

- [54] **INSTANT WATER HEATER**
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- [52] U.S. Cl. **126/350 R**
- [51] Int. Cl. **F24h 1/08**
- [58] Field of Search **126/350, 350 D, 271.2 R;**
122/250

FOREIGN PATENTS OR APPLICATIONS

- 508,231 12/1954 Canada.....126/350
- 535,230 4/1941 Great Britain.....126/350 D

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[57] **ABSTRACT**

A portable water heater for use in camping, mobile trailers, and pickup campers, that will rapidly heat quantities of water efficiently and safely. Heat is generated by burning bottled propane gas delivered through a simple burner apparatus, and the flame is directed into a surrounding water heating system through which water is circulated to be heated in a matter of seconds. The water heater may include a built in water supply or it may be adapted to connection to an external water container. The temperature of the hot water generated is regulated by the volume of water pushed through the water heating system.

12 Claims, 10 Drawing Figures

[56] **References Cited**

UNITED STATES PATENTS

- | | | | |
|-----------|---------|---------------------|---------------|
| 3,039,454 | 6/1962 | Gilbertson et al... | 126/271.2 R |
| 3,192,916 | 7/1965 | Vitkay | 126/5 |
| 3,533,380 | 10/1970 | Finger | 126/271.2 R X |
| 2,291,023 | 7/1942 | Burklin | 126/350 UX |
| 2,860,917 | 11/1958 | Thompson | 126/350 X |
| 3,401,673 | 9/1968 | Key, Jr. | 122/250 |

