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(54) SELF-CONTAINED SOLAR HEATER AND STORAGE DEVICE

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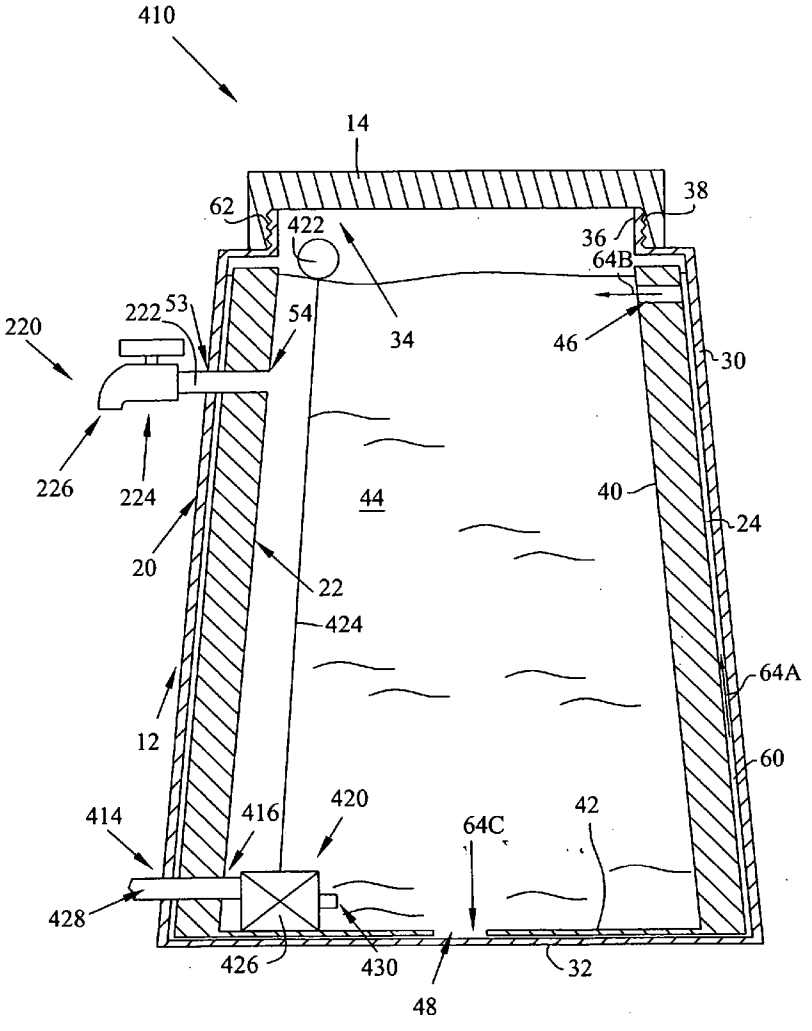
(57) **ABSTRACT**

A solar water-heating apparatus comprises an outer container sized and configured to receive a smaller inner container. The inner container includes a pair of openings, one formed in the floor thereof and one formed in the side wall thereof. The side wall and floor of the inner container define a reservoir capable of receiving a liquid. A gap is located between the floors and side walls of the two containers. Once the device has been filled with a liquid, the liquid present within the gap may be heated by solar energy, thereby increasing the temperature thereof. The liquid with the increased temperature becomes less dense and rises relative to the cooler liquid and travels upwards in the gap until the warmer liquid reaches an opening within the side wall of the inner container. The liquid then travels through the opening and back into the reservoir. The re-entry of this liquid through the opening forces cooler liquid out of an opening in the bottom of the smaller container and into the gap, whereby this cooler liquid may be heated by solar energy. This process will continue until the liquid within the container reaches a certain ambient temperature.



