

June 5, 1934.

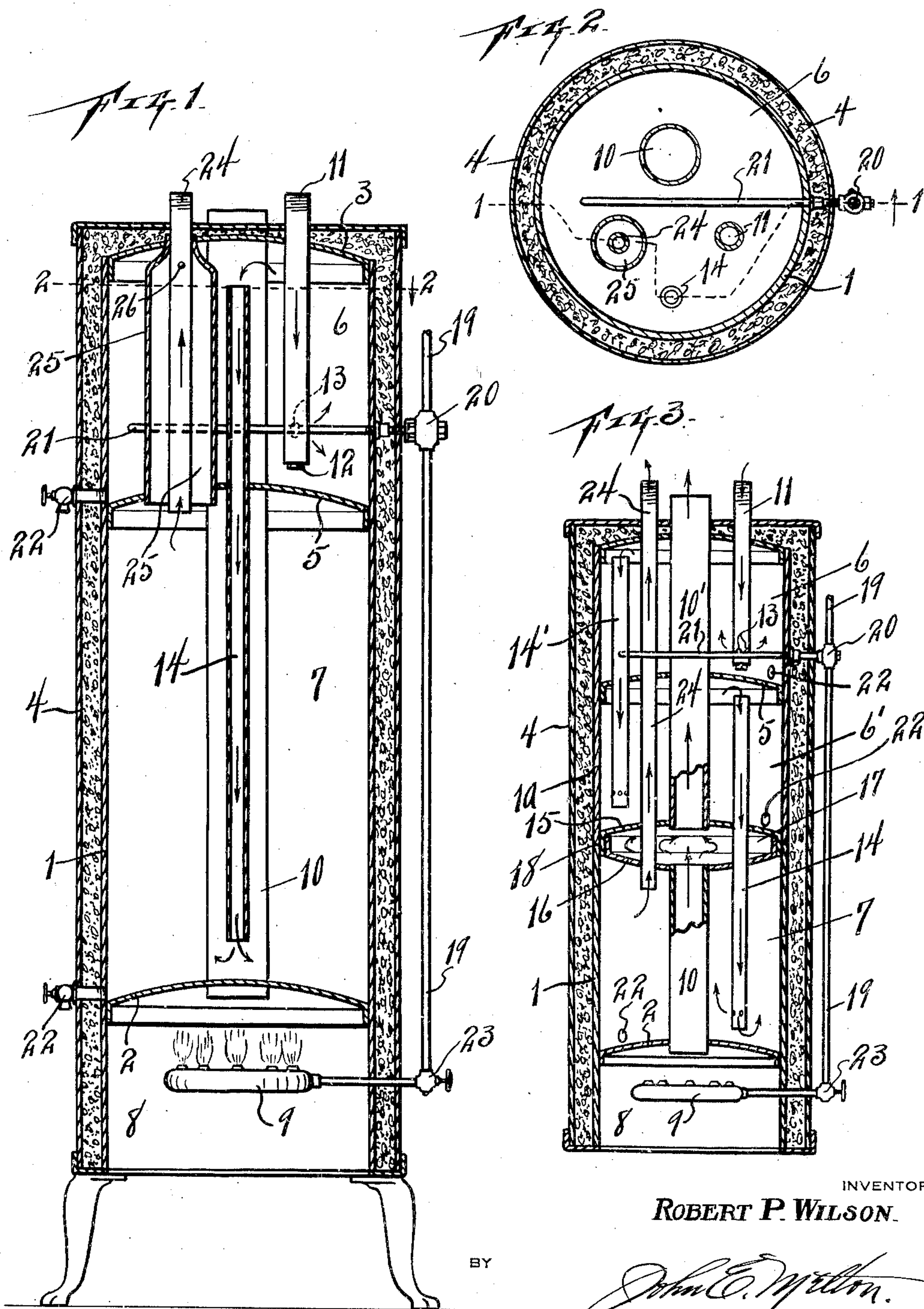
R. P. WILSON

1,961,723

HOT WATER HEATER

Original Filed Feb. 25, 1933

3 Sheets-Sheet 1



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