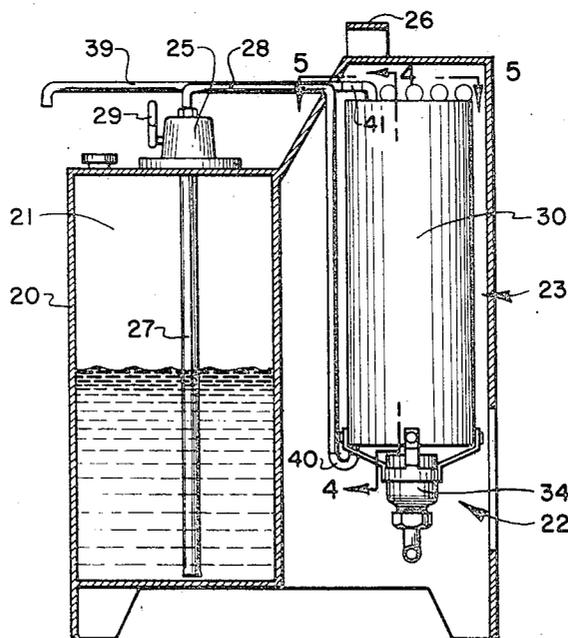


FIG 1

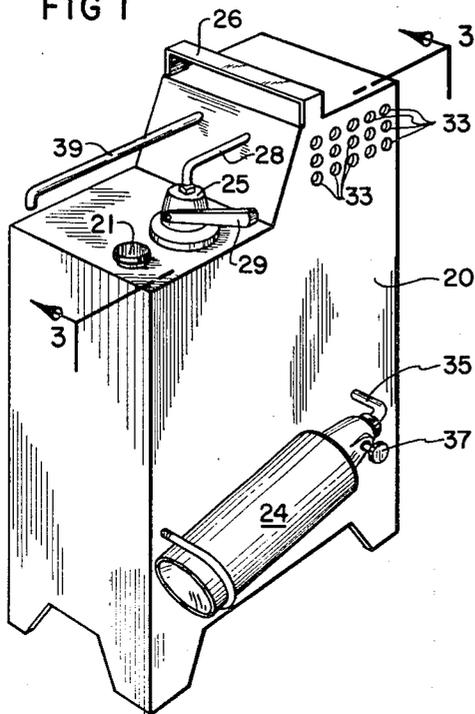


FIG 2

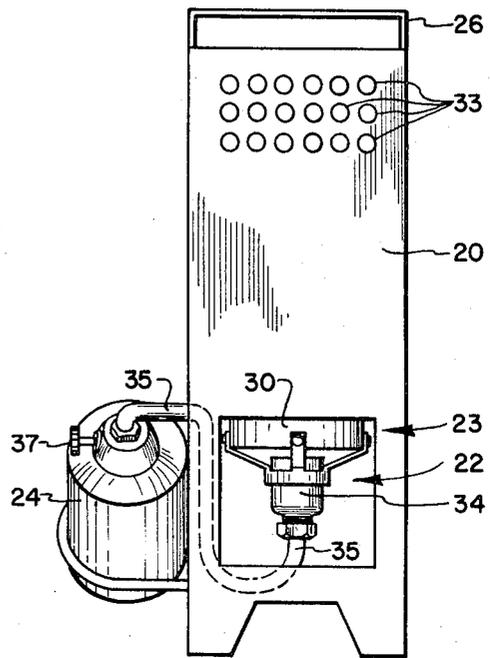


FIG 3

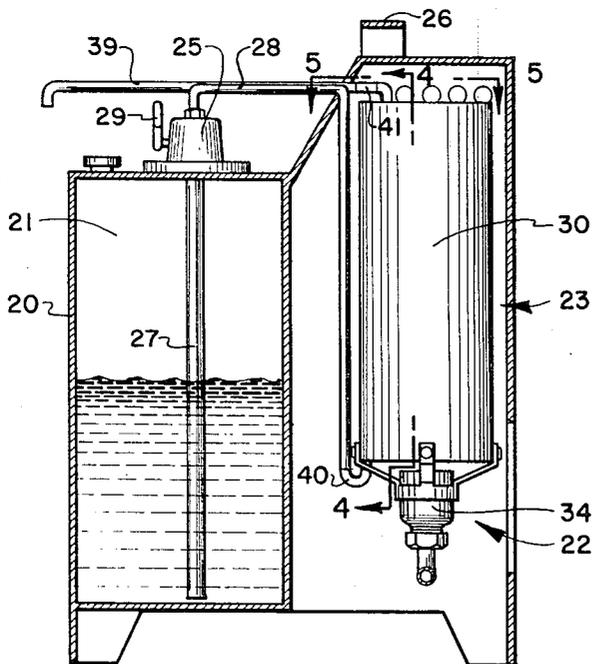
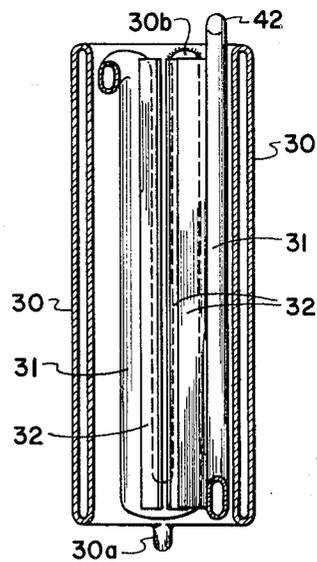


