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(54) FLUID STORAGE CONTAINERS WITH BAFFLES

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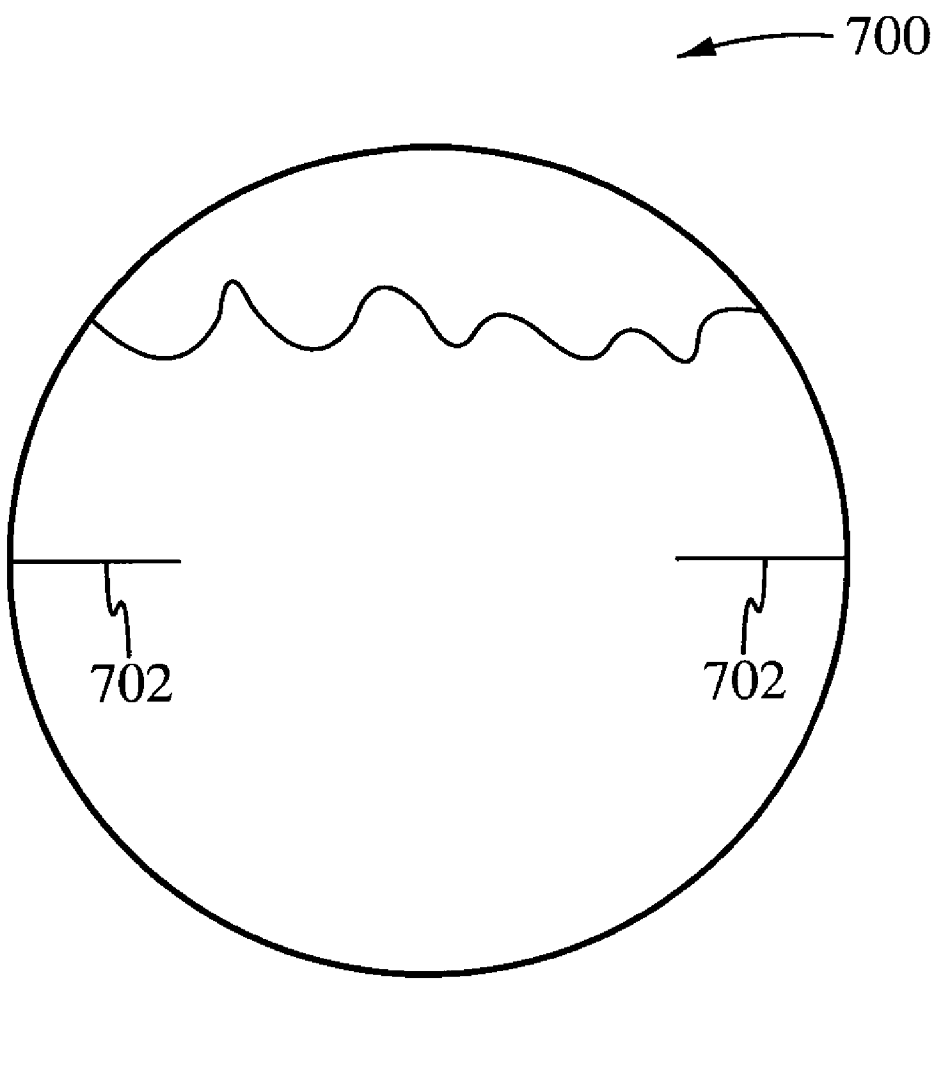
(57) ABSTRACT

A fluid storage container with a baffle controls the heat absorption percentage of the container. Fluid that is heated adjacent to the surface of a container rises replacing colder fluid which sinks downward, regardless of the baffle. This behavior is able to lead to onset of oscillations in the temperature and flow fields. Due to blockage effect of a thin baffle, multi-cell recirculating vortex structures are observed. The number and strength of these vortices depend on the position and length of the baffle. For certain placements and lengths of the baffle, the time rate of the rise of the bulk temperature is increased or decreased.