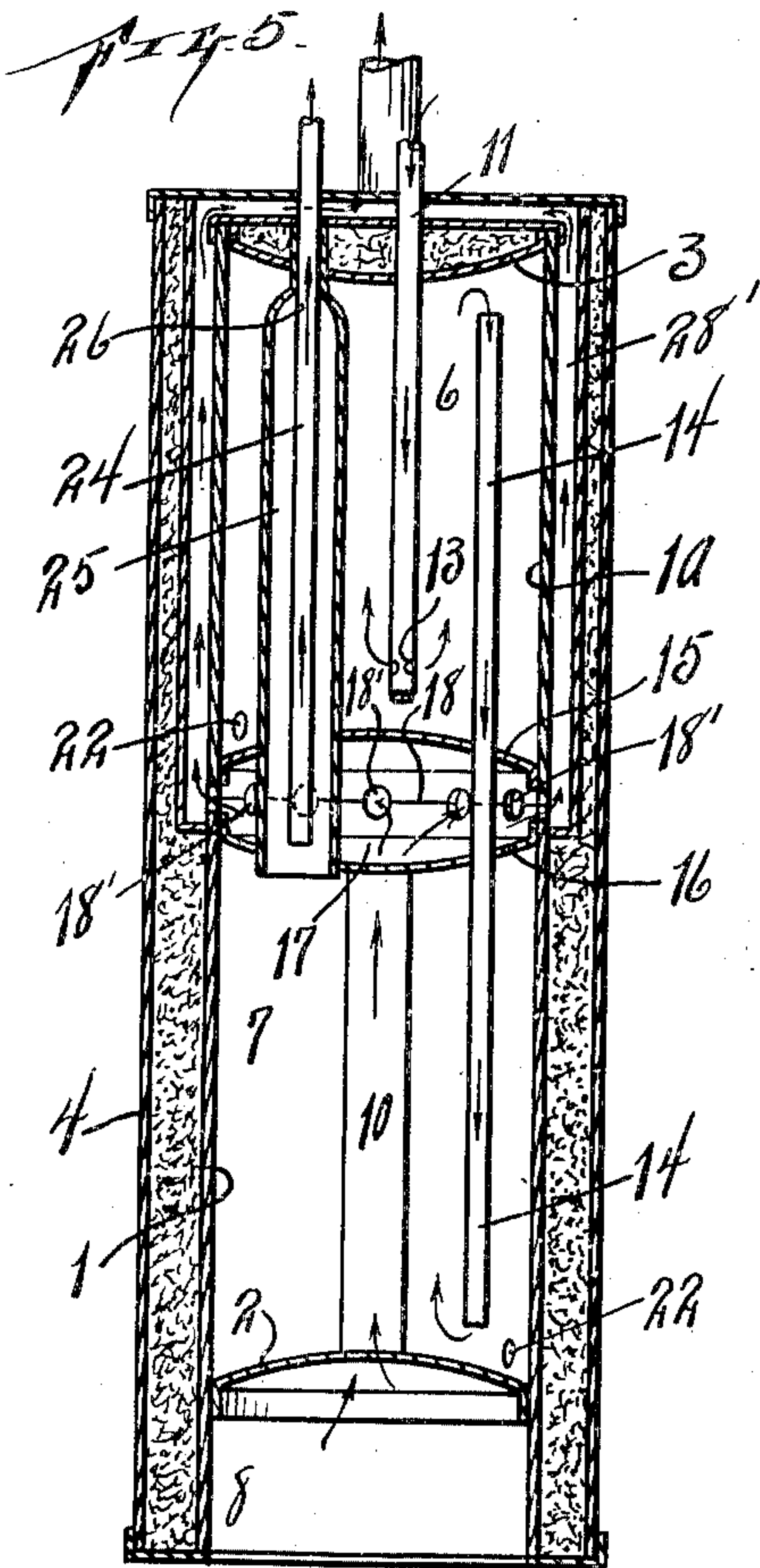
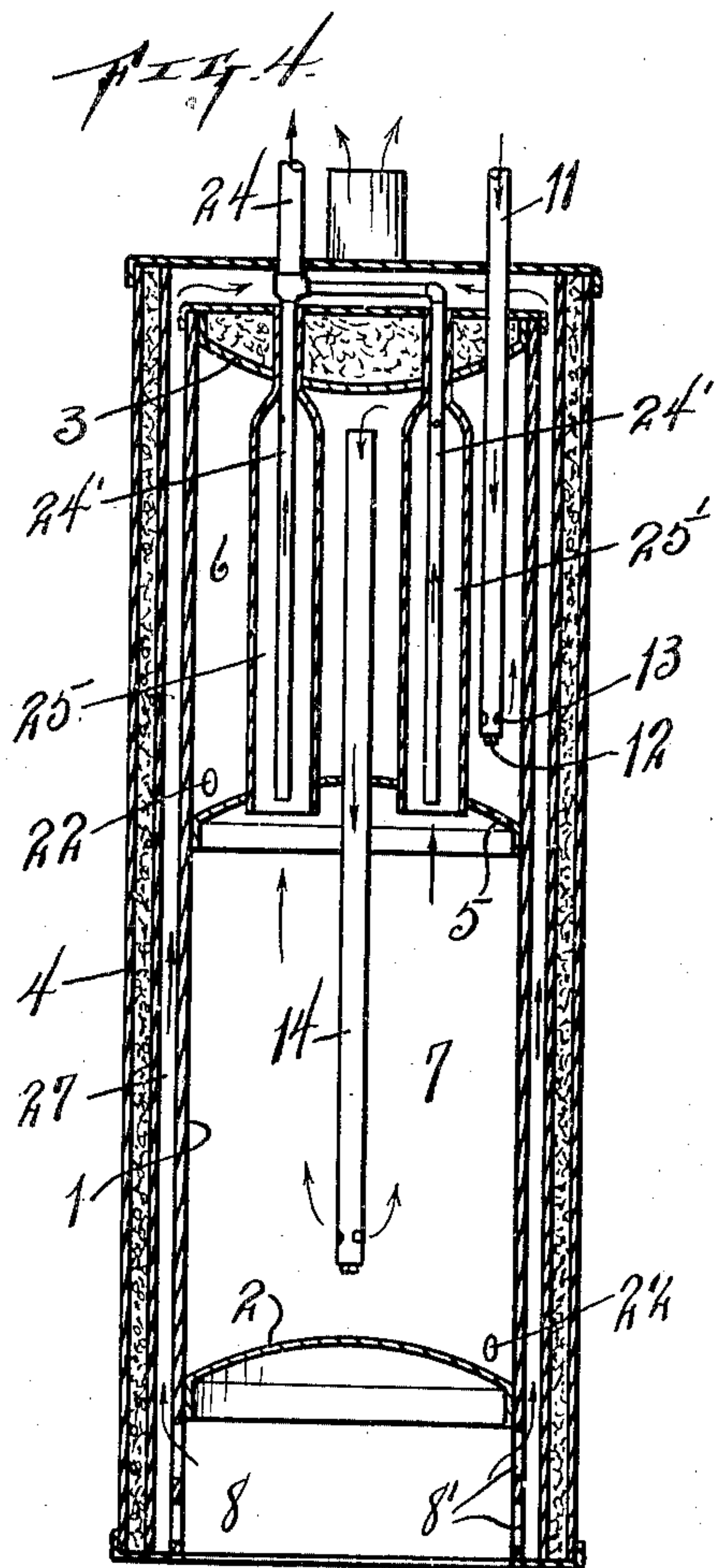
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3 Sheets-Sheet 2



