July 4, 1933. G. A. MATTESON 1,916,625

WATER HEATER

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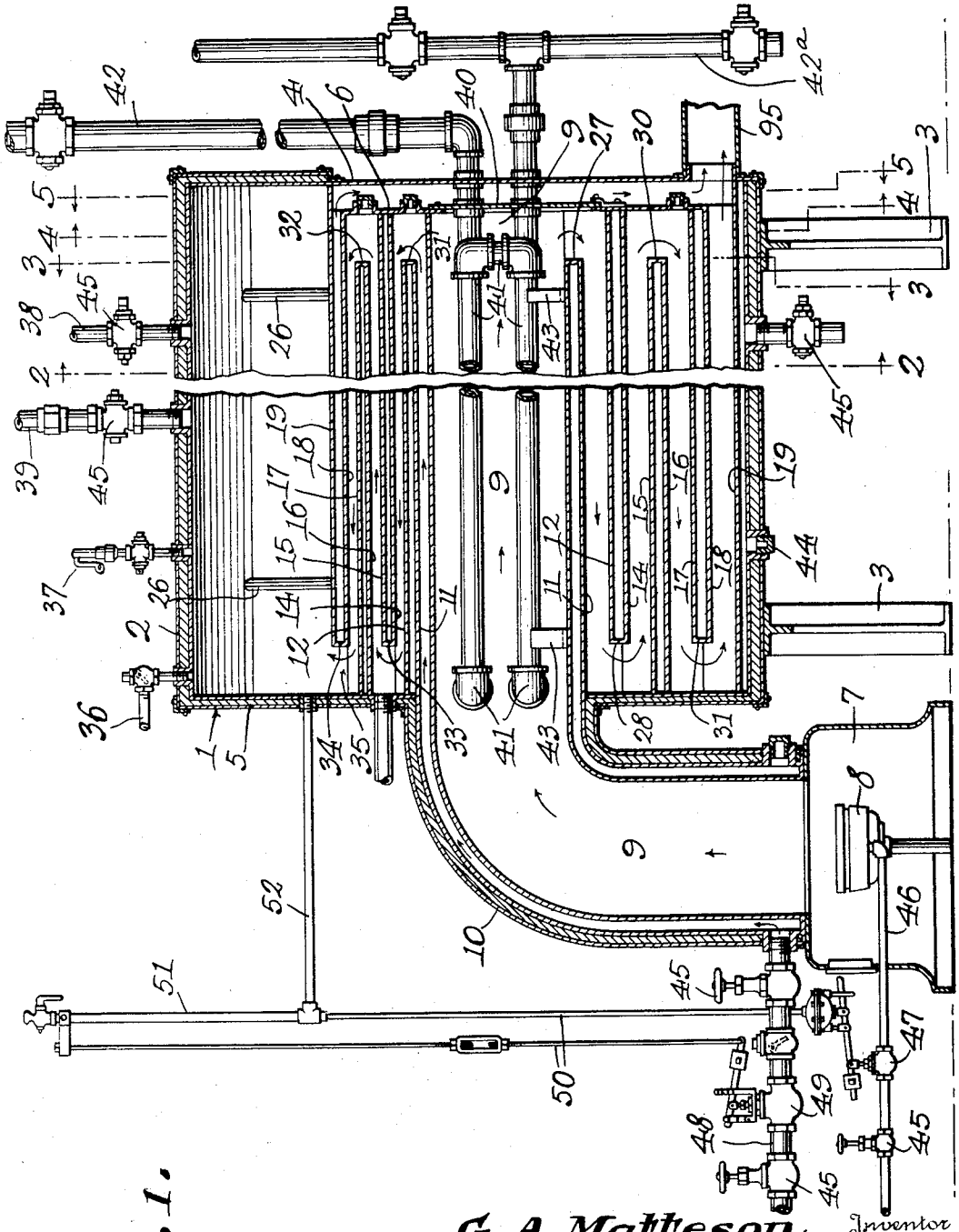


Fig. 1.

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Fig. 3.