FIG 4



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FIG 5

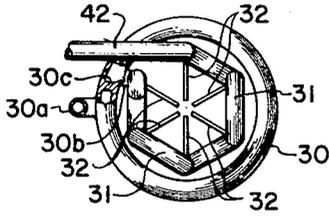


FIG 6

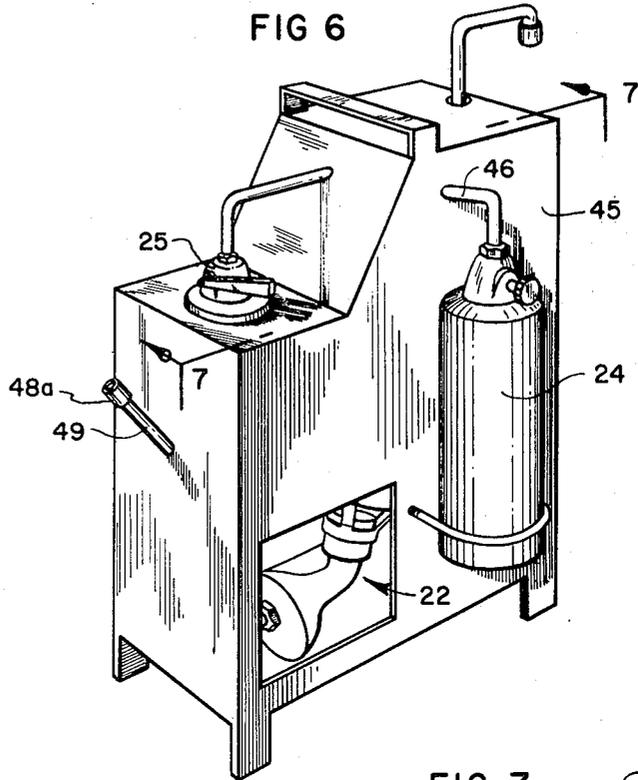


FIG 8

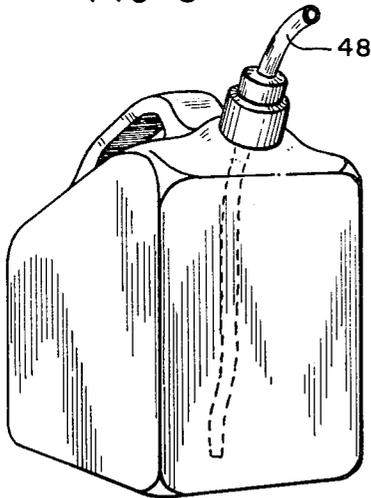
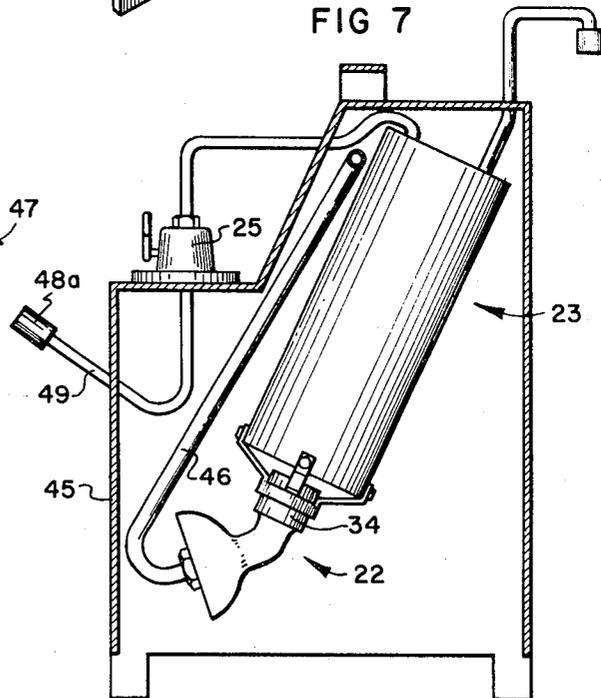


