March 13, 1951 J. H. KNAPP 2,544,927

WATER HEATER

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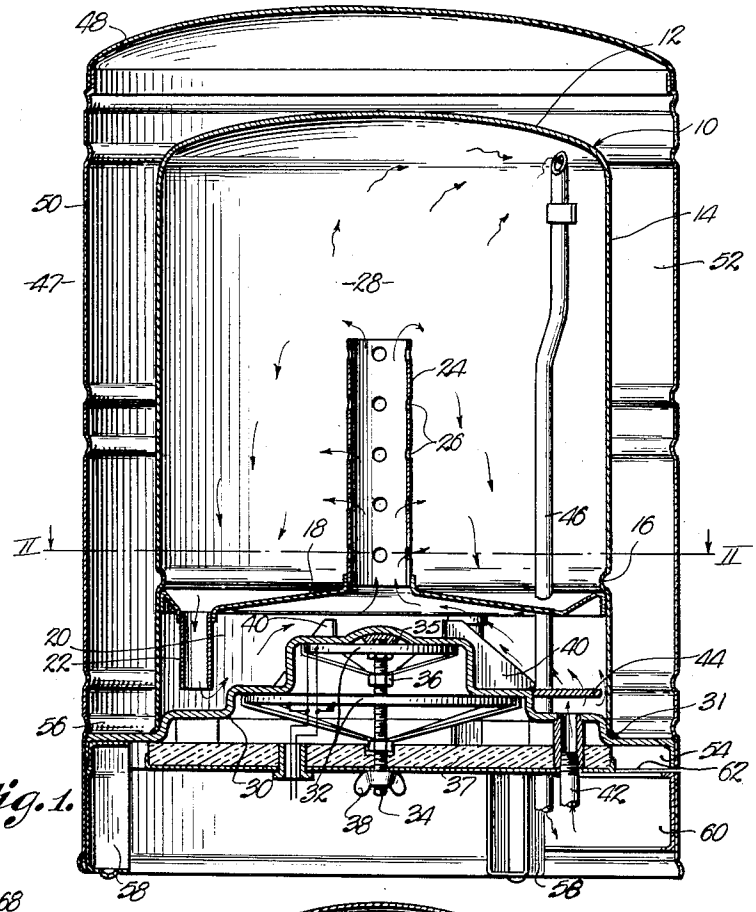


Fig. 1.

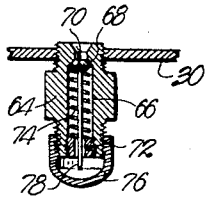


Fig. 3.

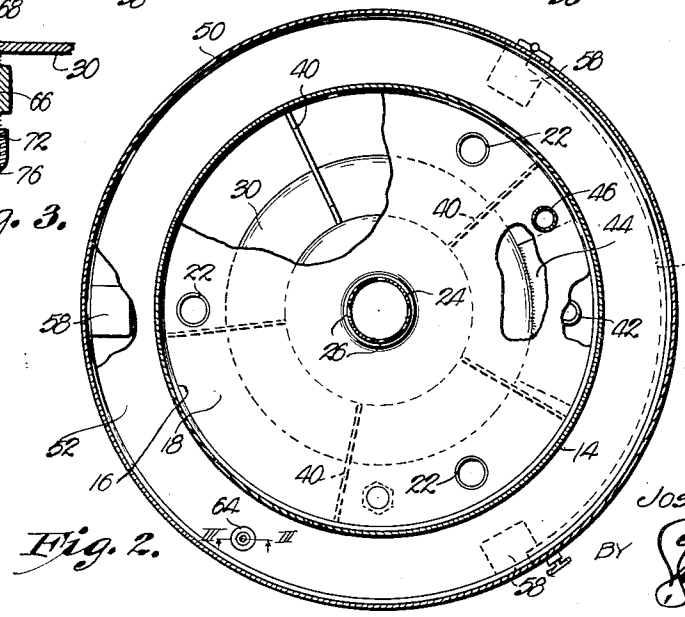


Fig. 2.