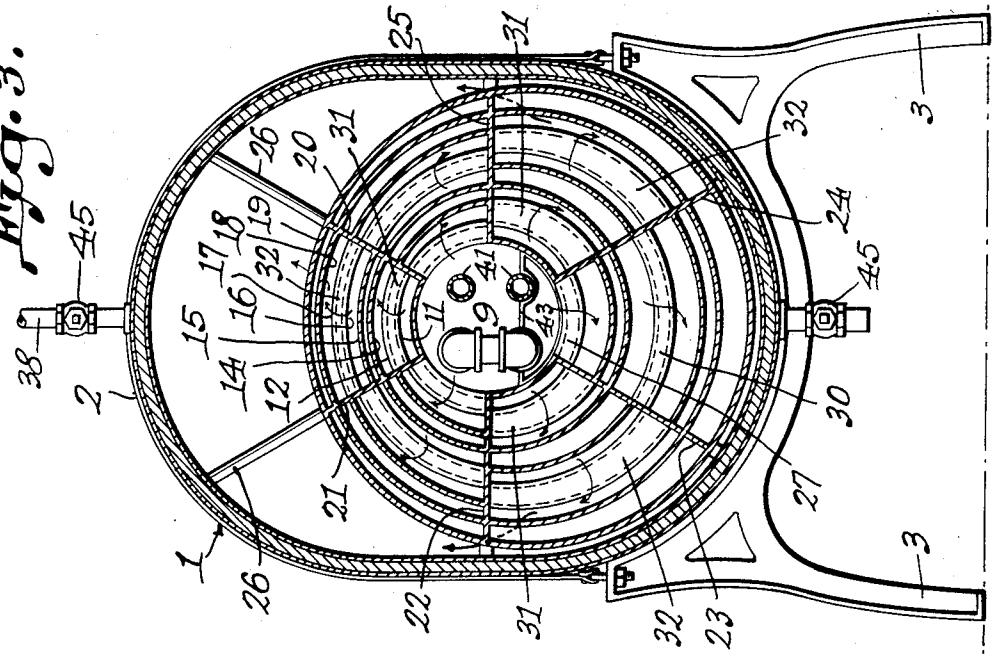
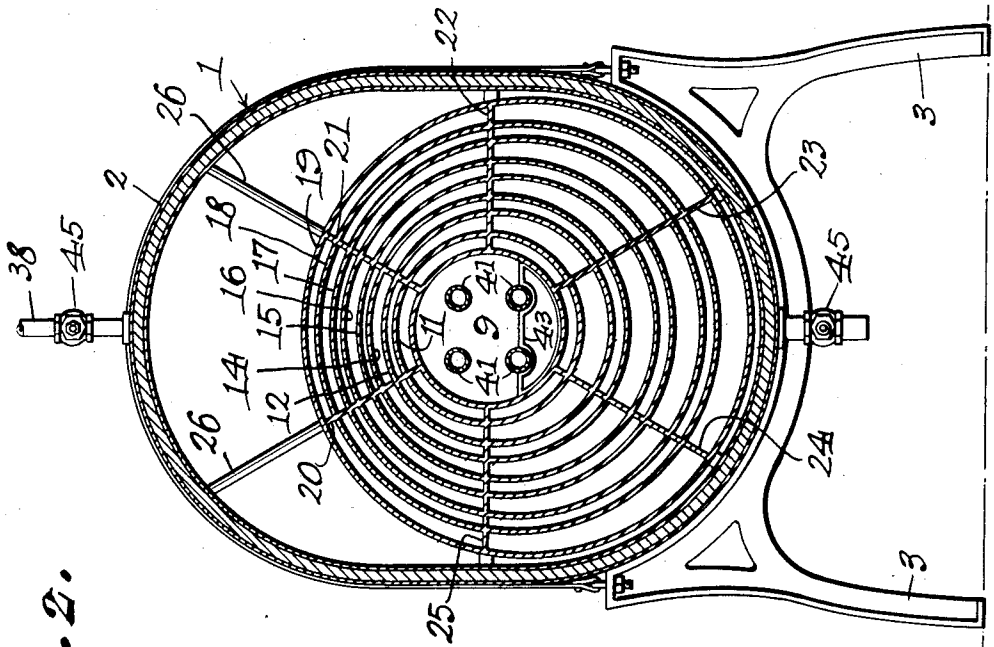


Fig. 2.