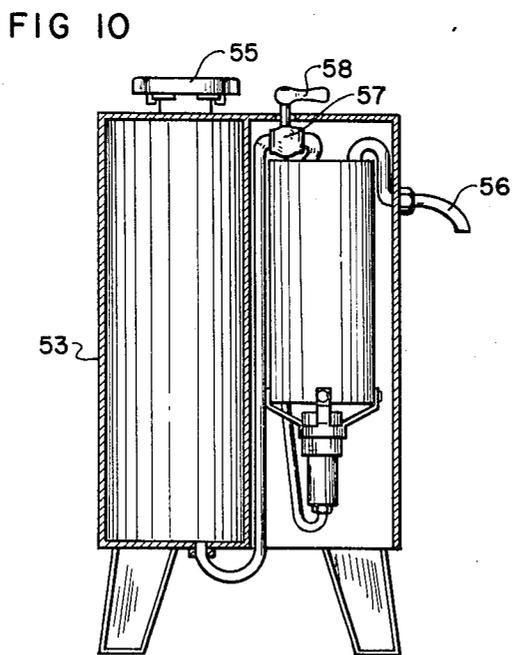
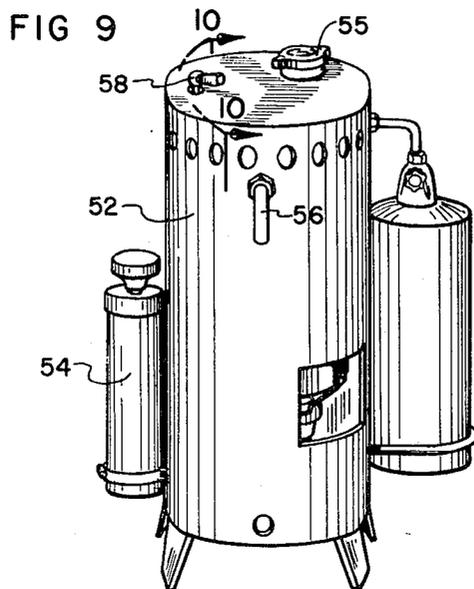
FIG 7



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INSTANT WATER HEATER

BRIEF DESCRIPTION OF THE INVENTION

1. Field of the Invention

This invention relates to hot water heaters and is particularly concerned with a compact, portable, low-cost, instant heater such as might be suitable for use by tent campers or owners of mobile camp trailers and truck-camper combinations.

2. Prior Art

There has long been a need for a water heater that can be used by tent campers and other outdoor enthusiasts to conveniently and efficiently produce quantities of hot water. In the past, it has usually been necessary to heat such hot water as may be needed over an open fire or over a camp stove utilizing a gas, charcoal or some other such available fuel. This requires large amounts of fuel and generally takes a long time to heat.

The use of coils surrounding an open flame as a water heater has also been proposed in the past. Thus, in U.S. Pat. No. 1,204,779, a water heater installation is shown wherein a coil or a water jacket surrounds a flame projecting from a burner and U.S. Pat. No. 2,189,490 shows such a unit wherein water is spiralled through a water jacket surrounding and above a burner flame. Another coil-type heater is shown in U.S. Pat. No. 3,118,430. While these prior devices, and others may have been satisfactory for the particular purposes and installations for which they were intended, to my knowledge there has not heretofore been available a portable, compact hot water heater usable for the purposes for which the present invention was developed. Especially, there has not heretofore been a burner system that will provide for efficient heating of the water and yet that will be entirely safe, nor has there been such a system in combination with a reservoir and a regulating pump such that the resulting unit can be readily transported from place to place.

SUMMARY OF THE INVENTION

Objects of the present invention are to provide a compact, portable, low-cost "instant" hot water heater.

Another object is to provide a unique heating system for such a hot water heater that will efficiently heat the water to even very high temperatures and to provide means whereby the water temperature can be regulated by varying the volume of flow through the heater system.

Still another object is to provide a safe water heater of the type described.

To accomplish these objects, I utilize as principal features of my invention a burner system wherein water is circulated into and through a water jacket housing surrounding and above an upwardly projecting, open, gas-fired flame where it is initially heated and then through vertically extending, flat-surfaced, interconnected tubes forming a ring of pickets inside the water jacket and also surrounding the flame where it is heated to a suitably higher temperature. Heat conductive fins extend from within the area surrounded by the tubes to the tubes, such that the fins can be heated directly by the flame and with the tubes then being heated by conduction from the fins, as well as by convection.

Other features include the use of a pump to force water through an open flow heating system, placed downstream of the pump and the use of destructible

conduits that will melt in the event the temperature of the heater exceeds maximum limits, thereby precluding the build up of any dangerous steam pressure anywhere in the heater.

The hot water heater is preferably supplied from a conventional, small, propane filled pressurized container, such as is commercially available and the housing for the unit is preferably formed of lightweight, small gage metal that will give maximum strength and durability while still being sufficiently lightweight to insure the desired portability of the heater.

