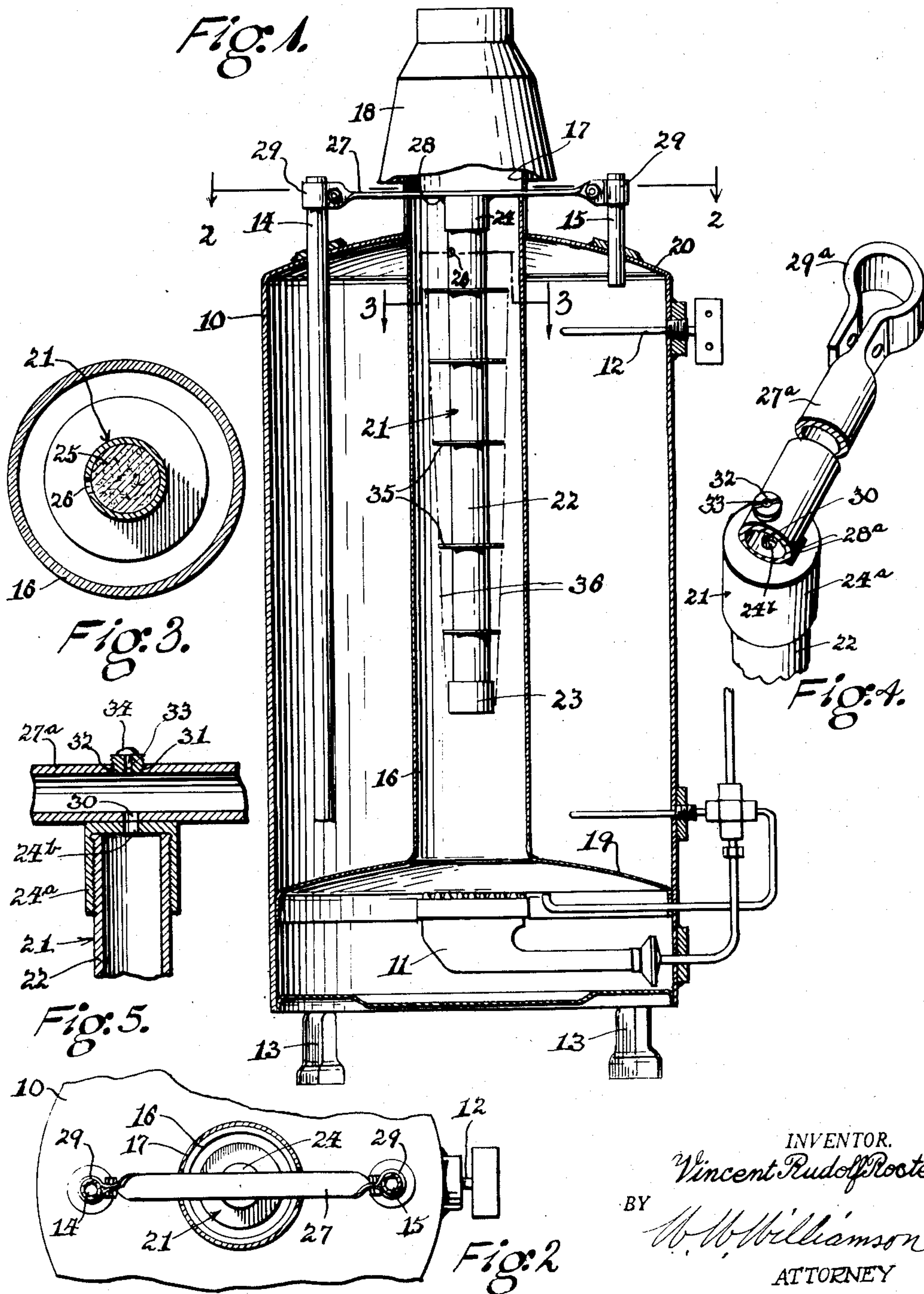


Feb. 17, 1953

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COMBINATION GAS AND ELECTRIC HOT-WATER HEATER  
WITH HEAT ABSORBER-TRANSMITTER IN THE FLUE  
Filed April 7, 1951

2,628,597



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## UNITED STATES PATENT OFFICE

2,628,597

COMBINATION GAS AND ELECTRIC HOT-  
WATER HEATER WITH HEAT ABSORBER-  
TRANSMITTER IN THE FLUE

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Application April 7, 1951, Serial No. 219,801

5 Claims. (Cl. 122—17)

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My invention relates to a new and useful combination gas and electric hot water heater with heat absorber-transmitter in the flue and has for one of its objects to provide a household boiler of the upright type with simple, efficient, strong and durable means for absorbing a portion of the heat generated during the water heating periods and reradiate some of the absorbed and stored heat to a portion of the boiler and thence to the water for maintaining the water in a heated condition for a longer time than would ordinarily be the case.