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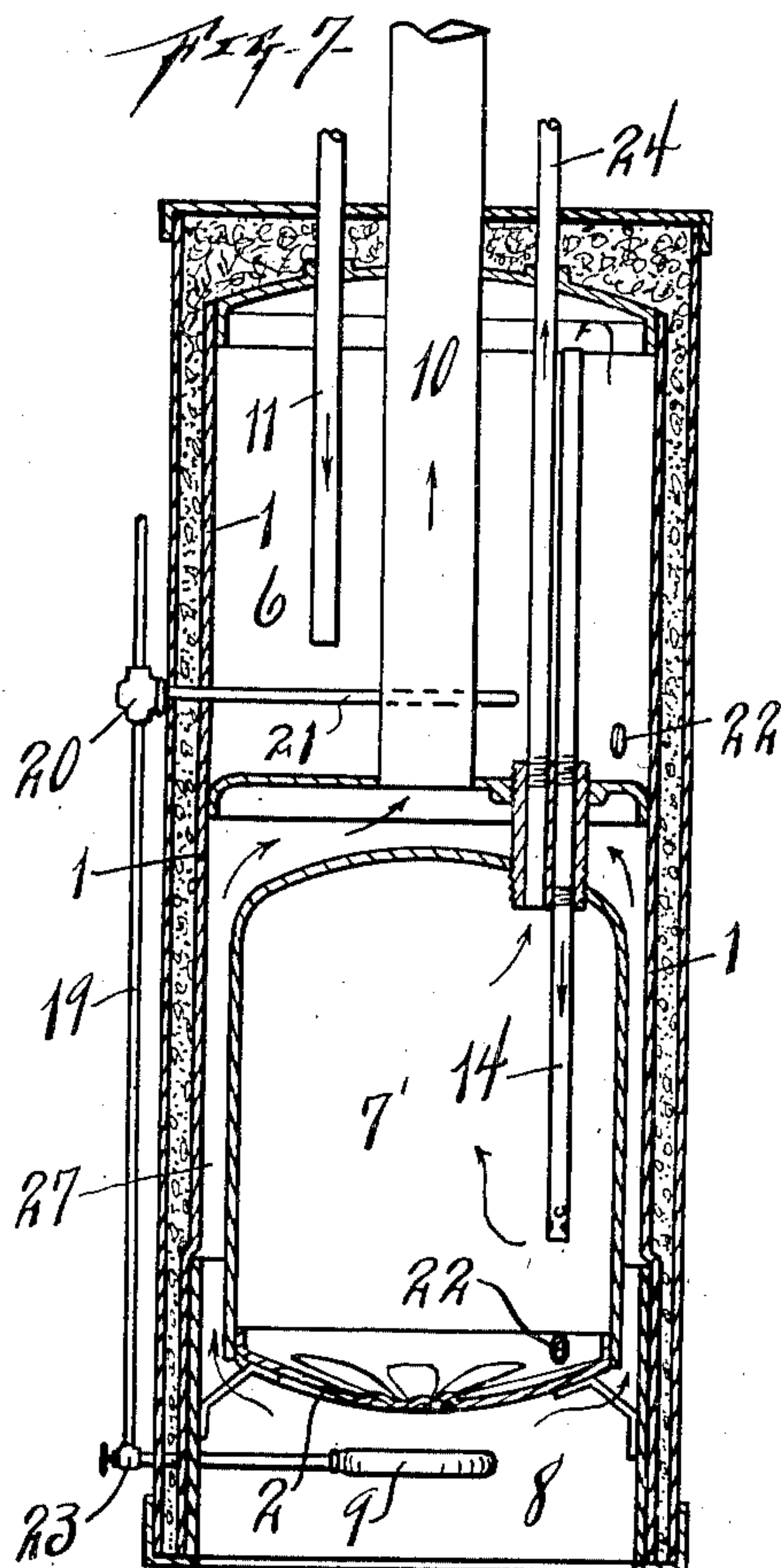