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Fig. 5.

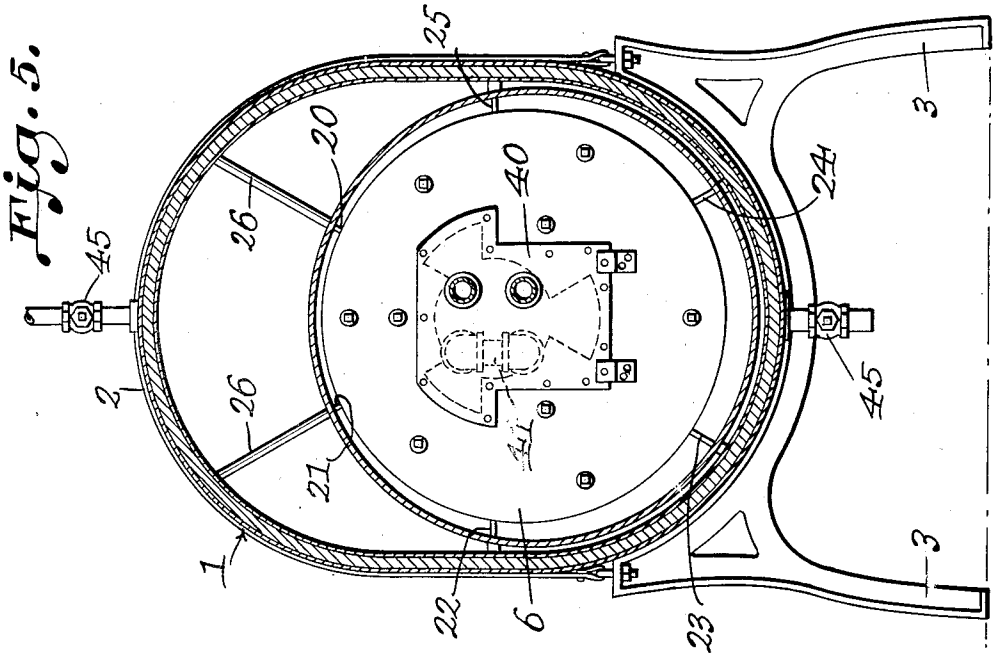
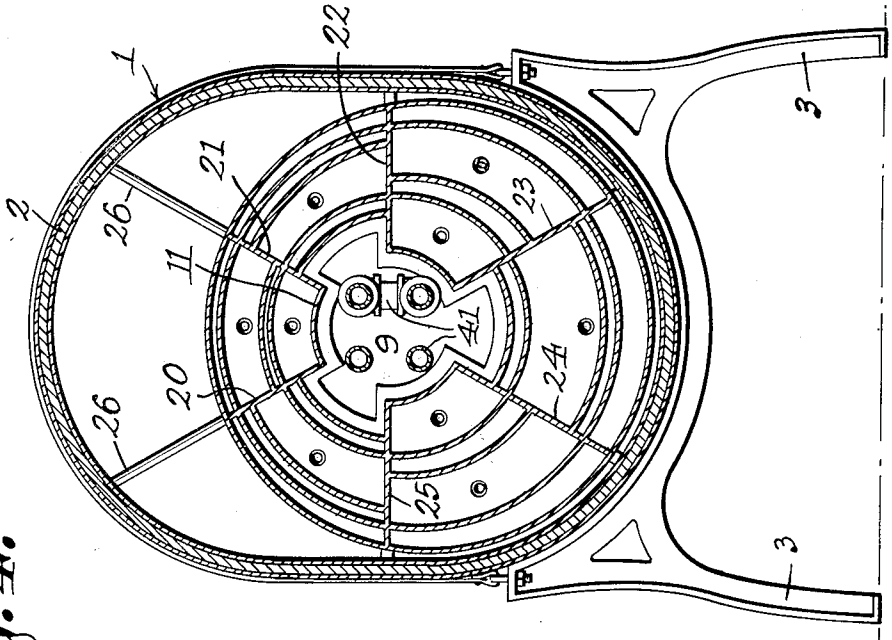


Fig. 4.



