June 16, 1942. A. S. GRETH 2,286,677

WATER HEATER

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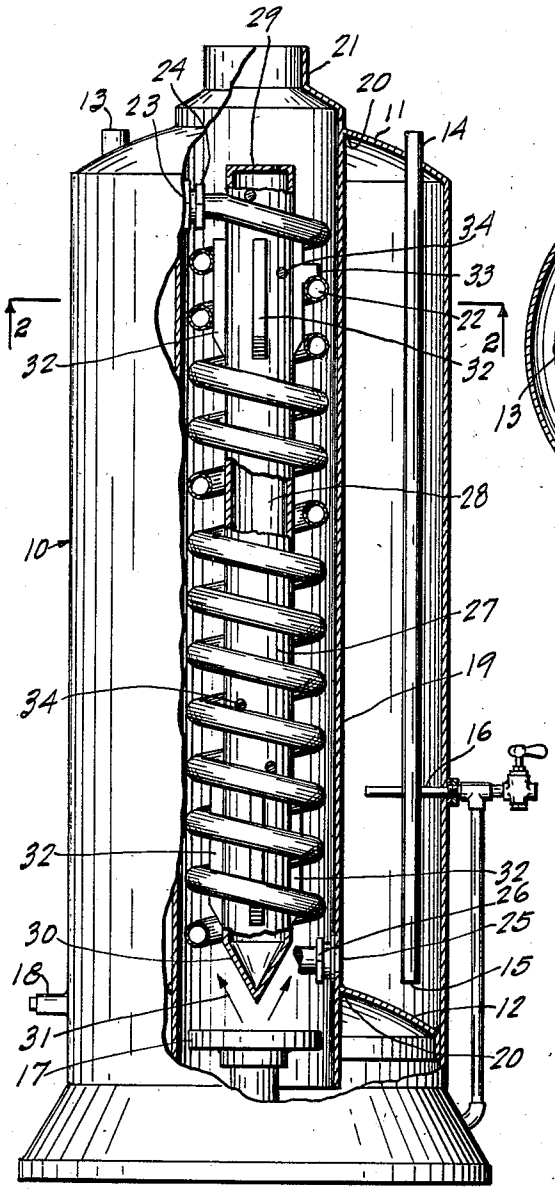


Fig. 1.

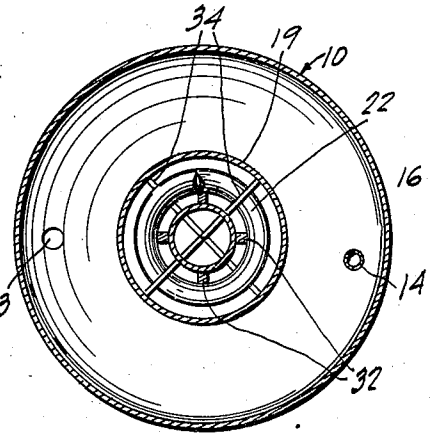


Fig. 2.

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WATER HEATER

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5 Claims. (Cl. 122—169)

This invention, a water heater, is an improvement over existing types of water heaters in that a more efficient application and utilization of the heat is effected, thus increasing the overall efficiency. It increases the proportionate amount of heat transferred to the water for a given amount of fuel over that of the usual types of heaters. In the case of tests conducted in comparison with some existent water heaters, a heat absorbtion of as much as four times that of the other heaters tested, was indicated.

This high efficiency is created through the elimination of heat funneling through the center of the coil; through the introduction of means which directs all of the heat from the burner directly to and around the coil; of eliminating the central funnel through the coil and equalizing the obstructional area of the coil with that of the heat passage about the coil; and by flaring the heat from the burner directly to the convolutions of the coil.

The objects of the invention are as follows:

First; to provide a water heater of maximum efficiency as related to the amount of water heated to a specific temperature on the basis of a specific consumption of fuel.

Second; to provide a water heater in which funneling of heat is completely eliminated, and in which all heat created by the fuel is directed into circulatory cooperation with the heating coil.