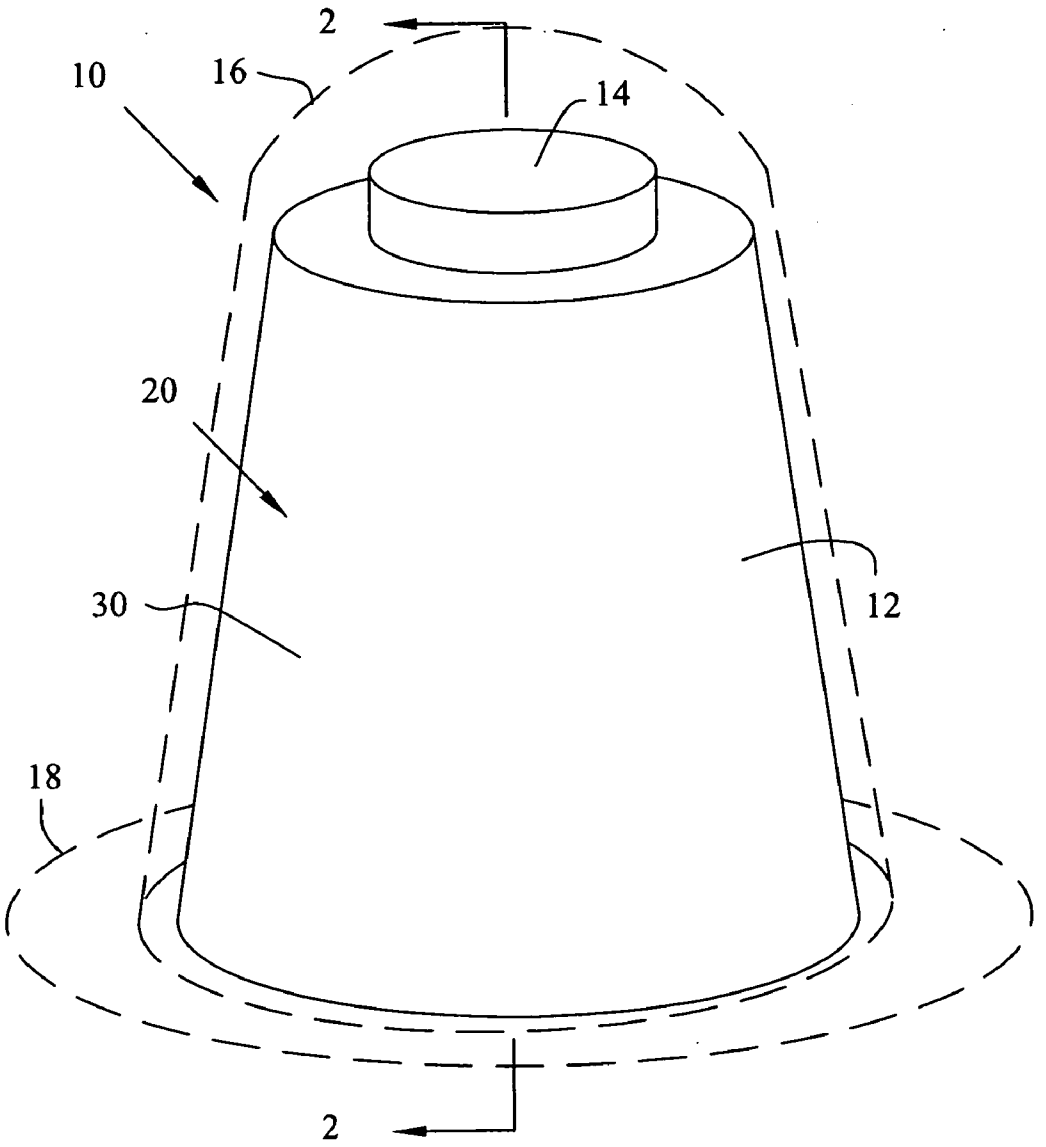


FIG. 1

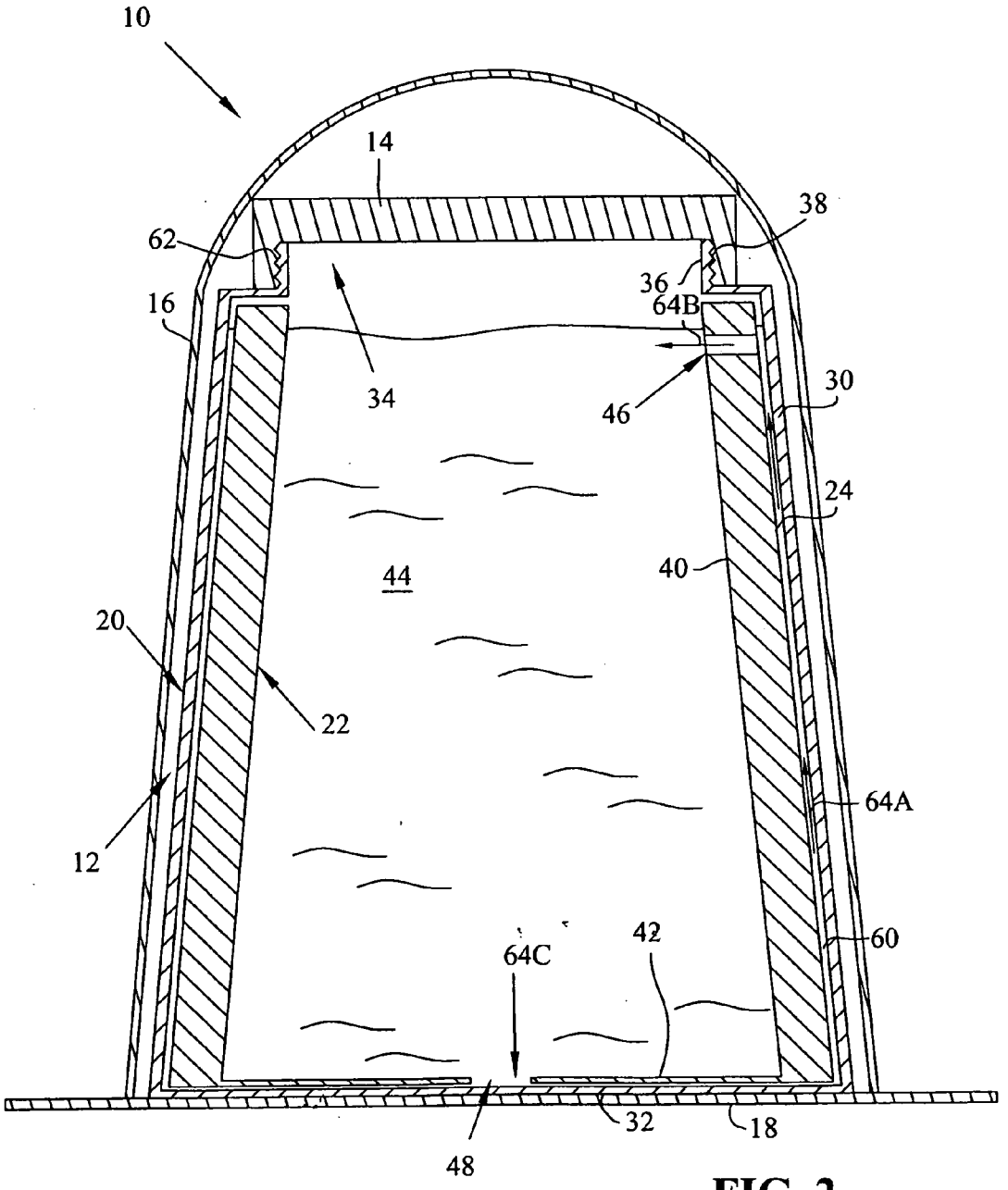


FIG. 2