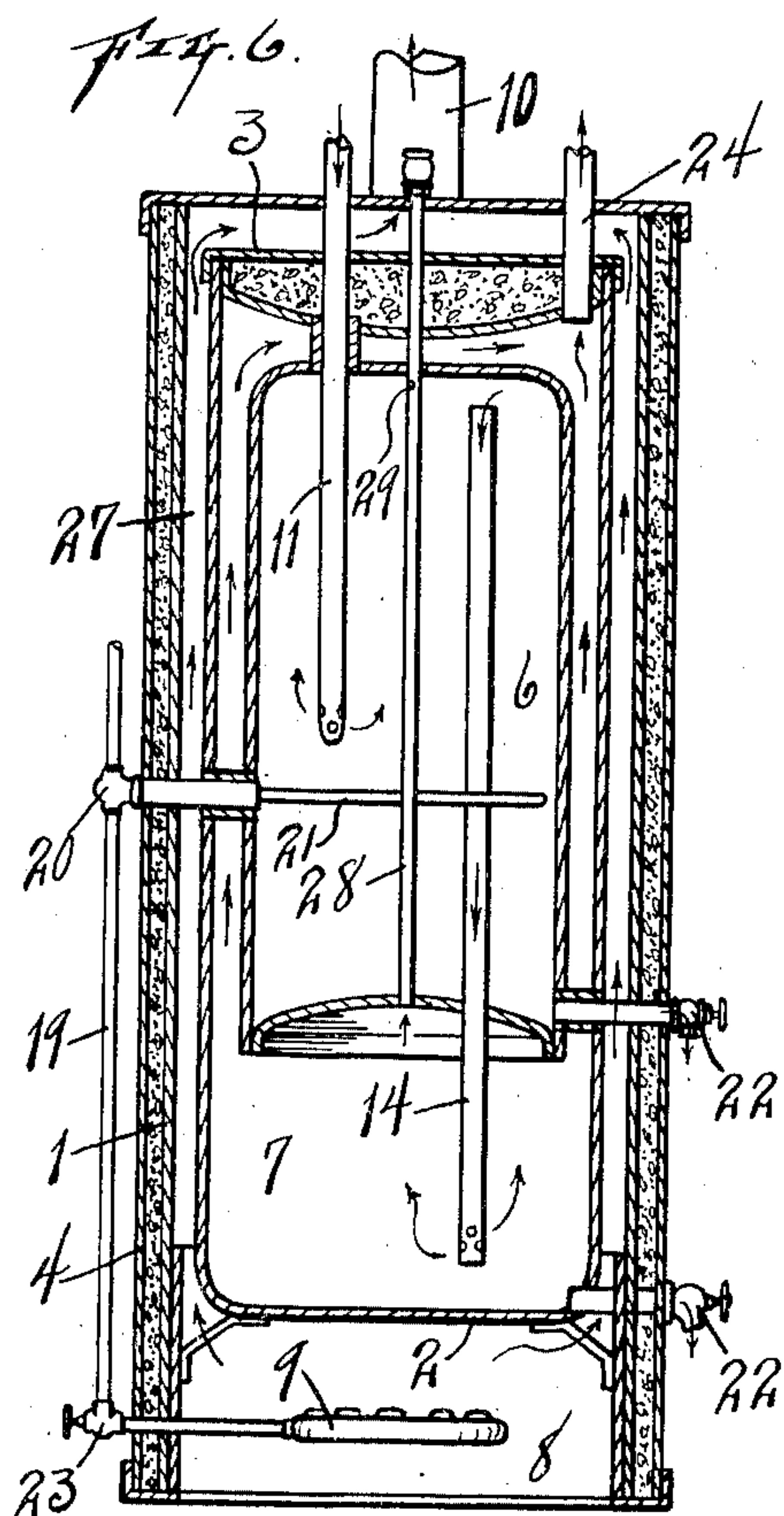
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HOT WATER HEATER