Additional objects and features of the invention will become apparent from the following detailed description and drawings, disclosing what are presently contemplated as being the best modes of the invention.

THE DRAWINGS

In the drawings:

FIG. 1 is a front perspective view of one preferred embodiment of the invention, showing the assembled front, side and top views;

FIG. 2, a side view, showing the access door, burner, and water heating assembly;

FIG. 3, a vertical section taken on the line 3—3 of FIG. 1 and showing the self contained water supply, the water heating system and the heating unit;

FIG. 4, a vertical section, taken on the line 4—4 of FIG. 3, and showing the water jacket, partially broken away to show the interior thereof, copper heating tubes, and conductive fins of the heating system;

FIG. 5, a cut away top plan view of the water heating system, taken on the line 5—5 of FIG. 3;

FIG. 6, a view like that of FIG. 1, but showing another preferred embodiment of the invention;

FIG. 7, a vertical section taken on the line 7—7 of FIG. 6 and showing the burner, pump, and water heating system;

FIG. 8, a front perspective of a separate water source as used with the embodiment of the invention shown in FIG. 7;

FIG. 9, a front perspective view of still another preferred embodiment of the invention;

FIG. 10, a vertical section taken on the line 10—10 of FIG. 9 and showing the internal pressurized water supply, burner and water heating assembly.

DETAILED DESCRIPTION

Referring now to the drawings:

In the illustrated preferred embodiment of FIGS. 1-5, the water heater includes a housing 20 within which there is a water reservoir 21, a burner assembly 22, a water heating system 23, and on which is mounted a propane gas cylinder 24, water pump 25, and carrying handle 26. Water is pumped from the water reservoir 21, through the intake pipe 27 of the pump 25, through a supply pipe 28 and into the water heating system 23. As shown, pump 25, which is conventional, has a handle 29 that is operated to manually suck water into and force it out of the pump. Water moving into the water heating system is directed through the circular, hollow water jacket 30, and then successively into spaced, flat-surfaced, tubes 31 that are positioned within the circle formed by water jacket 30.

Water entering the water jacket comes in through inlet 30a, travels completely out an outlet 30b. A parti-

tion 30c between the inlet and the outlet divides the interior of the jacket and insures full travel of the water. As will become apparent, hot air circulating through the spaced tubes and around the water jacket will cause it to heat.

A plurality of the tubes 31, which are made of copper or other highly heat conductive material, are used, and the number will vary with the design of the hot water heater. In any event the tubes will be flattened so that the water passing therethrough will be spread and a maximum volume of water will be placed in contact with the hottest portion of the copper tubing. Highly heat conductive fins 32 are fixed to the innermost flat surface of the tubing and radiate into the area into which the flame and heat from the flame is projected from burner assembly 22 in the bottom of housing 20. The fins are heated directly by the flame at their lower ends and above the area of direct flame contact by the heated air moving upwardly above the flame towards the vent holes 33 in the top of the housing 20. The heated air is directed upwardly through the cylinder formed by hollow water jacket 30, and is forced to pass directly across the copper tubing 31 and the heat conductive fins 32. Thus, water traveling the path through the water jacket and successively into and through each of the tubes 31 is heated during its entire path of travel and a maximum heating is obtained within a minimum time period.

The necessary heat is obtained by use of the standard burner assembly 22, which includes a nozzle 34 to which propane gas is supplied through a tube 35. The tube 35 is connected to a conventional pressurized gas supply cylinder 24. A match is used to ignite the propane gas as it is passed through the nozzle and the volume of gas can be controlled by a manual shut off valve 37 on the cylinder 24.

The volume of flow of water through the water heating system 23 is easily regulated by the speed with which pumping handle 29 of the pump 25 is operated, and, as will be apparent the volume of water pumped into the system determines the length of time required for the water to pass through the system, the length of time it is exposed to heating and, consequently, the temperature of the water.