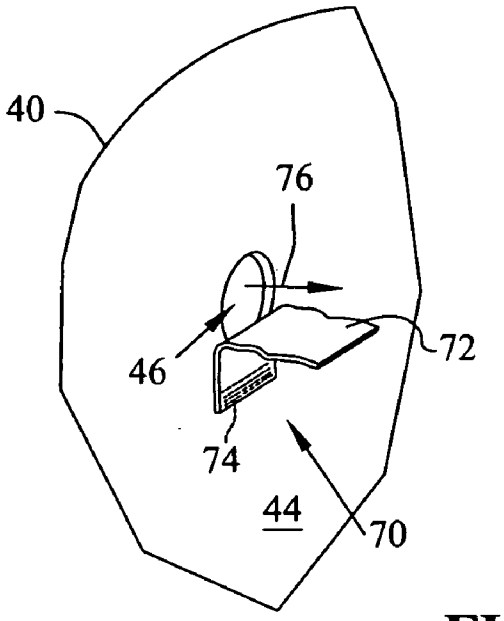


FIG. 3A

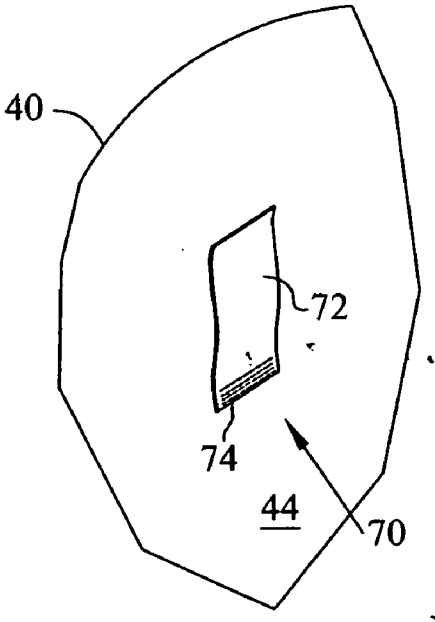


FIG. 3B

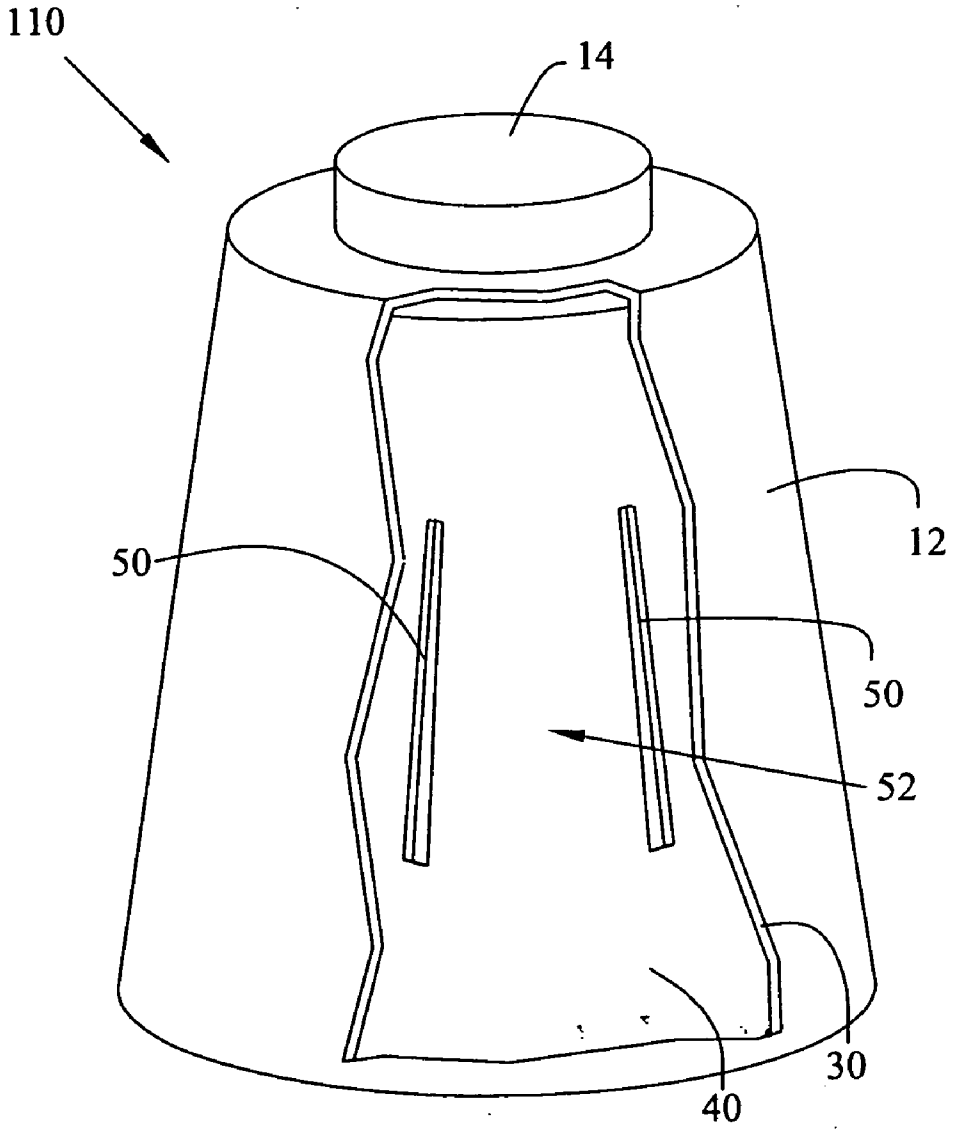