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Patented July 4, 1933 1,916,625

UNITED STATES PATENT OFFICE

GEORGE A. MATTESON, OF LOS ANGELES, CALIFORNIA

WATER HEATER

Application filed January 23, 1932. Serial No. 589,455.

This invention aims to provide an effective means for heating water, and for making steam, if desired, the construction being such that an ample supply of hot water will always be available, with the expenditure of a minimum amount of heat, the device being thoroughly efficient in operation. The invention aims to provide novel means for securing a circulation of the water and for securing a circulation of hot air, or products of combustion, in such relation to each other that an efficient heater will be produced.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:—

Fig. 1 shows in vertical longitudinal section, a horizontal type of heater constructed in accordance with the invention;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 1;

Fig. 5 is a section on the line 5—5 of Fig. 1.

In carrying out the invention as disclosed in Figs. 1, 2, 3, 4 and 5, there is provided a water tank 1, comprising a body 2 mounted on supports 3, the body having end walls 4 and 5. A head 6 is located in the tank 1, near to the end wall 4, but spaced therefrom. The numeral 7 marks a heater casing, within which is located a heater of any desired sort, preferably a burner 8 for liquid or gaseous fuel. The turbine (not shown) that feeds fuel to the burner 8 and vaporizes the oil, can be operated by steam, air or water, but when gas is used for fuel, the turbine is not needed. A hot air flue 9 is connected to the heater casing 7 and extends through the end wall 5 to the head 6. Around the part of the hot air flue 9 that is external to the tank 1 is placed a jacket 10 that extends up to the end wall 5. Within the body 2 of the tank is located a tube 11 that is spaced from the flue 9. Disposed one about the other, within the body 2 of the tank 1 are tubes 12, 14, 15, 16, 17, 18 and 19. The flue 9 and the tube 11 extend from the heater casing 7 through the end wall 5 of the tank to the head 6. The tubes 12, 14, 15, 16, 17 and 18 extend from the end wall 5 of the tank to the head 6, but the tube 19 extends between the end walls 5 and 4 of the tank.

Radial division plates 20, 21, 22, 23, 24 and 25 extend between the hot air flue 9 and the tube 19, and these division plates also extend between the end wall 5 of the water tank 1 and the head 6. The division plates 20, 21, 22, 23, 24 and 25 are sustained from the body 2 of the water tank by stay bolts 26.

At the right hand end of Fig. 1, in the spaces between the plates 24—23, 22—21, and 20—25, the space between the flue 9 and the tube 11 is closed by transverse walls 27, spaced from the head 6 the space between the tubes 15 and 16 being closed in the same way, as shown at 30. At the left hand end of Fig. 1, in the spaces between the plates 24—23, 22—21, and 20—25, the space between the tube 12 and the tube 14 is closed by transverse walls 28, spaced from the end wall 5, the space between the tubes 17 and 18 being closed in the same way, as shown at 31.

At the right hand end of Fig. 1, in the spaces between the plates 23—22, 21—20, and 25—24, the space between the tubes 11 and 12 is closed by transverse walls 31, spaced from the head 6, the space between the tubes 16 and 17 being closed in the same way, as shown at 32. At the left hand end of Fig. 1, in the spaces between the plates 23—22, 21—20, and 25—24, the space between the tubes 14 and 15 is closed by transverse walls 33, spaced from the end wall 5, the space between the tubes 18 and 19 being closed in the same way, as shown at 34. In the top of the tube 19, adjacent to the end wall 5, there is an opening 35.

The hot air moves through the flue 9, lengthwise of the tank 1, into the spaces be-

tween the division plates 24—23, 22—21 and 20—25, vertically around the transverse walls 27, horizontally between the tubes 11 and 12, vertically around the transverse walls 28, horizontally between the tubes 14 and 15, vertically around the transverse walls 30, horizontally between the tubes 16 and 17, vertically around the walls 31, between the tubes 18 and 19, and out of the pipe 95 which is attached to the end wall 4 of the water tank, the air between the tubes 18 and 19, at the upper part of the device flowing downwardly between the head 6 and the wall 4.