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3 Sheets-Sheet 3



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HOT WATER HEATER

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Renewed February 13, 1934

36 Claims. (Cl. 122—14)

My invention relates to hot water heaters and the like and more particularly to an improvement in heating systems for heating liquids in hot water heaters; and the object is to provide a device which embodies novel features of construction which permits the liquid to become preheated and settled before entering the heating chamber proper. Another object is to provide a heating device for liquids in which a greater portion of the sediment, scale, and lime are collected and held in the preheating chamber and withdrawn therefrom as occasion demands. Another object is to provide means for trapping and venting corrosive gases derived from the heated liquid.

An advantage of this invention is that the preheating chambers and the heater proper may be constructed in a complete unit so that the preheating units may receive their heat from the heater proper by radiation, conduction, or convection therefrom. Another advantage of this invention is that only a small amount of the sediment can reach the principal heat conducting surfaces, thus prolonging the life of the heater and making it more economical to operate. Another advantage of this invention is that the means for controlling the corrosive and erosive gases materially prolongs the life of the heater. Other objects and advantages will be fully explained in the following description and the invention will be more particularly pointed out in the claims.

Reference is had to the accompanying drawings which form a part of this application.

Fig. 1 is a vertical section of the heater, taken on the line 1—1 of Fig. 2.

Fig. 2 is a plan view of the same, taken on the line 2—2 of Fig. 1.

Fig. 3 is a vertical section of the heater on a smaller scale, showing a variation in the structure of the same.

Fig. 4 is a similar view showing a further variation in the same.

Fig. 5 is a similar view of the heater showing a means of directing the products of combustion around the heating medium.

Fig. 6 is a vertical section of the heater, showing the preheating chamber suspended within the tank proper.

Fig. 7 is a vertical section of the heater showing a variation in the assembly of the major parts of the same.

Similar characters of reference are used to indicate the same parts throughout the several views.

The heater consists of a tank 1 which may be provided with a base 2 near the lower end thereof and a top or lid 3. This tank 1 may consist of a plurality of sections, as shown in Fig. 3, with the abutting edges of the sections secured together by joints 18, preferably, adjacent one of the partitions of the tank. The tank 1 may be provided with a shell 4 adapted to contain insulation for the side, top, and bottom of the tank. The tank 1 may be provided with a baffle or partition 5 made rigid therein for dividing the tank into two chambers 6 and 7. It is apparent that a plurality of partitions may be made in the tank 1 for dividing the tank into a number of compartments or chambers 6'. The bottom of the tank 1 may be provided with an open space or compartment 8 formed below the bottom 2 for the purpose of containing a burner 9 for heating the tank and preheating chambers or units. In this instance a burner is shown for providing heat for the various units but it is apparent that the heater may be adapted to the use of various methods of heating.

In Fig. 5 the tank 1 is provided with a vent 10 which is made integral therein and projected therethrough for directing the heat units through the tank 7, up to and around the preheating chamber 6 and out through the upper exhaust pipe. The direction of the products of combustion from the heater 9 may be varied, as shown in Figs. 1, 3, and 7.

Liquid is supplied to the preheating chambers of the heater by means of supply pipe 11 which is preferably projected into the preheating chamber to near the bottom thereof and provided with openings 13 which direct the liquid out at a right angle to the base of the chamber. When a plurality of chambers are used, as shown in Fig. 3, the liquid is conveyed from one chamber to the other by means of pipes 14 and 14'. In this figure the preheated liquid in the chamber 6 is conveyed to the chamber 6' by means of a pipe 14' which is adapted to draw off the water from near the top of the tank 6 and convey it to near the bottom of the tank 6'. The preheated fluid is then conveyed from the tank 6' to the tank 7 by means of a pipe 14 which projects from near the top of the tank 6' into and near the bottom of the tank 7. Each of the pipes 11, 14, and 14' may be provided with a plug 12 for sealing the lower ends of the pipes so that the liquid is permitted to pass out through the openings 13 which are in the sides of the pipes adjacent the plugs 12. This structure permits the liquid to be released in the tanks near their bottoms in such

a manner as to not agitate the sediment in the bottom of the tanks.

In all the figures the pipe 14 may be located so as to draw off liquid and gases from the uppermost part of preheating chamber 6 to the lower part of storage chamber 7. The withdrawing of liquid and gases from pipe 24 results in a rapid flow of liquid and gases through pipe 14 in such a manner that all of the gases present in preheating chamber 6 preceding the withdrawal will be conducted to the heating chamber proper 7. The gases being lighter than the liquid, then rise and are trapped in said dome 25 or under convex base of preheating chamber 6.

The partitions in the tank 1 may be formed to provide a space 17 between each compartment or chamber and this space will lend added heating surface for the preheating units. The spacing is accomplished by the use of a double partition that consists of convex and concave members 15 and 16 respectively, or bell shaped members which are made integral with each other and rigidly attached within the tank 1. In this instance the vent 10 of the heater may terminate within the space 17 and the products of combustion from the burner directed on through the tanks 6 and 6' by means of a vent 10' which registers with the space 17 and is projected through the tanks 6 and 6'. The vent 10' is made rigid within the tanks 6 and 6' and adapted to pass therethrough for conveying the burnt gases out at the top of the heater. When this form of partition is used in the heater for forming chambers within the tank 1, the tank 1 may be more readily made into sections 1A by making the joints 18 adjacent the double partitions.

Fuel supply for the burner 9 is provided by a pipe 19 which is provided with a thermostatically operated valve 20. The valve 20 is actuated by a thermostat 21 which is projected into the tank 6 adjacent the openings 13 of the supply pipe 11 so that the incoming liquid will be directed to the thermostat 21 for actuating the same. The thermostatic valve controls the amount of fuel to the burner 9 in the usual manner.

Each of the chambers 6, 6', and 7 are provided with means for removing the sediment therefrom. A pipe or clean out valve 22 is placed in the bottom of each chamber so that they may be opened for draining the tanks and removing the scale and sediment that may accumulate therein.