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WATER HEATER

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2 Claims. (Cl. 122—13)

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This invention relates to water heaters of the type usable for domestic purposes or of the character that may be employed in mechanical equipment where a constant supply of hot water is required but where the heater must be of a minimum size to occupy as little space as possible.

One of the important aims of this invention is the provision of a water heater that is thoroughly insulated through the employement of a vacuum jacket; that is designed to establish circulation of the water through paths of travel insuring quick rise in temperature; that has a heating element and mounting therefor which is capable of quickly raising the temperature of the water, that is composed of parts so interfitted as to permit using welded seams and that may be assembled with a minimum amount of time because of the interfitting relation between the parts thereof.

Other objects of the invention will appear as the following specification more completely describes the form of the invention shown in the accompanying drawing, wherein:

Fig. 1 is a vertical longitudinal sectional view through a water heater made pursuant to the present invention.

Fig. 2 is a cross sectional view taken on line II—II of Fig. 1, and

Fig. 3 is an enlarged detailed sectional view taken on line III—III of Fig. 2.

The water heater illustrated comprises a tank 10 formed of sheet material and drawn into the contour shown in Fig. 1. This tank 10 is an enlarged thimble-shaped member, the top wall 12 whereof is arched to mesh with the annular side wall 14 which in turn terminates in an open bottom, closed as more fully hereinafter set forth. A bead 16 is pressed in annular side wall 14 at a point spaced above the lowermost edge of wall 14 to form a stop for partition 18 that is welded in place after being pressed into the position shown in Fig. 1 to separate the tank 10 into heating compartment 20 below the partition and a water compartment 28 above it. This partition has a number of depending tubes 22 at the annular marginal edge thereof and an up-standing riser tube 24 at the axis of both tank 10 and partition 18. Riser tube 24 has perforations 26 therein to direct water radially as will be described when describing the operation of the heater. Riser tube 24 and the tubes 22 put the chamber 28 in communication with heating compartment 20.

Tank 10 is bottomed by the specially formed

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floor or wall 30 stepped as illustrated in Fig. 1 and created to present a truncated cone having annular substantially vertical walls against one of which the free edge of tank 10 is secured. A weld 31 is employed when fastening wall 30 in place. Wall 30 extends upwardly into heating compartment 20 and a number of electrical heating elements 32 are clamped against the under side of this wall 30 through the medium of a bolt 34 and nuts 36 and 38 respectively. Heating elements 32 are in direct contact with the outer surface of wall 30 and heat exchange occurs immediately upon water flowing through compartment 20. These heating elements 32 are annular in form and bolt 34 passes upwardly centrally therethrough to a boss 35 into which the end of bolt 34 is threaded. Nut 38 lies directly against an insulating plate 37 that prevents the escape of heat from around elements 32 to a point other than in heating compartment 20. Through this arrangement heating units 32 may be replaced and the action thereof confined to a place within the heater assembly. A number of radial fins 40 secured by welding or otherwise directly to the inner surface of wall 30, serve to strengthen this said wall 30 and to conduct heat outwardly from elements 32 into compartment 20 where relatively cold water is supplied by pipe 42 extending from any suitable source. Customarily, this pipe 42 is connected into the city water system and as the water enters compartment 20, it is dissipated by baffle plate 44 mounted on wall 30 and projecting outwardly over the end of the intake pipe 42 in a manner revealed by Fig. 1. An outlet pipe 46 has its open upper end near the top of tank 10 where the hottest water is always found. This pipe extends downwardly along the inner side of tank 10 and thence out through partition 18, wall 30 and plate 37 to a point where connection may be made to the point of use of the hot water.

A jacket generally designated by the numeral 47 and comprising a top 48, and annular side wall 50 encases tank 10 and all of the parts associated therewith. The size of jacket 47 is such as to present a space 52 around the sides and top of tank 10 which space is exhausted to produce a vacuum for the purpose of insulating tank 10. Bottom wall 30 is large enough in diameter to snugly engage the inner surface of side wall 50 of jacket 47. A downwardly extending, continuous annular flange 54 at the lower periphery of wall 30 is welded to the side wall

50 when bottom 30 is slipped inwardly against one of the beads 56 embossed in side wall 50. This lowermost bead 56 constitutes a stop or limiting member for the movement of bottom wall 30 when the parts are being assembled. A number of feet 58 are secured to that portion of side wall 50 extending below bottom 30 and a door 60 closing an access opening 62 is removably mounted for convenience when the space below bottom 30 is to be entered for any reason.