Third; to provide a water heater in which the obstructional area of the coil to the travel of the heat is approximately equal to the free passage for the heat about the coil.

Fourth; to provide a water heater with means for eliminating the central funneling area and which means coincidently functions as a director of heat, to direct all heat from the burner into its most effective path for heating the coil.

Fifth; to provide a water heater in which the heating coil is secured in position to the water jacket, at its opposite ends by means of compression couplings, so as to enable convenient removal and replacement of the coil.

Sixth; to provide means for eliminating the funneling of heat with centering means for assuring centralization within the coil and thus assuring equalization of heat transfer throughout the height of the coil.

Seventh; to provide means for eliminating the funneling of heat with adjusting means for adjusting the means relative to the burner.

In describing the invention, reference will be made to the accompanying drawing, in which:

Fig. 1 is a sectional elevation through the invention, with a portion of the water jacket shown in full view.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

The invention includes the drum 10 which may be either, a water tank, or the water jacket of a side arm heater, and is suitably constructed with dome-shaped top and bottom 11 and 12 adapted to withstand predetermined internal pressures. A hot water outlet 13 communicates with the top 11 of the water jacket, and a cold water inlet 14 extends down to a point 15 close to the bottom 12 of the jacket.

A thermostat 16 projects into the water within the jacket and controls the operation of the burner 17, and a drain spout is provided at 18.

A cylindrical sleeve 19 extends throughout the height of the jacket and is suitably sealed and secured in the top 11 and bottom 12 of the jacket as indicated at 20. A suitable stove pipe reducer 21 is mounted at the upper end of the sleeve 19 which is usually designated as a flue.

Mounted within this flue 19 is a heater coil 22 which extends from a point 23 close to the top of the jacket where it is secured in place by means of the compression coupling 24, to a point 25 adjacent the bottom where its other end is secured by another compression coupling 26.

Mounted within the convolutions of the coil is a flue core 27 which extends throughout the height of the heater coil 22 and is preferably of tubular construction to form a dead air space 28 within the core and functions primarily to prevent funneling of heat up through the center of the coil, and secondarily to transfer heat absorbed by this core, through radiation to the coil; the top end being preferably closed as indicated at 29 to prevent circulation of cooler gases within the core. The diameter of this core is preferably made equal to approximately, the diameter of the flue minus four times the diameter of the tubing forming the coil.

The bottom end of the core is preferably of conical form as indicated at 30 for deflecting all heat from the burner directly to the space between the core and the flue walls as indicated by the flow arrows 31, though this lower end might conceivably be of streamline or other suitable form, though with a slight loss in efficiency and a slight increase in the cost of production. A flat or substantially flat end is not so desirable since it would result in loss of efficiency through conduction of a greater amount of heat upwardly through the core and would form an obstruction to the free flow of heat. The inverted cone was found to be by far the most efficient.

Spacers 32 are provided at the upper and lower ends of the core and function to centralize the core within the coil, and also for transferring heat from the core to the coil by conduction. Suitable means such as the projection 33 or rods 34 provides a support for the core, the core being thus supported by the coil. The convolutions of the coil function as threads, which in combination with the members 33 or 34 form adjusting means for adjusting the core axially relative to the burner, and the core is therefore removable and replaceable at will. The rods 34 when used, coincidently function as spacing devices for centrally locating the core in the flue, thus the combination of spacers 32 and rods 34 will centralize the core in the coil and the core and coil in the flue.

The heater coil is so constructed, proportioned and located that an even transfer of heat is effected to the interior and exterior peripheries of the coil. To illustrate: The core 27 transfers heat by radiation to the interior periphery while the flue 19 absorbs heat which it transfers to the water in the jacket. Thus, if the area between the inner periphery of the coil and the core, and that between the outer periphery and the flue walls, were equal, the heating efficiency would suffer, since the available heat within the coil would be excessive and heat would be lost through poor absorption, while the available heat between the coil and the flue would be lacking, and heat transfer between the outer and inner peripheries would be out of balance.