FIG. 4

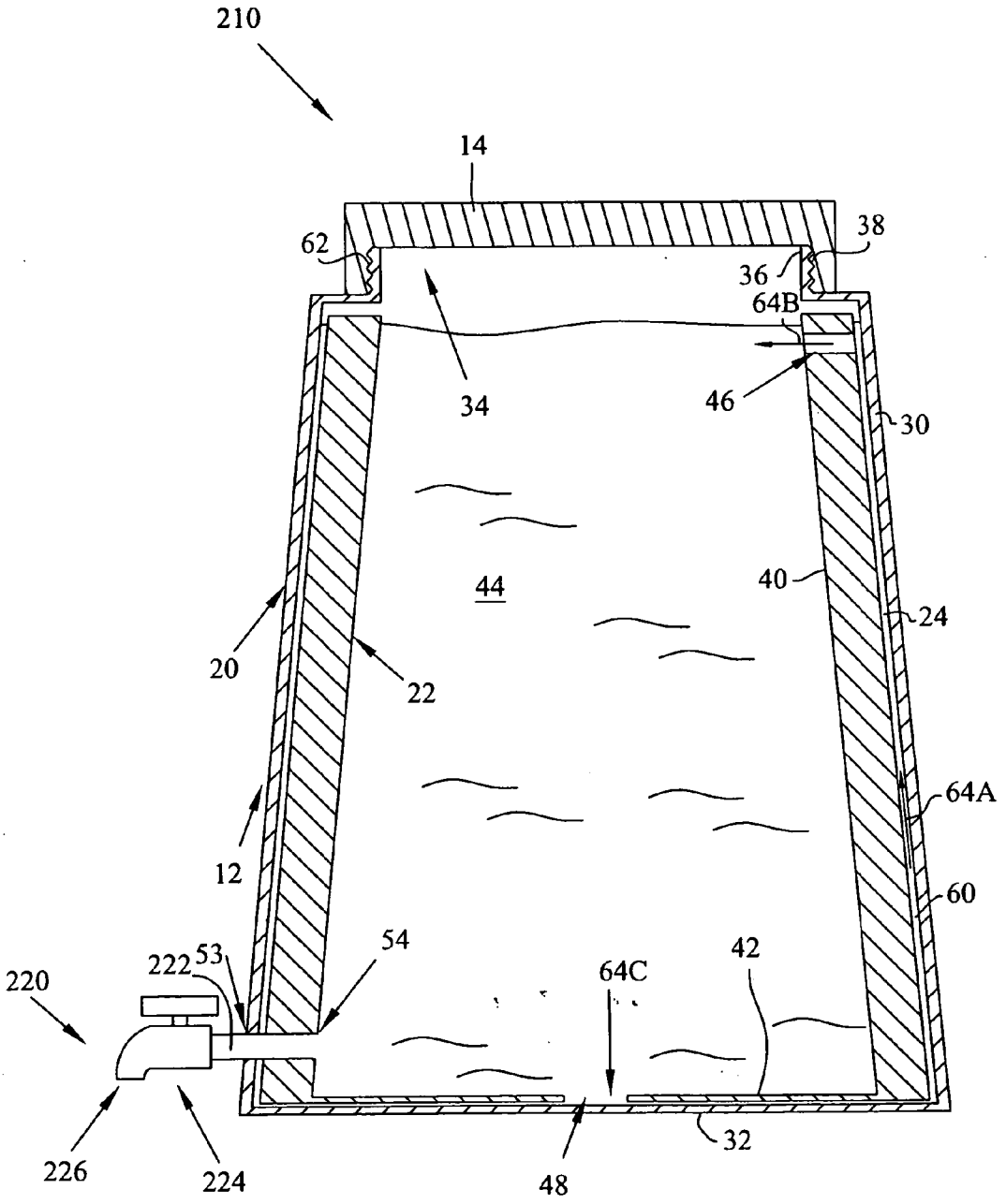
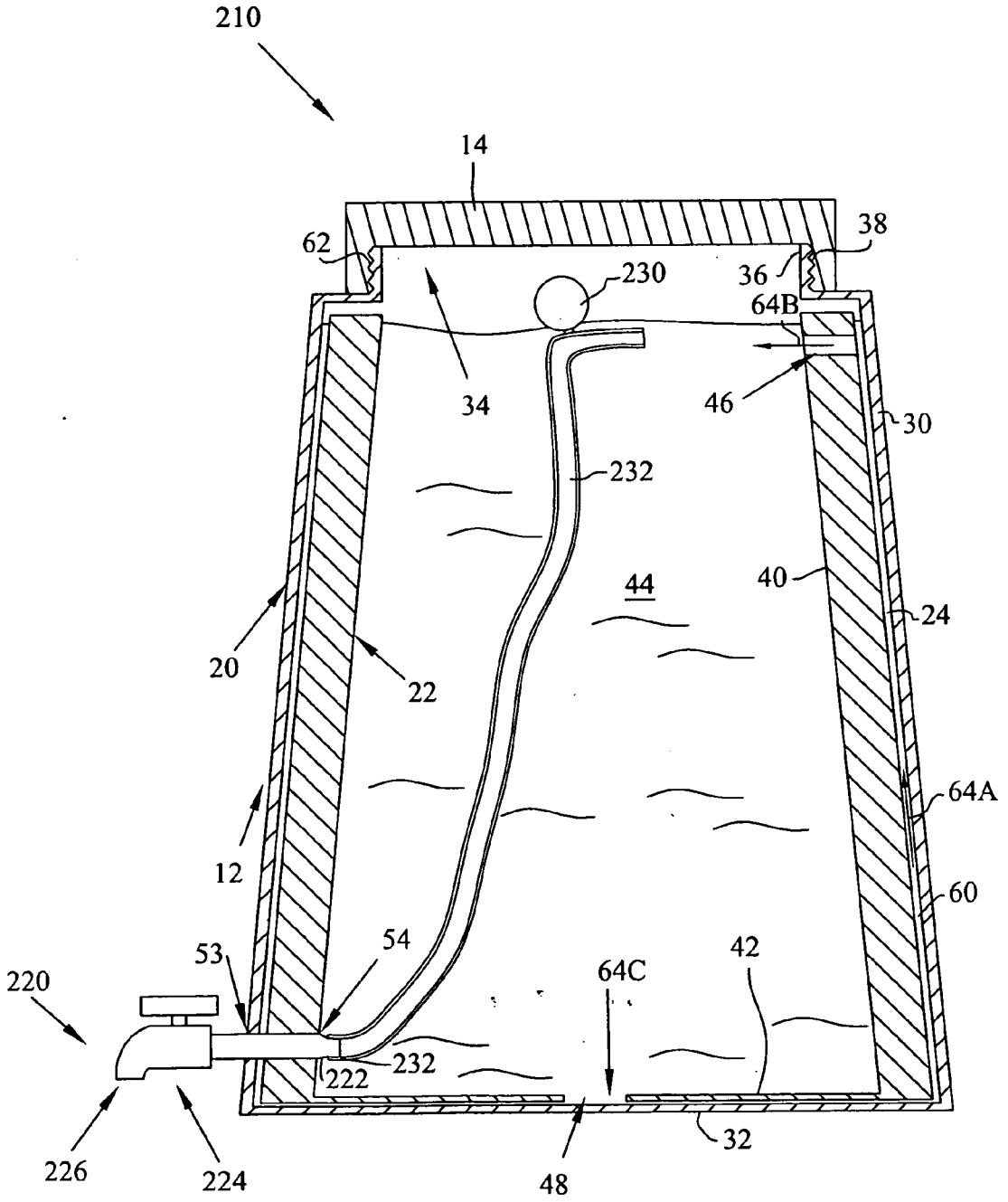