Another object of the invention is to produce a heat exchanger consisting of a tubular casing to be suspended in a central flue of a boiler and containing sand or an equivalent heat absorbing substance.

Another object of this invention is to mount a plurality of baffles on the sand holding casing in suitable spaced relation longitudinally of said casing and, preferably, said baffles increasing in size in fixed ratio from the bottom to the top of said casing whereby their edges are in an inverted conical plane.

Another object of the present invention is to provide means for suspending the sand holding casing within the central flue, said suspending means or hanger comprising either a strap of any cross-sectional shape or a tubular piece having its interior in communication with the interior of said casing, said suspending means or hanger being connected to either the upper head of the boiler or the inlet and outlet in any appropriate manner.

A further object of the invention is to provide a vent in the side of the sand holding casing to permit "breathing" of said casing due to temperature fluctuations therein.

A still further object of this invention is to produce a casing suspending means or hanger from a tubular section welded or otherwise secured to the normally closed upper end of the sand holding casing and having the interiors of said hanger and casing in communication for air circulation and said hanger further provided with a valved vent which may be utilized for filling the casing with sand.

Also, a highly desirable advantage of the present invention is that it reduces to a minimum the likelihood of condensation during periods between heating operations which often results in rusting or corrosion of the boiler elements that might finally cause leaky conditions.

With the above and other objects in view this invention consists of the details of construction

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and combination of elements hereinafter set forth and then designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by numerals to the accompanying drawing forming a part hereof, in which:

Fig. 1 is a longitudinal sectional view of an upright boiler, with some parts left in elevation, showing my improved heat exchanger assembled in the central flue and suspended by one type of hanger.

Fig. 2 is a fragmentary top plan and sectional view on the line 2—2 of Fig. 1.

Fig. 3 is an elongated sectional view of the central flue and heat exchanger therein on the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary and broken perspective view of another type of hanger.

Fig. 5 is also a fragmentary view, in section, of the type of hanger in Fig. 4 and the sand holding casing, in the region of the joint between said elements.

In carrying out my invention as herein embodied 10 represents a hot water boiler, generally known as a vertical or upright household boiler but can be employed anywhere desired for providing a supply of hot water. The water in this type of boiler is usually heated by a single heating unit, the fuel for which may be gas, electricity or oil, but I prefer to employ two heating units, one of them being of the flame burning type, supplied either by gas or oil, and the other of the electric heating type.

For purposes of illustration, the heating element 11 is of the flame burning type and the heating element 12 is any well known electric water heating device. Either one can be used according to the desires of the user or should one become inoperative the other can be temporarily used as a substitute. Also, when it is desirable to obtain hot water very quickly both heating elements can be operated simultaneously.

The boiler may be mounted on feet 13 or equivalent supporting means and has a water inlet nipple 14 leading to the interior for supplying cold water to the boiler and an outlet nipple 15 leading from said boiler to locations of use.

In the boiler is a central flue 16 open at both the lower and upper ends for the passage of air entering the lower end as it is heated by the heating unit 11 and flowing from the upper end through the short pipe 17 of the cap 18, mounted on the upper projecting end of said flue, the air



then traveling to a stack in the usual manner, which stack is connected to the upper end of the cap and a chimney.

The central flue 16 is connected at its lower end to the dome shaped bottom wall 19 of the tank portion of the boiler and projects through and a short distance above the upper head 20. In this central flue 16 is assembled the heat exchanger 21, preferably in the upper portion of said flue, as shown in Fig. 1. The heat exchanger 21 includes a tubular casing 22 of any desirable cross sectional shape and is closed at the lower end, as by a pipe cap 23, and is also completely closed at its upper end, Figs. 1 and 2, as by a pipe cap 24 or substantially closed at said upper end, Figs. 4 and 5, as by a pipe cap 24a having a hole 24b therethrough. The tubular casing 22 contains dry sand 25, or other equivalent heat absorbent material, Fig. 3, and has a vent opening 26, Figs. 1 and 3, in the side thereof adjacent the upper end.

The heat exchanger is, preferably, suspended in the upper portion of the central flue by a suitable suspension means and as illustrated in Figs. 1 and 2 the suspension means is in the form of a hanger strap 27 secured to the pipe cap 24 by any appropriate means, such as by welding 28. The ends of the suspension hanger strap are attached to any desirable part of the upper portion of the boiler, such as the upper head thereof or the inlet and outlet nipples and, merely for purposes of illustration, said hanger strap is depicted as fastened to said inlet and outlet nipples 14 and 15, respectively, by clamps 29 of any suitable formation.

