drawn by means of a suitable faucet H, fitted to extend across the outer encircling flue F³ and through the outer casing A at a point opposite the connecting-tube G² and preferably above the level thereof, as shown in Fig. 2.

The central compartment E is divided into two chambers I J (see Fig. 2) by means of a hollow water-tight partition K, fitted therein above the lateral circulating-port G, and which is made to communicate freely with the space below the compartment E through two or more open flues L L and with the space M in the casing above the concentric compartments D D′ D² by means of a single vertical tube or flue M′. Communication is also established between the upper and lower chambers I J by means of a tube N, extending through the hollow partition K from its upper side to a point near to the bottom of the lower chamber J, as shown in Fig. 2. The upper chamber I is supplied automatically with water from a supply-pipe O, Fig. 2, by means of a lateral cock or valve O′, fitted above the compartments of the heater and controlled by a float P, made annular in form to encircle and be guided by the vertical tube M′, the con-

nection of the float with the arm or lever *b* of the valve being made by means of a forked bail Q, spanning the tube M′.

The dome-shaped cover B, inclosing the space above the chamber I and compartments D D′ D^2, is suitably perforated, as at *a a a*, to allow the escape of the products of combustion discharged through the concentric flues F F′ F^2 F^3 and the tube M′. The casing A, thus fitted with the concentric compartments and flues encircling the central transversely-divided compartment E, may be placed over any suitable furnace or heating apparatus; but preferably I fit it upon a base S, within which is supported a Bunsen burner formed of two or more concentric hollow rings T T, (see Figs. 2 and 4,) each perforated on the upper side with two continuous rows of minute apertures, and each of which is supplied with a separate tube T′, fed with gas and air in the customary manner, and all controlled by a single valve T^2.

To render the flames from the burners steady and uniform, even when the base is exposed to irregular and violent drafts or currents of air, and to regulate the supply of air to said flames, I combine with the base S, beneath the burners, a perforated bottom plate or flame-guard W, which serves to control the admission of air to the furnace and to prevent it from reaching the flames in fitful or forceful jets, compelling it to flow in steady even currents.

The base S is provided with a lateral opening closed by a door V to admit of reaching the burners, and is mounted upon suitable legs V′ V′. The casing A is preferably fitted in the customary manner with a glass sight-tube or gage-glass U, (see Fig. 1,) connecting at top and bottom with the outer water-compartment D^2 to indicate the level of the water therein.

In the operation of this improved water-heater it is fed with water from any suitable source of supply by means of the supply-pipe O, the proper level of water in the apparatus being constantly maintained by the automatic operation of the float P, governing the supply-cock O′. The water delivered into the upper chamber I of the central compartment E of the heater passes through the tube N in the partition K and is delivered near to the bottom of the lower chamber J, being partially heated in its course by contact with the inner wall of the compartment encircled by the concentric flue F and of the walls of the hollow partition K and of the tubular flues M′ and L L. From this lower chamber the water passes through the lateral connecting-tube G into the annular compartment D and is made to flow around the same to the connecting-tube G′ on the diametrically-opposite side of said compartment and through it to the next compartment D′, from the opposite side of which it will pass into the third compartment D^2, from whence it is drawn off through the faucet H at a level above that of the partition K. The water is thus distributed and made to circulate in a thin sheet between the walls of the entire series of compartments, being immediately exposed therein to the heat derived from the hot currents flowing in direct contact with said walls through the narrow intervening heating-flues F F′ F^2 F^3, so as to be rapidly brought thereby to the boiling-point.

I claim as my invention—

1. The combination, in a water-heater, with a central cylindrical water-compartment having a single outlet, of a series of open concentric annular water-compartments and intervening heating-flues, said annular compartments being severally brought into communication with the central compartment and with each other by but one single port in the outer wall of each, a single tube connecting it with a corresponding port in the inner wall of the compartment next outside of it, the several ports being so disposed as that the outlet-port in each compartment shall be at a point in its circumference diametrically opposite the inlet-port therein, and a draw-off cock whereby the water may stand at the same level in the several compartments and be drawn off freely, substantially in the manner and for the purpose herein set forth.

2. The combination, in a water-heater, with a central water-compartment, of a hollow partition dividing it into an upper and lower chamber, an open circulating-tube extending through the partition from its upper side to a point near to the bottom of the lower chamber, one or more heating-flues extending through the lower chamber and communicating with the interior of the partition, and an open discharge-flue extending from within the partition through the upper chamber and above the top thereof, substantially in the manner and for the purpose herein set forth.

3. The combination, in a water-heater, with a central water-compartment and a supply-pipe for the same, of a hollow partition dividing said compartment into an upper and lower chamber, an open circulating-tube extending through the partition from its upper side to a point near to the bottom of the lower chamber, one or more heating-flues extending through the lower chamber and communicating with the interior of the partition, an open discharge-flue extending from within the partition up through the upper chamber, a series of concentric water-compartments having intervening heating-flues and which encircle said central compartment and communicate with its lower chamber, and a draw-off cock communicating with the outermost compartment, substantially in the manner and for the purpose herein set forth.

4. The combination, in a water-heater, with a central water-compartment and a supply-pipe for the same, of a hollow partition dividing said compartment into an upper and lower chamber, an open circulating-tube extending through the partition from its upper side to

a point near to the bottom of the lower chamber, one or more heating-flues extending through the lower chamber and communicating with the interior of the partition, an open discharge-flue extending from within the partition up through the upper chamber, a series of concentric water-compartments having intervening heating-flues and which encircle said central compartment and communicate with its lower chamber, a draw-off cock communicating with the outermost compartment, a cock controlling the supply-pipe, and a float placed within the central compartment and actuating automatically the supply-cock to determine the level of the water in the apparatus, substantially in the manner and for the purpose herein set forth.

5. The combination, in a water-heater, with a central water-compartment and a supply-pipe therefor, of a discharge-faucet, a series of heating-compartments encircling said central compartment and communicating therewith, with each other, and with the faucet to enforce a circulation of the water through the same from the central compartment to the faucet, a hot-air tube or flue extending vertically through the central compartment, an annular float encircling said tube and moving freely thereon, and a cock controlling the supply-tube and actuated by said float, whereby a uniform water-level is automatically maintained in the several compartments, substantially in the manner and for the purpose herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM G. FLANDERS.

Witnesses:
A. N. JESBERA,
E. M. WATSON.