210
14
62
38
36
64B
34
46
30
44
40
24
20
22
64A
12
60
54
222
53
42
64C
220
226
224
48
32

FIG. 5A


210
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230
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64B
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232
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54
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220
64C
232
222
226
224
48
32

FIG. 5B

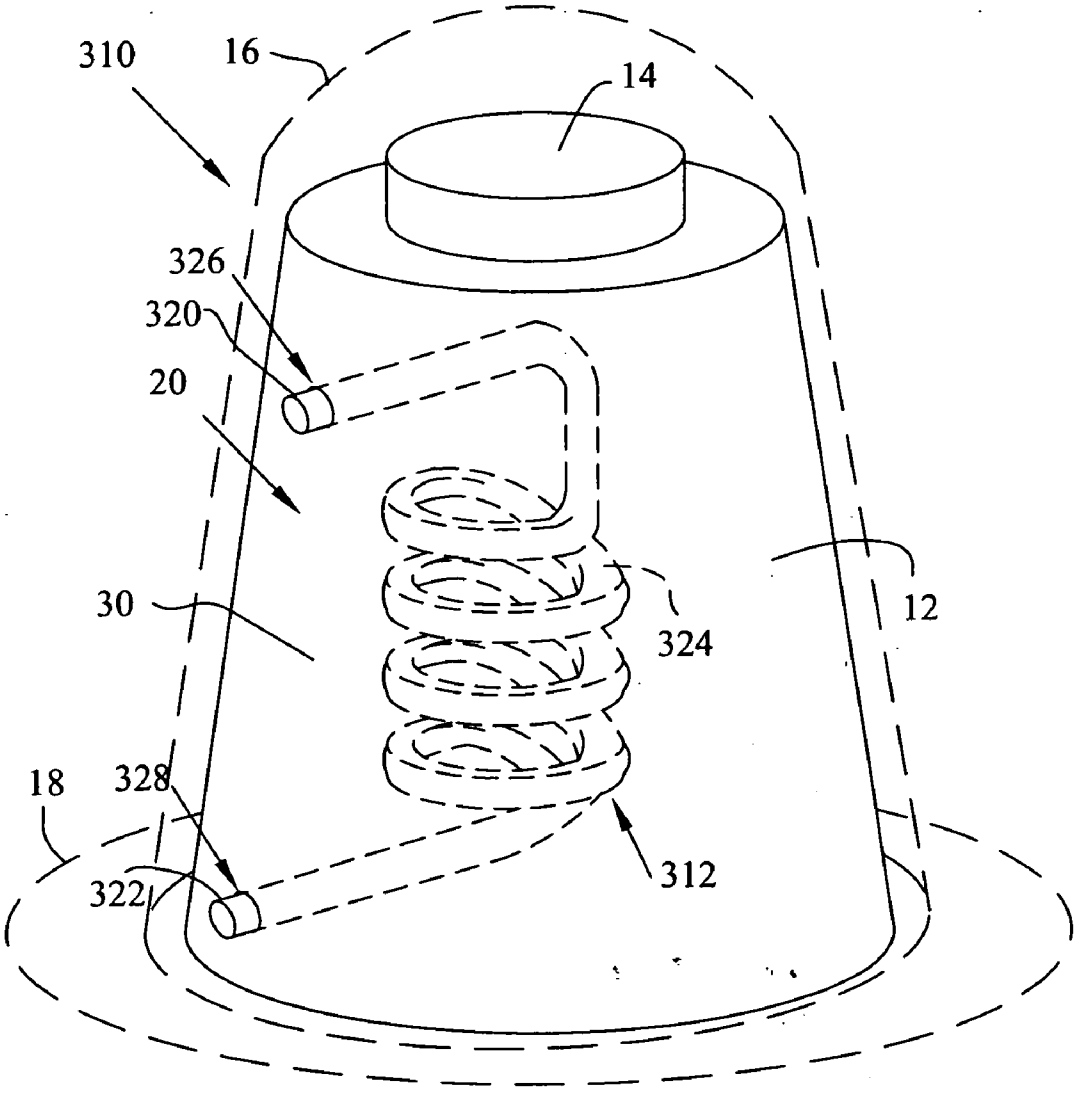

FIG. 6

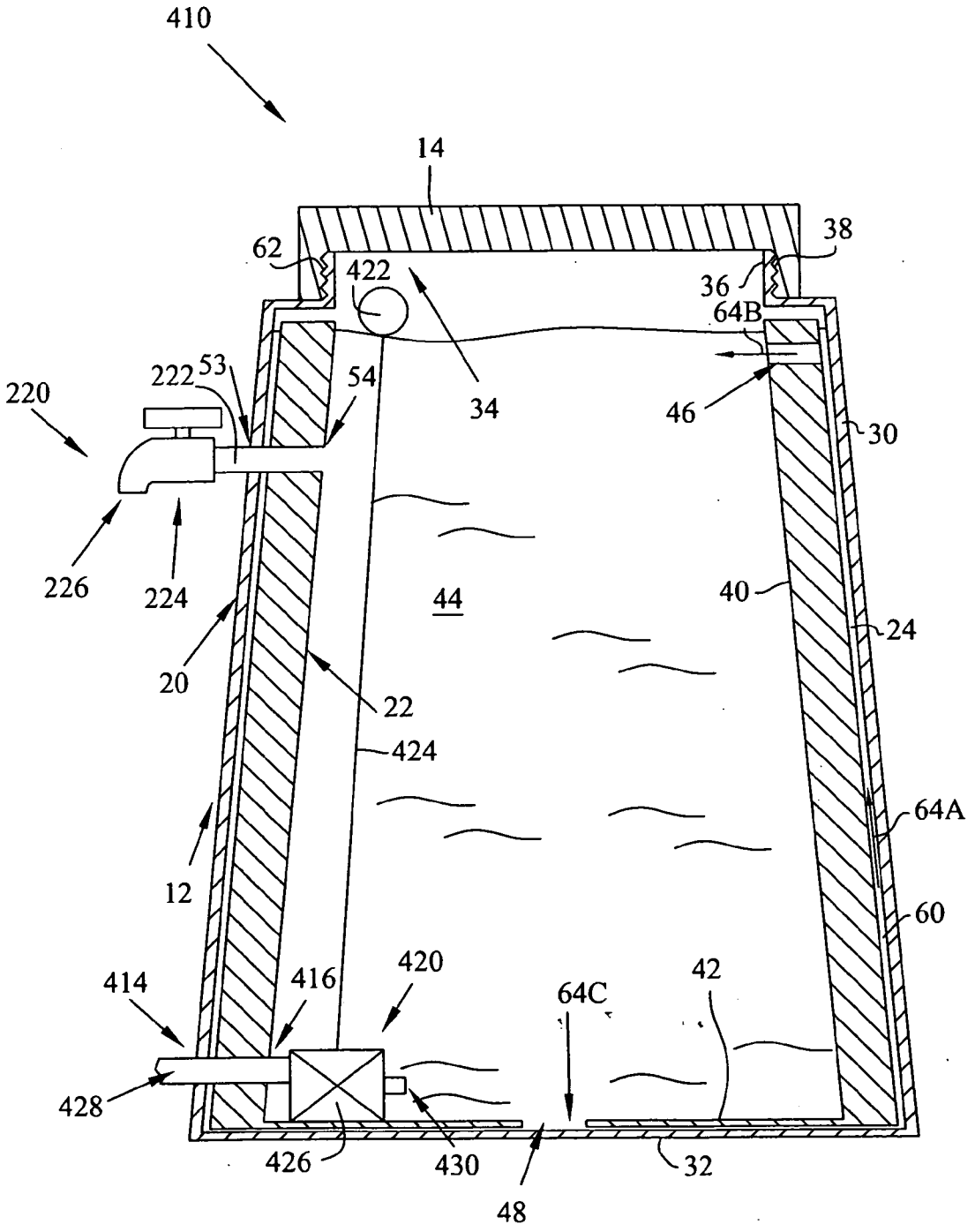
410
14
62
422
38
36
64B
220
222
53
54
34
46
30
226
224
44
40
24
20
22
424
64A
12
60
414
416
420
64C
42
428
426
430
32
48

FIG. 7

SELF-CONTAINED SOLAR HEATER AND STORAGE DEVICE

BACKGROUND OF THE INVENTION

[0001] The present invention relates generally to the field of solar heaters. In particular, the invention relates to a solar heater capable of heating and storing a liquid.

DESCRIPTION OF PRIOR ART

[0002] U.S. Pat. No. 2,388,940 discloses a Solar Heater. The disclosed solar heater is designed primarily to utilize the heat rays from the sun for assistance in home heating after sundown or during parts of the day when the sun is not shining. The invention provides for a self-contained solar heater comprising a tank adapted to contain water or other liquids. The tank includes a heating chamber and a storage chamber in open communication with each other. In the disclosed invention, the water heated in the heater chamber is utilized to circulate the water through both the heater chamber and the storage chamber. Sunlight subjected to the heating chamber warms the water contained therein. Once the water has been warmed by the sun, the tank radiates heat for a predetermined period. The solar heater may also be configured to function as a domestic hot water heater.

[0003] U.S. Pat. No. 4,419,983 discloses a Device for Passive Solar Heating and Storage of a Liquid. The disclosed invention includes a passive stationary collector. The collector comprises a cylinder with a substantially circular cross-section set in a fixed position, with its longitudinal axis orientated essentially in a vertical north/south plane and at appropriate angle to a local horizontal plane of the earth. The invention includes a plurality of liquid carrying heat absorbing conduits laying lengthwise on the external surface of the cylinder. The conduits convey heated liquid to the upper part of the reservoir internal the to cylinder. In addition, the conduits obtain cooler water from the lower part of the reservoir. The invention further includes a liquid density trap positioned between the reservoir and the conduits. The liquid density trap prevents cooling of the reservoir contents during periods of low radiation by the sun.

[0004] U.S. Pat. No. 4,452,231 discloses Integral Solar Water Heaters. The disclosed water-heating apparatus comprises a plurality of longitudinal tubular storage tanks. Adjacent tanks are aligned in the same direction and in the same plane. An aperture located at the bottom of each tank receives a cold water inlet pipe, and an aperture in the upper portion of the tank receives a hot water outlet pipe. Each tank in the array includes a heat conducting plate, and each plate includes a pipe connected thereto. The pipe for each tank is connected to the tank at two points by two openings. The first end of the pipe is connected to the tank near the bottom, while the second end of the pipe is connected to the tank near the top. The second opening near the top of the tank is covered by a counterbalanced valve member. The counterbalanced valve member is pivotally mounted to the tank and is constructed to block the second opening for flow pressures below a given pressure. Accordingly, as cold water is directed into the heater through the cold water inlet pipe, the cold water enters the pipe associated with the plate. Solar energy heats the water in the pipe, creating density changes and causing the water to rise through the pipe towards the top opening. When a particular pressure is reached due to the density change, the valve pivots and thus causes the heated water to flow back into the tank. In this manner, water will continue to circulate until the entire temperature of the storage tank reaches an ambient value. The presence of the valve prevents the water from cooling during the night.

[0005] U.S. Pat. No. 5,462,047 discloses a Solar Water-Heater With Integrated Storage. The disclosed hot water heater is configured to be filled isothermally with water at any temperature. Once the tank is full, the tank begins a thermo-siphoning mode. A collector and a storage tank are housed in a unit. The invention combines two principles of solar hot water heating into one. Primarily, cold water is raised to the desired final temperature in one pass through the absorber, thereby achieving good collector efficiencies and a quick response. In addition, once the storage is full, thermo-siphoning circulation sets in automatically and further heats the storage content and/or compensates for heat losses.

SUMMARY OF THE INVENTION

[0006] An embodiment of the present invention includes a solar heater for heating a liquid comprising a first container having an upright wall and a second container located within the first container and including an upright wall. The solar heater includes a gap intermediate the walls of the containers. The gap extends around the second container and encompasses the upright wall of the second container.

[0007] In an embodiment of the invention, the second container includes a floor connected to the wall of the second container. The wall of the second container includes an aperture, and the floor of the second container includes an aperture. In addition, the first container includes a floor connected to the wall of the first container and an aperture removed from the floor. In an embodiment of the invention, the solar heater includes an upright wall defining the aperture in the first container. The solar heater may also include a cap for mating with the upright wall in order to seal the aperture of the first container. The cap may include threads capable of mating with threads in the upright wall encompassing the aperture of the first container.