Fig. 3 illustrates the type of valve which is fitted into an opening through bottom 30. This valve remains as a part of the assembly after manufacture and comprises a body 64 having a central bore 66 therethrough and a seat 68 for valve head 70. A plug 72 engages one end of spring 74 while the other end of spring 74 bears against the under side of valve head 70. A cap 76 protects valve stem 78 when evacuation of space 52 has occurred. After the parts are assembled as above indicated, and the water heater is to be put into use, a vacuum pump is brought into play and attached to body 64 forming a part of the valve assembly illustrated in Fig. 3. When space 52 has been evacuated, valve head 70 will be seated and a perfect insulating chamber will be created without adding to the weight of the structure.

After the water heater is installed, relatively cold water will enter through pipe 42, impinge against baffle plate 44 and pass therearound in the direction of the arrows and thence over the upper surface of the stepped truncated cone shaped floor 30 upon which radial fins 40 are mounted. The water will be at once raised in temperature and will pass upwardly through perforated riser tube 24 and thence outwardly through the perforations 26 thereof to be disbursed in chamber 28. This breaking up of the incoming stream of water will equalize the temperature throughout its mass and cause the coldest water in the chamber 28 to be forced downwardly through the several tubes 22 which terminate at a point within an annular channel formed between wall 14 of tank 10 and the outermost stepped portion of bottom 30 as indicated at the left in Fig. 1. Thus the cooler water will again be brought into contact with bottom 30 and through natural action due to differential in temperature, it will continue on upwardly through riser tube 24 and pass into chamber 28 at points depending upon its temperature. The hottest water will seek the top of chamber 28 and pass outwardly through out-let pipe 46 when the water is drawn from the heater.

Obviously such thermostatic controls as may be necessary and as are conventionally known, can be associated with the heater to automatically cause electric current to be supplied to elements 32 until the temperature of water in all parts of the heater reaches the temperature setting of the thermostat.

Water heaters having physical characteristics different than those shown and described may be produced without departing from the spirit of the invention or scope of the appended claims.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. A water heater of the kind described comprising a closed top tank having a partition of heat-conducting material setting off a water compartment thereabove and a heating compartment immediately below said partition; a frusto-conical wall of heat-conducting material closing the bottom of said tank and extending inwardly into said heating compartment; an insulated plate spanning the base of said wall and setting off a closed chamber; at least one heating element in said chamber; a cold water inlet conduit for said heating compartment, said conduit passing through said chamber, whereby said cold water is pre-heated by heat emanating from said element; an outlet opening formed in said partition for passage of hot water from the heating compartment to the water compartment; and an outlet pipe extending from a point near the top of said tank, downwardly through the partition, the heating compartment, the wall, the closed chamber and the insulated plate, whereby hot water flowing from the tank through the pipe is maintained in a heated condition between the plate and the uppermost end of the pipe.

2. A water heater of the kind described comprising a closed top tank having a partition of heat-conducting material setting off a water compartment thereabove and a heating compartment immediately below said partition; a frusto-conical wall of heat-conducting material closing the bottom of said tank and extending inwardly into said heating compartment; an insulated plate spanning the base of said wall and setting off a closed chamber; at least one heating element in said chamber; a cold water inlet conduit for said heating compartment, said conduit passing through said chamber, whereby said cold water is preheated by heat emanating from said element; an outlet opening formed in said partition for passage of hot water from the heating compartment to the water compartment; an outlet pipe extending from a point near the top of said tank, downwardly through the partition, the heating compartment, the wall, the closed chamber and the insulated plate, whereby hot water flowing from the tank through the pipe is maintained in a heated condition between the plate and the uppermost end of the pipe; and a jacket surrounding the sides and tops of said tank in spaced relationship thereto, said wall extending from the tank into connecting relationship with the jacket to present a closed space around the tank capable of air evacuation.

JOSEPH H. KNAPP.

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