The water pumped through the unit moves through the heating system and is discharged for use through flexible hose 39. Connections 40 and 41, between the pump 25 and the heating system and the heating system and the hose 39, respectively, are preferably of plastic or other suitable heat destructible material. Thus, if an over heating condition should develop, the plastic tubing will melt before any dangerous head of pressure can build up in the unit. Also, since the pump 25 pushes water through the heating assembly rather than pulling it through and there is no control valve downstream of the heating system, no obstruction is present between the heating system 23 and the discharge of the unit. Thus, any water left in the heating system 23 after pumping has stopped and while heat is still being applied will vaporize and harmlessly pass into the atmosphere, with no danger of a pressure built up in the heater.

Through use of the flexible hose 39, water left in the system after pumping has stopped can be directed back into the reservoir, which may be provided with a

stopper lid (not shown) to prevent leakage as the unit is transported.

In FIGS. 6-8 there is shown another embodiment of the invention. In this embodiment, the burner assembly 22, water heating system 23 and propane cylinder 24 are all constructed as previously described. However, the propane cylinder is mounted upright with respect to the housing here shown as 45, a long tube 46 extends from a coupling with the cylinder to the intake of the burner assembly 22, and the housing does not include a water reservoir. Instead, a separate water reservoir 47 is provided and a tube 48, leading to the bottom of reservoir 47 is adapted to be connected through coupling 48a to the intake conduit 49 of the pump 25, which may be the same as the pump previously described. When the tube 48 and conduit 49 are connected the unit operates in the same manner as the unit previously described. However, since the reservoir is separate and may be made of lightweight plastic, or the like, it can easily be refilled without moving the heater unit housing 45, and the overall weight can be further reduced.

In FIGS. 9 and 10, there is shown another embodiment of the invention. In this embodiment, as with the embodiment of FIGS. 1-5, the housing 52 of the unit has a reservoir 53 therein. A conventional, hand operated, air pump 54 is mounted on the side of the housing 52 and has its outlet connected into the reservoir such that operation of the pump will build up a positive air pressure within the reservoir. A pressure type sealing cap 55 is provided for the filling spout of the reservoir so that the pressurized air in the reservoir will not escape. A spout 56 leads from the heating system, which is the same as those previously described, to the outside of the housing, and a valve 57, operated by a valve handle 58 regulates flow from the pressurized reservoir to the heating system.

While the unit does have a valve upstream of the heating system the heating system is open to atmosphere and it is unlikely that a dangerous pressure build up can occur in the system. Also, the heat destructible couplings, heretofore described are still provided between the pump and the heating system and the heating system and the spout so that they will fail in the event of a heat build up and before any damaging and dangerous pressure build up can occur.

In all of the embodiments of the invention, when metal is used to form the reservoir housing the interior of the reservoir is preferably coated with a suitable material not subject to rusting or corrosion.

Although preferred embodiments of my invention have been herein described, it is to be understood that the present disclosure is made by way of example and that variations are possible without departing from the scope of the hereinafter claimed subject matter, which subject matter I regard as my invention.

I claim:

1. A portable, instant hot water heater comprising a first housing;
 - a burner unit having a second housing mounted within the first housing and having a fuel nozzle directed into the second housing at one end thereof;
 - first vent means through the second housing at the end of the housing opposite the fuel nozzle;

second vent means through the first housing in the vicinity of the vent means through the second housing, whereby heat from the burner unit vented through said second housing is vented through said first housing;

water heating system means providing means for circulating water therethrough, spaced from the burner unit and between the burner unit and the vent means through the second and first housings; a water reservoir;

pump means on the exterior of the first housing; means for controlling the pump means to regulate the velocity of liquid pumped therethrough;

means coupling the pump means, the reservoir and the water heating system, whereby water is pumped from the reservoir and into the water heating system upon operation of the pump means; an outlet nozzle connected to the heating system and projecting outwardly of the housings whereby water pumped into and through the heating system is discharged through the outlet nozzle;

attachment means connected exteriorly of said first housing for attaching a source of combustible gas under pressure thereon, said attachment means including a valve to control flow from said source; and

means connecting said valve to said burner unit.