[0008] In an embodiment of the invention, the second container includes a reservoir for holding the liquid. The reservoir is connected to the gap by an aperture. The invention may also include a valve capable of sealing the aperture in the wall of the second container. The valve prevents the flow of liquid through the aperture when the valve seals the aperture. In and embodiment of the invention, an adhesive attaches the valve to the wall of the second container.

[0009] In an embodiment of the invention, the solar heater includes a plurality of ribs. The ribs reside within the gap. In addition, in an embodiment of the invention, the first container and the second container each have a conical cross section.

[0010] In an embodiment of the invention, the solar heater includes a heat exchanger disposed within the reservoir. In addition, the solar heater may include reflectors configured to direct sunlight toward the gap. The reflectors may be arranged on a mat.

[0011] In an embodiment of the invention, the solar heater includes a spigot assembly interconnected with the reservoir.

The spigot assembly configured to drain liquid from the reservoir. The spigot assembly may include a tube and a float. In addition, the spigot assembly may further include a second tube and a valve.

[0012] In an embodiment of the invention, the solar heater includes a valve assembly configured to allow the flow of liquid into the reservoir. The valve assembly may include a valve, a float, and a connector connecting the float to the valve. The float is capable of floating on the top of the liquid and causing additional liquid to flow into the reservoir when the liquid level reaches a predetermined level.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. **1** depicts a perspective view of an embodiment of the present invention.

[0014] FIG. **2** depicts an section view of the invention depicted in FIG. **1**.

[0015] FIGS. **3**A and **3**B depict an embodiment of a valve that may be used in an embodiment of the invention.

[0016] FIG. **4** depicts a perspective view of an embodiment of the present invention with a portion of a wall removed for illustrative purposes.

[0017] FIG. **5**A depicts a section view of an embodiment of the present invention.

[0018] FIG. **5**B depicts a section view of an alternative of the embodiment of the present invention depicted in FIG. **5**A.

[0019] FIG. **6** depicts a perspective view of an embodiment of the present invention with a portion of the components illustrated in phantom for illustrative purposes.

[0020] FIG. **7** depicts a section view of an embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0021] FIG. **1** depicts a perspective view of an embodiment of the present invention. In FIG. **1**, numeral **10** generally indicates a self-contained solar heater and storage device. In the present embodiment, device **10** includes a body portion, generally indicated by numeral **12**, a mating cap **14**, transparent cover **16** and reflector mat **18**.

[0022] FIG. **2** depicts a section view of device **10** taken along section line **2** of FIG. **1**. Body portion **12** includes a first container **20** and a second container **22**. In the embodiment depicted, body portion **12** further includes insulation **24**.

[0023] In the embodiment depicted, first container **20** includes a side wall **30** and a floor **32**. In the present embodiment, side wall **30** has a conical cross-section. Floor **32** mates with side wall **30** along the lower edge of side wall **30** in such a manner as ensuring a liquid tight seal. In the present embodiment, first container **20** further includes an opening **34** opposite floor **32**. In the embodiment depicted, a raised portion **36** defines opening **34**. Raised portion **36** includes threads, generally indicated by numeral **38**.

[0024] In the present embodiment, side wall **30** is manufactured from a material capable of absorbing solar energy, such as metal or plastic, for example, polyethylene plastic. In embodiments of the invention, it is preferable that this material have maximum solar absorption capability and thus, side wall **30** may allow for the use of a wall **30** with a thinner cross section than would be utilized in an application in which the outer wall provides insulation. The outer surface of side wall **30** is colored black in order to achieve maximum solar energy absorption. In addition, in embodiments of the invention, the inner surfaces of walls **30** and floor **32** are substantially smooth.

[0025] Second container **22** includes side wall **40** and floor **42**. In the present embodiment, the connection between side wall **40** and floor **42** is liquid tight and prevents liquid from flowing therebetween. In addition, side wall **40** has a conical-shaped cross-section, as depicted in FIG. **2**. It should be noted that if desired first container **20** and second container **22** may have cross-sections other than conical. For example, first container **20** and second container **22** may have hemispherical shapes.

[0026] The combination of side wall **40** and floor **42** defines an inner area or reservoir, generally indicated by numeral **44**. As shown in FIG. **2**, side wall **40** and floor **42** may include or be manufactured from an insulative material having a relatively thicker cross-section, such as plastic. For example, the inventor anticipates that second container **22** may be manufactured from polystyrene or polyurethane.

[0027] Referring still to FIG. **2**, side wall **40** includes an opening **46**. In the present embodiment, opening **46** is located in side wall **40** at an end opposite where side wall **40** joins with floor **42**. In addition, floor **42** also includes an opening **48**. Opening **48** may be positioned anywhere within floor **42**.

[0028] Referring still to FIG. **2**, first container **20** is sized and configured to receive second container **22**. Accordingly, the outer surfaces of side wall **40** and floor **42** are separated from the inner surfaces of side wall **30** and floor **32**. Numeral **60** generally indicates the gap defined by the separation. It should be noted that opening **46** and opening **48** both extend from reservoir **44** into gap **60**. In addition, it should further be noted that gap **60** is substantially constant in size around the circumference of side wall **40**.

[0029] Referring still to FIG. **2**, cap **14** includes a plurality of threads **62**. In the present embodiment, threads **62** are configured to mate with threads **38**. Accordingly, cap **14** may be threaded onto first container **20**, thereby sealing off access to reservoir **44**. When a user desires access to reservoir **44**, however, the combination of threads **38** and **62** allows a user to remove cap **14** from body portion **12**. In the present embodiment, cap **14** is manufactured from an insulative material in order to minimize any heat loss from the device **10**.

[0030] Operation of the device **10** will now be described. Device **10** functions by absorbing solar energy and heating any liquid stored therein. In the present example, water will be used for exemplary purposes. However, it should be noted that device **10** is not limited to the heating of water, but rather will succeed in heating any liquid. The first step in the usage of device **10** requires the removal of cap **14** from body portion **12**. This may be accomplished in the present embodiment by rotation of cap **14** in order to disengage threads **62** from threads **38**. Once cap **14** has been removed from body portion **12**, the liquid to be heated by the device

10 is added to reservoir **44**. As should be understood by one skilled in the art, the opening **48** in floor **42** allowing flow from reservoir **44** into gap **60** will ensure that the level of liquid in gap **60** is substantially equivalent to the level of liquid in reservoir **44**. A sufficient amount of liquid should be added to device **10** in order to ensure that the liquid level rises above the level of opening **46** in side wall **40**.

[**0031**] After the device has been filled with a sufficient volume of liquid, cap **14** may be reattached to body portion **12**. Device **10** may then be set out in the sunlight in order to absorb solar energy. It should be noted that in the present embodiment of the invention, the conical arrangement of side walls **30** and **40** ensures that more solar radiation is absorbed by device **10** from the sun than that which would be absorbed if device **10** had a cylindrical orientation. This occurs because the conical shape presents a greater surface area to the sun than that which would be achieved if a cylindrical shape were used.

[**0032**] The solar energy transmitted from the sun to device **10** may be absorbed by a portion of side wall **30** and transferred to the water contained within gap **60**. This transfer of solar energy results in the increase in the temperature of the water. As the water temperature increases, the density of the water decreases. Accordingly, water with an increased temperature will begin to flow upward in the direction of arrow **64**A.

[**0033**] The warm water continues warming within device **10** and continues to migrate within gap **60** until the water reaches opening **46**. Once the water reaches opening **46**, the water travels through opening **46** into reservoir **44** as indicated by arrow **64**B. The water entering reservoir **44** along the line of arrow **64**B is warmer than the water already present within reservoir **44**. Accordingly, the warmer water will remain in the upper portion of reservoir **44**. In order to accommodate the arrival of this warmer water, cooler water near the bottom of reservoir **44** is forced out of reservoir **44** through opening **48** as indicated by arrow **64**C.