An exhaust or discharge pipe for the hot liquid is provided for the heater which consists of a pipe 24 which leads from the upper part of the heater through the preheating units and down into and near the upper part of the chamber 7. A dome or inverted vessel 25 may be provided for that part of the pipe 24 which passes through the preheating chambers, as shown in Figs. 1, 4, and 5. This dome consists of a housing rigidly positioned within the heating chamber 6 so that it surrounds the pipe 24. The base of the dome 25 is open and registers with the chamber 7 so that the fluid and the gases in the chamber may pass up into the dome and lend greater radiating surface for conveying heat to the preheating chamber. The top of the dome may terminate within the heating chamber and be swedged or be provided with a top so as to trap the gases. A siphon hole or relief opening 26 may be provided in the side of the pipe 24 adjacent the top and within the dome or inverted vessel 25 for permitting the gases to escape from the top of the dome into and out the exhaust pipe 24.

The structure shown in Fig. 6 may be provided with a pipe 28 which is made rigid within the preheating chamber 6, passed therethrough, and adapted to register with under portion of the convex base of the tank 6 so that the gases that may accumulate under this base may be conveyed out of the heater. A check valve is provided on the exhaust end of this pipe and an opening 29 is provided in the side of the pipe 28 adjacent the upper part of the preheating tank 6 so that the gases may be permitted to escape from the tank 6 and the tank 7.

A valve 23 may be provided in the fuel supply line 19 for cutting off the fuel to the burner 9. Provision is also made for cutting off the liquid supply to the heater so that the units may be cleaned of the sediment through the valves 22.

When a plurality of preheating tanks or chambers are adapted to cooperate with the heater proper the exhaust for the liquid and the gases from these tanks is provided by means of a pipe 24' which connects with the common exhaust pipe 24. Each of the pipes 24' and the pipe 24 may be provided with its individual dome 25 so that a greater radiating surface is provided for the preheating chambers.

When the products of combustion from the burner 9 are to be conveyed around the tank 1, as shown in Figs. 4 and 6, a space 27 may be left between the outer walls of the tanks and the insulating jacket 4 of the heater for the passage of the same.

The direction of the products of combustion in Fig. 5 conveys the heat around the preheating chamber after it has been passed through the tank 7 by means of the vent 10. In this instance a space 28' is provided around the preheating chamber 6 by constructing the upper portion of the insulating jacket or housing 4 so that the space will extend the length of the chamber 6. The partition consisting of the members 15 and 16 are provided with perforations 18' so that the heat may pass from the space 17 through the tank 1 adjacent the joint 18 and into the space 28.

It will be obvious that the means which I employ to vent the corrosive gases liberated from the liquid may be advantageously employed in liquid heater constructions of types differing widely from the apparatus here shown, such as in single tank heaters: also that the construction here described is merely illustrative of my invention and that such changes and modifications may be made as fall within the scope of the following claims.

What I claim, is:

1. In a water heater, means forming a storage chamber, means to provide a preheating chamber in heat exchange relation with the upper part of said storage chamber, means to supply water to said preheating chamber, means to withdraw water from the upper part of said preheating chamber to the lower part of said storage chamber, means to withdraw water from the upper part of said storage chamber, means for trapping gases that are present in the chambers, and means to withdraw said gases from the heater, and means to heat the storage chamber.

2. In a water heater, means forming a tank, means to provide a preheating chamber suspended in the upper part of said tank, means to provide water to said preheating chamber, means to withdraw water from the upper part of said preheating chamber to the lower part of said tank, means to withdraw water from the upper part of said tank, means for heating said tank and said cham-

ber, means to provide a gas bell in the base of said chamber, means for removing the gases from said bell, said chamber, and said tank.

3. In a water heater, two chambers, one within the other, the outer a storage chamber, the inner a preheating chamber, means for collecting gases in the top of the storage chamber, means for collecting gases in the top and below the bottom of the preheating chamber, means to supply water to said preheating chamber, means to withdraw water from said preheating chamber to the lower part of said storage chamber, means to withdraw water from the upper part of said storage chamber, and means comprising a pipe for withdrawing gases from below the preheating chamber and from the top of the preheating chamber and an air relief valve connected to the end of said pipe.

4. In a water heater, means forming a tank, means for partitioning said tank into two chambers, part of said means projecting upward from the lower chamber into the upper part of the upper chamber, said upwardly projecting part forming a means for collecting gases, said upwardly projecting part also forming a means for transferring heat from the lower chamber to the upper chamber, means to supply water to said upper chamber, means to withdraw water and gases from said upper chamber to the lower part of said lower chamber, means to withdraw water from said lower chamber and gases from said upwardly projecting part of said lower chamber, and means for heating said tank.

5. In a water heater, means forming two tanks, an upper preheating tank and a lower storage tank, means for heating said tanks, means for trapping gases in said tanks, means to supply water to said preheating tank, means to withdraw water and gases from the upper part of said preheating tank to the storage tank, means to withdraw water and gases from said storage tank.

6. In a fluid heater comprising a tank, having a preheating chamber in the upper part thereof, means forming a dome in the base of said preheating chamber for trapping gases, means for directing fluid into said chamber, means for conducting fluid from said chamber to said tank, means for withdrawing fluid from said tank and gases from said chamber, said dome, and said tank, and means for heating said tank.