2. A portable, instant hot water heater as in claim 1, wherein the pump means is coupled between the reservoir and the heating system.

3. A portable, instant hot water heater as in claim 2, wherein the pump means comprises a manually operated pump.

4. A portable, instant hot water heater as in claim 1, wherein the pump means comprises an air pump mounted to pressurize the reservoir; a control valve between the reservoir and the heating system; an operating handle for the control valve extending exteriorly of the housing.

5. A portable, instant hot water heater as in claim 1, wherein the heating system includes a hollow, cylindrical jacket having an intake connected to the reservoir; a vertical baffle within the jacket and adjacent to the intake extending therewith and an outlet adjacent to baffle on the opposite side thereof as the intake and extending from the interior of the jacket outwardly;

a plurality of spaced-apart flat-sided tubes extending vertically within said water jacket; means interconnecting the interiors of said tubes and the interior of the water jacket for fluid flow therebetween; and

heat conductive fins extending from a flat-surface of each of said tubes away from the water jacket and into the area above the burner, the lower ends of said fins being positioned to be directly heated by a flame emanating from said burner.

6. A portable, instant hot water heater as in claim 2, wherein the reservoir is within the first housing and is transportable therewith.

7. A portable, instant hot water heater as in claim 2, wherein

the reservoir is separate from the first and second housings and is transportable separately therefrom.

8. A portable, instant hot water heater as in claim 3, wherein the reservoir is within the first housing and is transportable therewith.

9. A portable, instant hot water heater as in claim 3, wherein the reservoir is separate from the first and second housings and is transportable separately therefrom.

10. A portable, instant hot water heater as in claim 8, wherein the heating system includes

a hollow, cylindrical water jacket forming the second housing and having an intake connected to the reservoir;

a vertical baffle within the jacket and adjacent to the intake extending therewith and an outlet adjacent to the baffle on the opposite side thereof from the intake and extending from the interior of the jacket outwardly;

a plurality of spaced-apart flat-sided tubes extending vertically within said water jacket;

means interconnecting the interiors of said tubes and the interior of the water jacket for fluid flow therebetween; and

heat conductive fins extending from a flat-surface of each of said tubes away from the water jacket and into the area above the burner, the lower ends of said fins being positioned to be directly heated by a flame emanating from said burner.

11. A portable, instant hot water heater as in claim 9, wherein the heating system includes

a hollow, cylindrical water jacket forming the second housing and having an intake connected to the reservoir;

a vertical baffle within the jacket and adjacent to the intake extending therewith and an outlet adjacent to the baffle on the opposite side thereof from the intake and extending from the interior of the jacket outwardly;

a plurality of spaced-apart flat-sided tubes extending vertically within said water jacket;

means interconnecting the interiors of said tubes and the interiors of the water jacket for fluid flow therebetween; and

heat conductive fins extending from a flat-surface of each of said tubes away from the water jacket and into the area above the burner, the lower ends of said fins being positioned to be directly heated by a flame emanating from said burner.

12. A portable, instant hot water heater comprising a housing assembly having vent means at one end thereof;

a burner unit having means for directing a flame into the housing assembly and towards said vent means; water heating system means inside the housing assembly, said water heating system means providing means for circulating water therethrough and being spaced from the burner unit and between the burner unit and the vent means;

a water reservoir; pump means mounted on the exterior of the housing assembly;

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means for controlling the pump means to selectively regulate the velocity of liquid pumped therethrough;

means coupling the pump means, the reservoir and the water heating system whereby water is pumped from the reservoir and into the water heating system upon operation of the pump means;

an outlet nozzle connected to the heating system and projecting outwardly of the housing assembly

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whereby water pumped into and through the heating system is discharged through the outlet nozzle; attachment means connected exteriorly of the housing assembly for attaching a source of combustible gas under pressure thereon, said attachment means including a valve to control flow from said source and a means of releasing gas from said source.

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