[**0034**] This cooler water travels through the portion of gap **60** intermediate floor **32** and floor **42** until the water reaches the area of gap **60** intermediate side wall **30** and side wall **40**. At this point, the sun again heats the water, thereby causing the liquid to migrate as indicated by arrow **64**A. This process repeats itself until a steady state temperature has been reached. It should be noted that this process will succeed in heating a liquid which has a higher density at cooler temperatures, such as water. Theoretically, during the heating of a liquid that achieves a greater density at higher temperatures, the opposite would happen. Specifically, cooler liquid would exit reservoir **44** through opening **46**, travel downward through the portion of gap **60** intermediate side wall **30** and side wall **40**, and return into reservoir **44** at a warmer temperature through opening **48**. It should be noted in embodiments of the invention a transparent cover **16** may encompass the device **10** in order to entrap heat. In addition, the inventor also foresees the use of reflectors to increase the amount of sunlight directed upon body portion **12**. For example, body portion **12** may sit upon a reflector mat **18** capable of reflecting sunlight onto side wall **30**. Reflector mat **18** represents a mat manufactured of reflective material capable of redirecting sunlight toward body portion **12**.

[**0035**] When one wishes to remove the warm water contained by the device **10**, one need only unscrew mating cap **14**. The removal of cap **14** presents one with access to reservoir **44**. One may then remove water from the reservoir **44** as one desires. In order to function properly again, additional water must be added to reservoir **44** in order to ensure the level of the water is above opening **46**.

[**0036**] FIGS. **3**A and **3**B depict a check valve **70** which may be employed in embodiments of the invention. Check valve **70** is configured to be used in conjunction with opening **46** when water or a similar liquid is being heated. In the embodiment shown, check valve **70** comprises a plastic body **72** and an adhesive **74**. Plastic body **72** is generally manufactured from a plastic material having a density less than that of water, thereby allowing plastic body **72** to float within water. Adhesive **74** must be water insoluble and must have sufficient strength to allow plastic body **72** to be attached to the inner surface of side wall **40** without being pulled away when pressure is applied to the plastic body **72**. FIG. **3**A shows the functioning of check valve **70** when water is flowing into reservoir **44**. During the usage as shown in FIG. **3**A, sunlight would be shining on side wall **30**, as discussed with respect to FIG. **2**. Accordingly, water indicated by arrow **76** is flowing into reservoir **44** through opening **46**. The water supplies a pressure sufficient to ensure that plastic body **72** contorts or moves, thereby allowing the water to flow through opening **46**.

[**0037**] FIG. **3**B depicts the check valve **70** functioning when solar energy is no longer available. In this instance, water is no longer flowing through opening **46** because the water is no longer being heated within gap **60**. Accordingly, there is insufficient water pressure to displace the plastic body **72** of the check valve **70**, and check valve **70** seals opening **46**, thereby preventing water from exiting the reservoir **44**. This occurs as the less dense check valve **70** floats in the water, and due to the inward sloped of wall **40** attributed to the conical shape thereof, seals the opening **46**. Since the water contained by reservoir **44** is greater insulated against the relatively cooler external air than the water contained within gap **60**, a greater amount of heat is retained by water within reservoir **44**, vis-à-vis, the water present within gap **60**. It should be noted that because the relatively warmer water in the reservoir **44** cannot travel out of opening **46** due to the check valve **70**, cool water located within gap **60** cannot flow back into reservoir **44** through opening **48**. Thus, the presence of check valve **70** prevents reverse flow of water and generally allows the device **10** to maintain a relatively warm water temperature within reservoir **44**. It should be noted that in embodiments of the invention, the inventor anticipates the utilization of other check valves known in the art.

[**0038**] FIG. **4** depicts a perspective view of an additional embodiment of the present invention, generally indicated by numeral **110**. In this figure, a portion of side wall **30** has been removed in order to show more easily the outer surface of side wall **40** of device **110**. In device **110**, side wall **40** includes a plurality of ribs, each indicated by numeral **50**. The ribs **50** may be integrally formed within the side wall **40**. In alternative embodiments of the invention, the ribs **50** may be added to side wall **40** as a separate component and held thereto by an adhesive. The presence of ribs **50** in device **110** ensures that gap **60** is sized consistently throughout device **110**. In order to ensure proper functioning of device **110**, however, ribs **50** should not extend as far downward as floor **42**. This allows a liquid being heated by the device to flow

around the periphery of side wall **40** before being directed into channels **52** defined by ribs **50**. In addition, ribs **50** should not extend upward as far as the level of opening **46**. Thus, the liquid heated by device **110** will be allowed to intermix above ribs **50** before flowing through opening **46** and back into reservoir **44**.

[**0039**] FIG. **5**A depicts a section view of an alternative embodiment of the present invention, generally indicated by numeral **210**. In device **210**, side wall **30** further includes an additional opening **53**, and side wall **40** further includes an additional opening **54**. A spigot assembly **220** extends into reservoir **44** through openings **53**, **54** in order to allow removal of warm water from reservoir **44**. Ideally, spigot assembly **220** is utilized once the liquid within reservoir **44** has reached a relatively constant temperature. Spigot assembly **220** includes tube **222** and valve **224** of a type known in the art. When a user desires to drain all or a portion of the liquid within reservoir **44**, the user need only turn on the valve **224** of the spigot assembly **220**. This will allow liquid from reservoir **44** to flow through tube **222** and exit out of tube **222** at opening **226**. It should be noted that in this embodiment of the invention, in order to ensure device **210** functions properly, liquid must be added to reservoir **44** after removal of liquid through spigot assembly **220**, thereby ensuring that the water level rises above the level of opening **46**.

[**0040**] FIG. **5**B depicts a modified version of the embodiment of the invention depicted in FIG. **5**A. In FIG. **5**B, device **210** further includes a float **230** and tube **232**. Float **230** is comprised of a material less dense than the liquid thereby ensuring float **230** floats on the top of the liquid. Tube **232** may be manufactured from a flexible material, such as plastic. In the present embodiment, one end of tube **232** is attached to tube **222** of spigot assembly **220**. If necessary, tube **222** may be elongated in order to ensure a sufficient length of tube **222** extends into reservoir **44**. The opposing end of tube **232** is affixed to float **230**.

[**0041**] The embodiment of the invention depicted in FIG. **5**B would be utilized in a situation where one desires to always drain the warmest liquid from reservoir **44**. Specifically, float **230** floats on the top of the liquid contained within reservoir **44**. As explained above, due to density differences in the liquid at different temperatures, warmer liquid generally migrates to the upper portion of reservoir **44**. Accordingly, the combination of float **230** and tube **232** ensures that generally the top layer of liquid is being drained through spigot assembly **220**, thereby ensuring that one is draining the warmest liquid from reservoir **44**.

[**0042**] FIG. **6** depicts another embodiment of the invention, generally indicated by numeral **310**. Device **310** includes a heat exchanger **312**. Heat exchanger **312** includes an outlet pipe portion **320**, inlet pipe portion **322** and exchanger portion **324**. In addition, in the embodiment of device **310** depicted, wall **30** includes openings **326**, **328** and wall **40** (FIG. **2**) includes similar openings (not shown). In the embodiment depicted, outlet pipe portion **320** extends through opening **326** and the corresponding opening in wall **40**. Similarly, inlet pipe portion **322** extends through opening **328** and the corresponding opening in wall **40**. Any sealant known in the art may be used to ensure a liquid tight seal occurs between the pipe portions **320**, **322** and the openings **326**, **328**.