For this reason the area between the outer periphery of the coil and the flue wall is made greater than that between the inner periphery of the coil and the core, slowing down the flow of heat between the coil and the core relative to that between the coil and the flue wall. Thus the highest efficiency and most rapid and uniform heating of water is realized.

Having regard to the foregoing disclosure, it will be understood that variations in construction and arrangement of parts, which variations are consistent with the appended claims may be resorted to without detracting from the spirit or scope of the invention, or sacrificing any of the advantages thereof.

I claim:

1. A water heater comprising; a water jacket having a vertical flue of uniform cross-section throughout its height and terminating at its upper end in a stove pipe reducer; a heater coil mounted in said flue; a burner at the lower end of said flue; and a cylindrical core uniform in cross-section mounted within the confines of the convolutions of said coil and spaced from the inner peripheries of the convolutions thereof and extending throughout the height of the coil and terminating in non-obstructive spaced relation below the lower end of said reducer and terminating at its lower end in an inverted cone and forming an annular flue for directing all heat from the burner to a limited area about the convolutions of the coil and preventing funneling of heat through the axis of the coil and arms projecting laterally from said core and cooperating with the walls of the flue for centering the core, and resting and adjustable on the convolutions of the coil for adjusting the tip of the cone vertically relative to the burner through manual rotation of the core.

2. A water heater comprising; a water jacket having a vertical cylindrical flue extending therethrough terminating at its upper end in a stove pipe reducer; a burner located at the lower end of said flue; a heater coil axially mounted in said flue and removably secured in communication with said water jacket at its opposite ends; a cylindrical core of uniform cross-section axially supported in said coil and extending throughout the height thereof and terminating in non-obstructive relation to said reducer for free escape of gases and having an inverted cone formed at its lower end with its point located in spaced relation to said burner; said core having spacer elements for maintaining the core in axial position relative to the coil, and supporting means comprising arms laterally projecting from the core for cooperation with the convolutions of the coil and which arms have a transverse length equal to the inside diameter of the flue for cooperation with the walls thereof for maintaining the core axially in the flue, and in combination with the spacer elements maintaining the flue, coil and core all in axial relation; said arms coincidently functioning as adjusting means for manual adjustment of the point of the cone relative to the burner through rotative cooperation with the convolutions of the coil functioning as a thread.

3. A core for a water heater having a heating coil, comprising; a hollow cylindrical shell conically formed at its lower end and having spacer lugs projecting radially from its upper and lower end portions for centering the core within the coil, and radial arms for supporting the core on the convolutions of the coil and coincidently forming adjusting means for axially adjusting the core within the coil with the convolutions of the coil functioning as a thread.

4. A structure as defined in claim 3; said radial arms projecting beyond the outer periphery of the convolutions of the coil for centering the core and coil in said water heater by cooperation with the inside of the heater.

5. A water heater comprising; a water jacket having an axial cylindrical flue of uniform cross-section extending vertically therethrough and terminating at its upper end in a stove pipe reducer; a burner mounted at the lower end of said flue; a heater coil mounted axially in said flue and having its upper and lower ends in communication with said water jacket; a cylindrical core uniform in cross-section axially mounted within said coil and terminating at its lower end in an inverted cone with the tip of the cone in spaced relation to said burner and with its upper end spaced below in non-obstructive relation to said reducer for free flow of gases from said flue through said reducer; said core consisting of a hollow closed shell forming a dead air space within to minimize heat conduction and cause almost immediate radiation of the heat absorbed; spacers mounted on the upper and lower portions of said core and projecting radially and cooperating with the inner peripheries of the convolutions of said coil for uniform spacing of the core and coil; and arms projecting from the upper and lower ends of said core and cooperating at their outer ends with the inside wall of said flue to space the core and coil axially within said flue; said arms having support on the convolutions of said coil and supporting the core in spaced relation to said burner and functioning as adjusting means for adjusting the conical end of the core relative to said burner through manual rotation of the core, for maximum heating efficiency.

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