7. In a liquid heater, means forming a tank, means forming a chamber in the upper part of said tank, means forming a dome in the base of said chamber, means for supplying liquid to said tank and said chamber, said dome arranged to collect gases from said liquid, means for removing liquid and gases from said tank, said chamber, and said dome, means for heating said tank and said chamber.

8. In a liquid heater, means forming a tank, means forming a chamber in said tank, means forming a dome in the base of said chamber arranged to project into the upper part of said chamber, means for supplying liquid to said chamber and then to said tank, means for removing gases and liquids from said tank and the upper part of said dome, and means for heating said tank and said chamber.

9. A liquid heater comprising a tank and a bell-shaped housing in the upper part thereof, means for supplying water to said tank, means within said housing for withdrawing water from said tank, means for withdrawing gases from said housing, and means for heating said tank.

10. A water heater comprising a tank and a bell-shaped housing in the upper part thereof,

means for supplying water to said tank, means to withdraw water and gases from said tank and said bell, and means for heating said tank.

11. A liquid heater comprising a tank, means comprising a dome in the upper part of said tank, means for supplying liquid to said tank, a conduit extended upwardly through said dome for withdrawing liquid from said tank, an opening in said conduit communicating with the interior of said dome, and means for heating said liquid.

12. A water heater comprising a tank, an inverted vessel in the upper part of said tank, means for supplying water to said tank, a conduit extending upwardly through said inverted vessel for withdrawing the water from said tank, and means for heating said tank.

13. A liquid heater comprising a tank, a dome within the upper part of said tank spaced below the top thereof, means for supplying liquid to said tank, a conduit extending from said dome through a wall of said tank for withdrawing gases therefrom, means for withdrawing liquid from said tank, and means for heating said tank.

14. A liquid heater comprising a tank having a domed top and arranged to collect and trap gases liberated from liquid, a liquid inlet conduit, a liquid outlet conduit extending from within said dome through the wall of said tank, an opening in said liquid outlet conduit communicating with the interior of said dome, said outlet conduit arranged to withdraw water and gases from within said tank and said dome, and means for heating said tank.

15. A liquid heater comprising a tank, means for feeding liquid into said tank, a conduit for withdrawing liquid from the tank, said conduit extending from within the tank through the top thereof, means for trapping and venting gases from the upper part of the tank into said conduit above the lower end thereof, and means for heating said tank.

16. A liquid heater comprising a tank having a domed top, means for feeding liquid into said tank, and an outlet conduit extending from within the tank through the top thereof, said domed top being contoured to define an inverted vessel arranged to collect and trap gases liberated from the liquid, means for venting gases from said vessel into said conduit above the lower end thereof, and means for heating said tank.

17. A liquid heater comprising a tank having a domed top, means for feeding liquid into said tank, and an outlet conduit extending from within the tank through the top thereof, said domed top being contoured to define an inverted vessel arranged to collect and trap gases liberated from the liquid, said outlet having a vent therein above its lower end, means for leading gases from said vessel to said vent, and means for heating the liquid in said tank.

18. A liquid heater comprising a tank, means for feeding liquid into the tank, a conduit extending upwardly from the top of the tank for withdrawing liquid therefrom, and means for collecting and venting gases liberated from the liquid, said collecting and venting means comprising a dome surrounding said conduit and in open communication with the top of said tank, said conduit having an opening formed therein above the tank in communication with said dome whereby gases collected in said dome are vented into said conduit, and means for heating said tank.

19. A liquid heater comprising a tank, means

for feeding liquid into the tank, a conduit extending from the upper part of the tank for withdrawing liquid therefrom, and means for collecting and venting gases liberated from the liquid, said collecting and venting means comprising an inverted vessel surrounding said conduit and in open communication with the upper part of said tank, said conduit having an opening formed therein above the tank in communication with said inverted vessel whereby gases collected in said inverted vessel are vented into said conduit.

20. A fluid heater comprising two tanks spaced apart and supported one above the other, a heater disposed at the lower end of the lower tank, means for passing the products of combustion from said heater around one tank and through the other tank, means for trapping the gases in said tanks liberated from the fluid, means for supplying fluid to one of said tanks, means for conducting fluid from the upper part of one tank to the other tank, and means for withdrawing water and gases from one of said tanks.

21. A water heater comprising two tanks spaced apart and arranged one above the other, the upper being a preheating tank and the lower a storage tank, means for heating said tanks, means for trapping gases in said tanks, means to supply water to said preheating tank, means to withdraw water and gases from the upper part of said preheating tank to the storage tank, and means for withdrawing water and gases from said storage tank.

22. A water heater comprising two tanks spaced apart and arranged one above the other, the upper being a preheating tank and the lower a storage tank, a heater disposed at the lower end of the lower tank, means for passing the products of combustion from said heater around one tank and through the other tank, means for trapping gases liberated from the water in said tanks, means for supplying water to said preheating tank, means to withdraw water and gases from the upper part of said preheating tank to the storage tank, and means for withdrawing water and gases from said storage tank.

23. A water heater comprising a tank and a preheating chamber in heat exchange relation therewith, means for trapping gases in said tank and means for trapping gases in said chamber, a single conduit for withdrawing water and gases from said chamber into said tank, and a single conduit for withdrawing water and gases from said tank, and means for heating said tank.