[**0043**] In the present embodiment, exchanger portion **324** resides within reservoir **44**. Exchanger portion **324** interconnects the pipe portions **320**, **322**. Exchanger portion **324** may be manufactured from any material allowing for high heat conductivity, such as copper.

[**0044**] In operation, device **310** may be utilized to heat any fluid capable of flowing through heat exchanger **312**. For example, the fluid to be heated enters heat exchanger **312** via pipe portion **322**. The fluid then enters the exchanger portion **324**. It should be noted that since the liquid within reservoir **44** has been heated by solar energy, as described above, the flow of fluid through exchanger portion **324** allows the fluid to absorb heat energy from the liquid within reservoir **44**. The heat energy absorbed by the fluid increases the temperature of the fluid. The fluid then exits heat exchanger **312** via pipe portion **320** at a temperature greater than that of the fluid when the fluid entered heat exchanger **312**.

[**0045**] FIG. **7** depicts another embodiment of the present invention, generally indicated by numeral **410**. Device **410** includes spigot assembly **220**, as described above. In this embodiment, spigot assembly **220** is positioned proximate the upper surface of the liquid stored within reservoir **44**.

[**0046**] Device **410** includes two additional openings **414**, **416** and a float valve assembly **420**. Float valve assembly **420** may be of any known type. Wall **30** includes opening **414**, and wall **40** includes opening **416**.

[**0047**] In the present embodiment of the invention, float valve assembly **420** includes a float **422**, connection **424**, valve **426**, inlet pipe **428** and opening **430**. Float **422** is comprised of a material with a density allowing float **422** to float on top of the liquid contained within reservoir **44**. Connection **424** comprises any connection known in the art and connects float **422** to valve **426** in a known manner. Connection **424** is such that when the level of liquid within reservoir **44** falls to a given level, as measured by float **422**, connection **424** activates valve **426**. Activation of valve **426** allows additional liquid to flow through valve **426** from inlet **428**. The additional liquid then enters reservoir **44** via opening **430**. Liquid will continue to flow into reservoir **44** through opening **430** until the liquid reaches a predetermined level. Once this predetermined level is reached, float **422** interacts with connection **424** to shut off valve **426** thereby stopping the flow of liquid into the reservoir **44**.

[**0048**] It should be noted that in the present embodiment, spigot assembly **220** is positioned proximate the upper surface of the liquid within reservoir **44**. Conversely, valve **426** and inlet **428** are positioned proximate floor **42**. As explained above, generally warmer liquid is located at the top of reservoir **44** and cooler liquid is located near the bottom of reservoir **44**. Thus, in the present embodiment, spigot assembly **220** draws off warmer liquid from reservoir **44**. Moreover, cooler liquid from inlet **428** intermixes with the cooler liquid contained within reservoir **44**. The inclusion of additional cooler liquid in the lower portion of reservoir **44** causes relatively warmer liquid to flow upwards in reservoir **44**, based upon the difference in density of liquid at different temperatures. Accordingly, in the present embodiment of the invention, spigot assembly **220** is able to draw out the relatively warmer liquid from reservoir **44**.

[**0049**] It should be noted that the inventor also anticipates that one may include the float **230** and tube **232** combination

depicted in FIG. **5**B, with the spigot assembly **220** of the present embodiment. This combination of components allows for flexibility in height when positioning the spigot assembly within body **12**.

[**0050**] While this invention has been described as having an exemplary design, the present invention may be further modified within the spirit and scope of this disclosure. The application is, therefore, intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains.

What is claimed is:

1. A solar heater for heating a liquid including:

a first container having an upright wall;

a second container located within the first container and including an upright wall; and

a gap intermediate the wall of the first container and the wall of the second container;

wherein the gap extends around the second container and encompasses the upright wall of the second container.

2. The solar heater for heating a liquid as set forth in claim 1 wherein the second container further includes a floor connected to the wall of the second container.

3. The solar heater for heating a liquid as set forth in claim 2 wherein the wall of the second container includes an aperture and the floor of the second container includes an aperture.

4. The solar heater for heating a liquid as set forth in claim 1 wherein the first container includes a floor connected to the wall of the first container and an aperture positioned apart from the floor.

5. The solar heater for heating a liquid as set forth in claim 4 wherein an upright wall defines the aperture in the first container.

6. The solar heater for heating a liquid as set forth in claim 5 further including a cap for mating with the upright wall and sealing the aperture.

7. The solar heater for heating a liquid as set forth in claim 6 wherein the cap includes threads and the upright wall includes threads that mate with the threads of the cap.

8. The solar heater for heating a liquid as set forth in claim 3 wherein the second container includes a reservoir for holding the liquid, the reservoir connected to the gap by the aperture.

9. The solar heater for heating a liquid as set forth in claim 8 further including a valve capable of sealing the aperture in the wall of the second container in order to prevent flow of the liquid through the aperture.

10. The solar heater for heating a liquid as set forth in claim 9 further including an adhesive for attaching the valve to the wall of the second container.

11. The solar heater for heating a liquid as set forth in claim 1 further including a plurality of ribs intermediate the wall of the first container and the wall of the second container.

12. The solar heating for heating a liquid as set forth in claim 1 wherein the first container and the second container are each of a conical cross section.

13. A solar heater for heating a liquid including:

a reservoir for storing the liquid; and

a gap encompassing the reservoir and connected to the reservoir by an upper aperture and a lower aperture.

14. The solar heater for heating a liquid as set forth in claim 13 further including a first upright wall and a floor defining the reservoir, the upper aperture being disposed in the first upright wall and the lower aperture being disposed in the floor.

15. The solar heater for heating a liquid as set forth in claim 13 further including a valve capable of sealing the upper aperture in order to prevent the flow of liquid through the aperture.

16. The solar heater for heating a liquid as set forth in claim 13 further including a second upright wall positioned adjacent the gap and opposite the first upright wall.

17. The solar heater for heating a liquid as set forth in claim 13 further including a transparent cover encompassing the gap and the reservoir.

18. The solar heater for heating a liquid as set forth in claim 13 further including a threaded cap capable of sealing the reservoir.

19. The solar heater for heating a liquid as set forth in claim 13 further including a heat exchanger disposed within the reservoir.

20. The solar heater for heating a liquid as set forth in claim 13 further including reflectors configured to direct sunlight toward the gap.

21. The solar heater for heating a liquid as set forth in claim 20 further including a mat, the reflectors being arranged on the mat.

22. The solar heater for heating a liquid as set forth in claim 13 further including a spigot assembly interconnected with the reservoir, the spigot assembly configured to drain liquid from the reservoir.

23. The solar heater for heating a liquid as set forth in claim 22 wherein the spigot assembly includes a tube and a float.

24. The solar heater for heating a liquid as set forth in claim 23 wherein the spigot assembly further includes a second tube and a valve.

25. The solar heater for heating a liquid as set forth in claim 13 further including a valve assembly configured to allow the flow of liquid into the reservoir.

26. The solar heater for heating a liquid as set forth in claim 25 wherein the valve assembly includes a valve, a float, and a connector connecting the float to the valve, the float being capable of floating on the top of the liquid and causing additional liquid to flow into the reservoir when the liquid level reaches a predetermined level.

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