The suspension means is shown in Figs. 4 and 5 as including a hollow or tubular hanger limb 27a secured to the top end of the upper pipe cap 24a by suitable means, such as by welding 28a and the ends of said hanger limb are attached to any suitable part of the upper portion of the boiler as described in connection with the hanger strap. If desirable, clamps 29a of appropriate construction may be provided at the ends of said hanger limb.

A hole 30 is formed in the under side of the hanger limb and is in registration with the hole 24b so said holes provide a passageway to function as a vent and communication between the interiors of the sand holding casing and hanger limb for circulation of air from one to the other. Diametrically opposite the hole 30 is formed another hole 31, preferably slightly larger than said hole 30 to permit unobstructed flow of sand or other equivalent material in comminuted form therethrough for subsequent passage through the holes 30 and 24b into the chamber of the casing 22. A plug 32 is inserted in the hole 31 when the latter is not in use for filling the casing with a heat absorbing material and said plug has a small vent opening 33 through it which may be controlled by a valve 34, Fig. 5, if such is desired, to allow the escape of expanding air without permitting the ingress of cold air.

Regardless of the type of suspension means utilized and the specific type and arrangement of vent, a plurality of fins or baffles 35 of any desirable or appropriate shape are mounted on the exterior of the casing in longitudinally spaced relation and increasing in size from the bottom one to the top one whereby their outer edges are in the plane of an inverted cone or pyramid as indicated by the dot and dash lines 36 in Fig. 1.

In practice, the flame from the heating unit 11 will impinge on the bottom wall 19 to raise

the temperature of the water within the boiler and also raise the temperature of the air in and flowing through the central flue 16 to further raise the temperature of the water. The fins or baffles retard the flow of hot air through the central flue and direct its course towards the flue walls for absorption of some of the heat by the water and towards the casing 22 to heat the latter and its contents. Thereafter, when the heating unit is temporarily shut off, as by an automatic control, the heat stored by the heat exchanger will gradually be transferred from the casing to the air in the central flue and thence to the water in the boiler retaining the temperature of said water at a relatively high degree for a considerable period of time. When the electric heating unit 12 is employed separately some of the heat in the water will be transferred to the air in the central flue and thence to the heat exchanger for subsequent reverse action.

While the plain hanger strap illustrated in Figs. 1 and 2 functions in a highly efficient manner I have found that by using the hollow hanger limb slightly better results are obtained because the air in the hanger limb chamber becomes heated and assists in retaining the heat exchanger, as a whole, at a relatively high temperature for a longer period of time.

As the heat exchanger remains hot for a considerable length of time after the temperature of the water begins to fall, any moisture laden air flowing through the central flue will be dried out so that condensation will be reduced to a minimum thus helping to prevent corrosion.

Of course I do not wish to be limited to the exact details of construction herein shown and described as these may be varied within the scope of the appended claims without departing from the spirit of my invention.

Having described my invention what I claim as new and useful is:

1. In combination, an upright household boiler including inlet and outlet nipples and having a central vertical flue open at both ends, the upper end of said flue projecting above the upper head of said boiler, a flame heating element below the lower end of said flue, an electric heating unit in the boiler, a heat exchanger assembled in said flue and including a tubular casing located in the longitudinal axis of said flue, means to close the lower end of said casing, means to substantially close the upper end of said casing, said upper closure means having a hole therethrough, a tubular hanger limb having diametrically opposite aligned holes of different sizes therein intermediate the ends thereof, said hanger limb secured to the upper closure means with the smaller hole in alignment with the hole in the upper closure means, a plug having a small aperture therethrough and inserted in the larger hole and sand within the casing, and means to attach the ends of the hanger limb to portions of the boiler for holding the casing in suspension in the upper portion of the flue.

2. The structure according to claim 1, in combination with a valve to control the flow of air outwardly through the aperture in the plug.

3. The structure according to claim 1, in combination with baffles on the exterior of the casing in spaced relation longitudinally of said casing, said baffles increasing in size in uniform order from the lower one to the uppermost one.

4. In a device of the kind described, the combination with an upright household boiler having



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a central flue therein open at both ends, a heat exchanger positioned in the upper portion of said flue, said heat exchanger including a tubular casing closed at the lower end and having an apertured cap on its upper end, a tubular limb fixed to said cap and having aligned diametrical openings in alignment with the aperture in the cap whereby the interior of the casing is in communication with the interior and exterior of the limb, means to temporarily close the communication to the exterior, the ends of said limb having means to fasten it to supports for suspending the casing, dry sand contained within said casing, and thin flat shaped baffles fixed on the outside of the casing in spaced relation longitudinally of said casing to deflect a current of hot air and cause it to follow a vertically circuitous path of travel.

5. The structure according to claim 4 wherein

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the diameters of the baffles increase in uniform order from the lower one to the upper one.

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