The water to be heated flows upwardly between the jacket 10 and the hot air flue 9, into the space between the horizontal part of the flue 9 and the tube 11, and then traverses the spaces between the division plates 23—22, 21—20, and 25—24, the water moving vertically around the transverse walls 31, between the tubes 12 and 14, vertically around the transverse walls 33, between the tubes 15 and 16, vertically around the walls 32, between the tubes 17 and 18, around the walls 34, and into the top of the body 2 of the water tank through the opening 35.

The pipe at 36 is for the water and steam column, and the body 2 of the tank carries a pop valve 37, it being understood that the tank 1 may be considered as a boiler, as well as a tank, depending upon the temperature to which the water is raised. The numeral 38 designates a steam outlet, and if hot water is delivered, then recourse is had to a water outlet 39 on the top of the tank.

The header 6 carries a removable plate 40. Through the plate 40 and through the end wall 4 of the tank extends the loops 41 of a pipe 42, one vertical branch 42*a* of which forms a scale trap. The scale trap 42*a* at the end of the coils 41 is desirable, to prevent the scale from drifting in the pipes and clogging the water cocks and shut-off valves, it being a matter of common knowledge that in many localities, the water available contains lime, alkali or other scale-forming ingredients. The pipe 42 may be located in the stack (not shown), and since the loops 42 are supported at 43 in the flue 9, the pipe and its loops form a means for heating water. Drain plugs 44 and valves 45 may be provided wherever necessary, these being details that may be left to a steam-fitter. The fuel supply pipe for the burner 8 is shown at 46, and contains a valve 47. The water supply pipe is shown at 48, and contains a valve 49. Through the instrumentality of any suitable mechanism shown at 50, the valves 49 and 47 may be operated by a thermostat 51, connected at 52 to the tank 1, by way of the end wall 5.

It is to be observed, referring, for instance, to Figs. 2 and 3, that the tubes 19, 18, 17, 16, 15, 14 and 12 are not arranged in concentric order, their axes being so placed that the space between the tubes increases progressively, from the top of the device toward the bottom, the heater, therefore, being peculiarly efficient in bringing the water to a high temperature.

When using the device to produce steam, a good boiler compound can be used, which will remove practically all of the scale.

Having thus described the invention, what is claimed is:—

In a device of the class described, a water tank comprising a body having first and second end walls, a head in the body, near to the first end wall, but spaced therefrom, a horizontal conducting flue for the products of combustion, extending through the second end wall to the head, a water tube about the flue, and extended through the second end wall to the head, a plurality of tubes, comprising first, second, third, fourth, fifth, sixth, and seventh horizontal tubes disposed one about the other and about the conducting flue and the water tube, all of the tubes of said plurality extending from the second end wall to the head, saving the seventh tube, the seventh tube extending between the first and second end walls, and having an opening located adjacent to the second end wall and communicating with the top portion of the tank body, radial first, second, third, fourth, fifth, and sixth division plates extending between the conducting flue and the seventh flue, and extending between the second end wall and the head, the space between the flue and the water tube being closed, and the space between the third and fourth tubes being closed, adjacent to the first end wall, in the spaces between the fifth and fourth, the third and second, and the first and sixth division plates, the space between the first and second tubes, and the space between the fifth and sixth tubes being closed, adjacent to the second end wall, in the spaces between the fifth and fourth, third and second, and first and sixth division plates, the space between the water tube and the first tube being closed, and the space between the fourth and fifth tubes being closed, adjacent to the second end wall, in the spaces between the fourth and third, the second and first, and the sixth and fifth division plates, the space between the second and third tubes, and the space between the sixth and seventh tubes being closed, adjacent to the first end wall, in the spaces between the fourth and third, second and first, and sixth and fifth division plates, the space between the sixth and seventh tubes being in communication with the space between the head and the first end wall, and the last-specified space having an opening for the exit of the products of combustion.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

GEORGE A. MATTESON.