24. A water heater comprising a tank and a preheating chamber in the upper part thereof, the bottom wall of said chamber being formed to provide a trap for collecting gases liberated from fluid in said tank, means for supplying water to said chamber, means for conducting fluid from said chamber into said tank, means for withdrawing fluid from said tank and for withdrawing gases from said chamber said trap and said tank, and means for heating said tank.

25. A water heater comprising a tank and a preheating chamber in heat exchange relation therewith, a dome means for trapping the gases in said tank and said preheater, a conduit for withdrawing water and gases from said tank and said preheater, said withdrawing conduit extending downwardly within said tank with an opening therein adjacent to and communicating with the upper part of said dome, a conduit for supplying water to said tank and said preheater, and means for heating said tank and said preheater.

26. A liquid heater comprising a storage tank, a conduit for conducting liquid into said tank, an outlet conduit extending upwardly from said tank, means for collecting and venting the gases liberated from said liquid, said collecting and venting means comprising an inverted vessel above said tank surrounding said conduit and in open communication with said tank, said outlet conduit having an opening therein communicating with the interior of said inverted vessel, and means for heating said liquid.

27. A liquid heater comprising a storage tank, a conduit for conducting liquid into said tank, a conduit extending upwardly from said tank for conducting liquid and gases out of said tank, an inverted vessel above said tank surrounding said conduit and in open communication with said tank for collecting and trapping the gases therein, an opening in said conduit communicating with the interior of said tank and said inverted vessel, and means for heating said liquid.

28. A water heater comprising a tank, means providing a preheating chamber in heat exchange relation therewith, means for trapping gases in said tank and said preheating chamber, means for supplying water to said tank and said preheating chamber means for conducting the water and gases from said chamber to said tank, a single conduit for withdrawing water and the gases from said tank, and means for heating said tank.

29. A water heater comprising two tanks, an upper preheating tank and a lower storage tank, means for heating said tanks, means for trapping gases in said tanks, means to supply water to said preheating tank, means to withdraw water and gases from the upper part of said preheating tank to the storage tank, means to withdraw water and gases from said storage tank, means for trapping sediment in the lower end of said preheating tank, and means for withdrawing water and sediment from said sediment trapping means.

30. A water heater, comprising a tank partitioned to provide a storage compartment in its lower portion and a preheating compartment in its upper portion, a bell extending from said partition into the upper part of said preheating compartment in open communication with said storage compartment, a conduit for conducting water into said preheating compartment, a conduit for conducting water from the upper part of said preheating compartment to the lower part of said storage compartment, a conduit for withdrawing water from said storage compartment, said partition providing means for trapping sediment liberated from the water in said preheating compartment, a sediment withdrawal conduit leading from said sediment trapping means in said preheating compartment, and a heater for said tank.

31. A water heater comprising two tanks, one within the other the outer constituting a storage tank, the inner a preheating tank, means for supplying water to said preheating tank, a conduit for conducting preheated water from the upper part of said preheating tank into said storage tank, means for removing sediment from the bottom of said preheating tank, means for removing sediment from said storage tank and means for heating said tanks.

32. A water heater comprising an upper preheating tank and a lower storage tank, said tanks being spaced apart, a burner arranged beneath the storage tank, a conduit for feeding water into said preheating tank, a pipe for feeding water from the upper portion of said preheating tank to said storage tank, the bottom wall of said pre-

heating tank being substantially dome-shaped to provide a trap for collecting sediment separated from the liquid in said preheating tank, and means for withdrawing sediment from said trap.

5 33. A liquid heater comprising two containers, an upper preheating container and a lower storage container, in heat exchange relation, the bottom wall of said preheating container being bulged to provide a trap for collecting sediment
10 liberated from the liquid in said preheating container, a conduit for conducting liquid from the upper part of said preheating container into said storage container, means for withdrawing liquid
15 from said storage container, means for withdrawing sediment from said trap, and means for heating said heater.

34. A liquid heater comprising a tank, a partition dividing said tank into an upper preheating chamber and a lower storage chamber, said partition being located in the upper portion of the
20 tank and convexed to provide an annular trap above its margin for collecting sediment liberated from the liquid in said preheating chamber, means for supplying liquid to said preheating chamber,
25 a conduit for conducting liquid from said preheating chamber into said storage chamber,

means for withdrawing liquid from said storage chamber, means for withdrawing sediment from said trap, and means for heating said tank.

35. A liquid heater comprising a tank, an inlet for supplying liquid to said tank, an outlet extending within said tank for withdrawing the liquid, and means for heating said liquid, said outlet having an aperture therein communicating with the upper portion of said tank whereby said
80 outlet with its aperture provides a means for the withdrawal of both water and gases from said tank. 85

36. A domestic water heater comprising an upper preheating tank and a lower storage tank, both adapted to be filled with water, a water inlet entering the preheating tank to deliver water thereto, means for withdrawing water from the preheating tank and delivering it to the storage tank, an outlet to withdraw water from said storage tank, said outlet having an aperture therein communicating with the upper portion of said
90 tank whereby said outlet with its aperture provides a means for the withdrawal of both water and gases from said tank, and means for heating the water in said tanks. 100

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