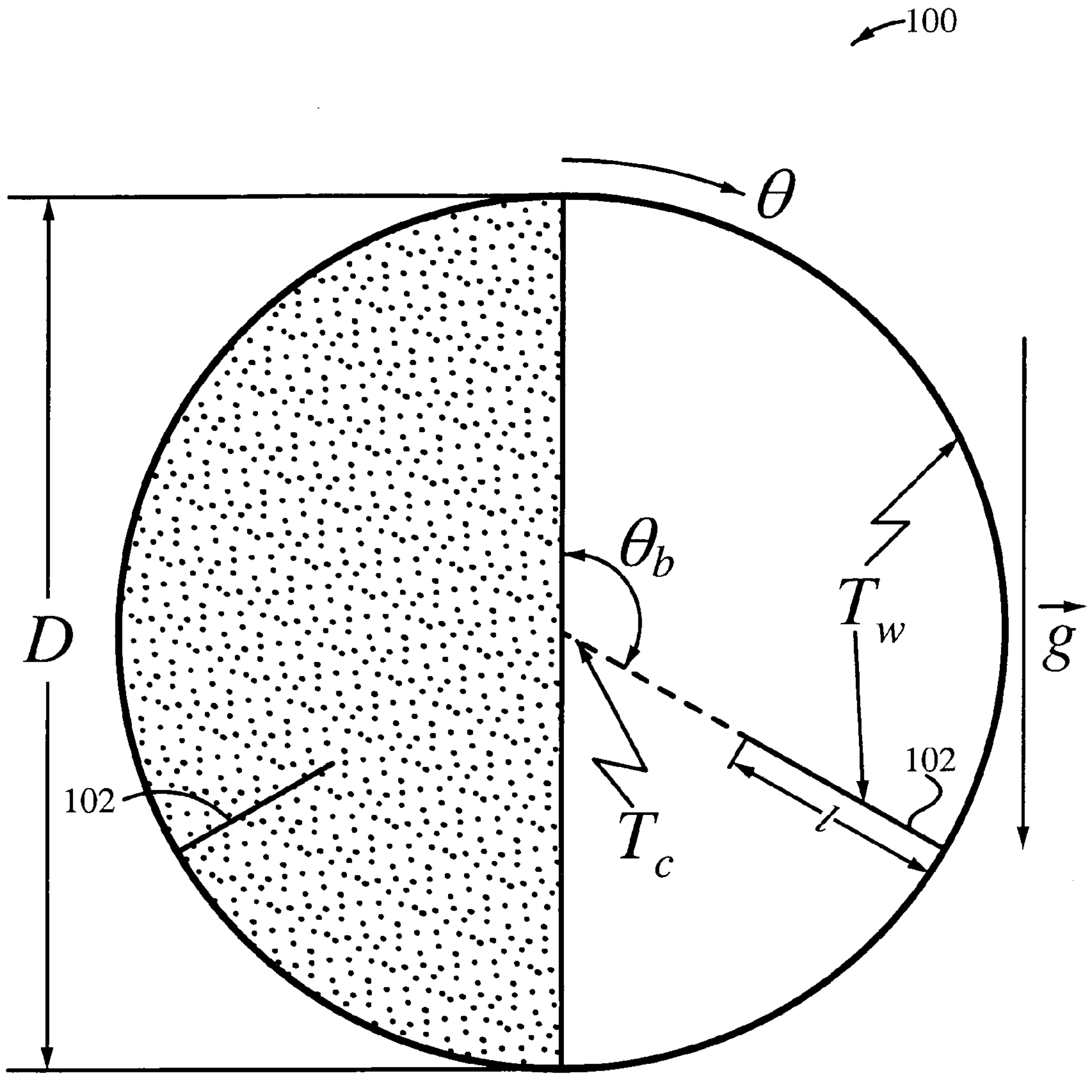



Fig. 1

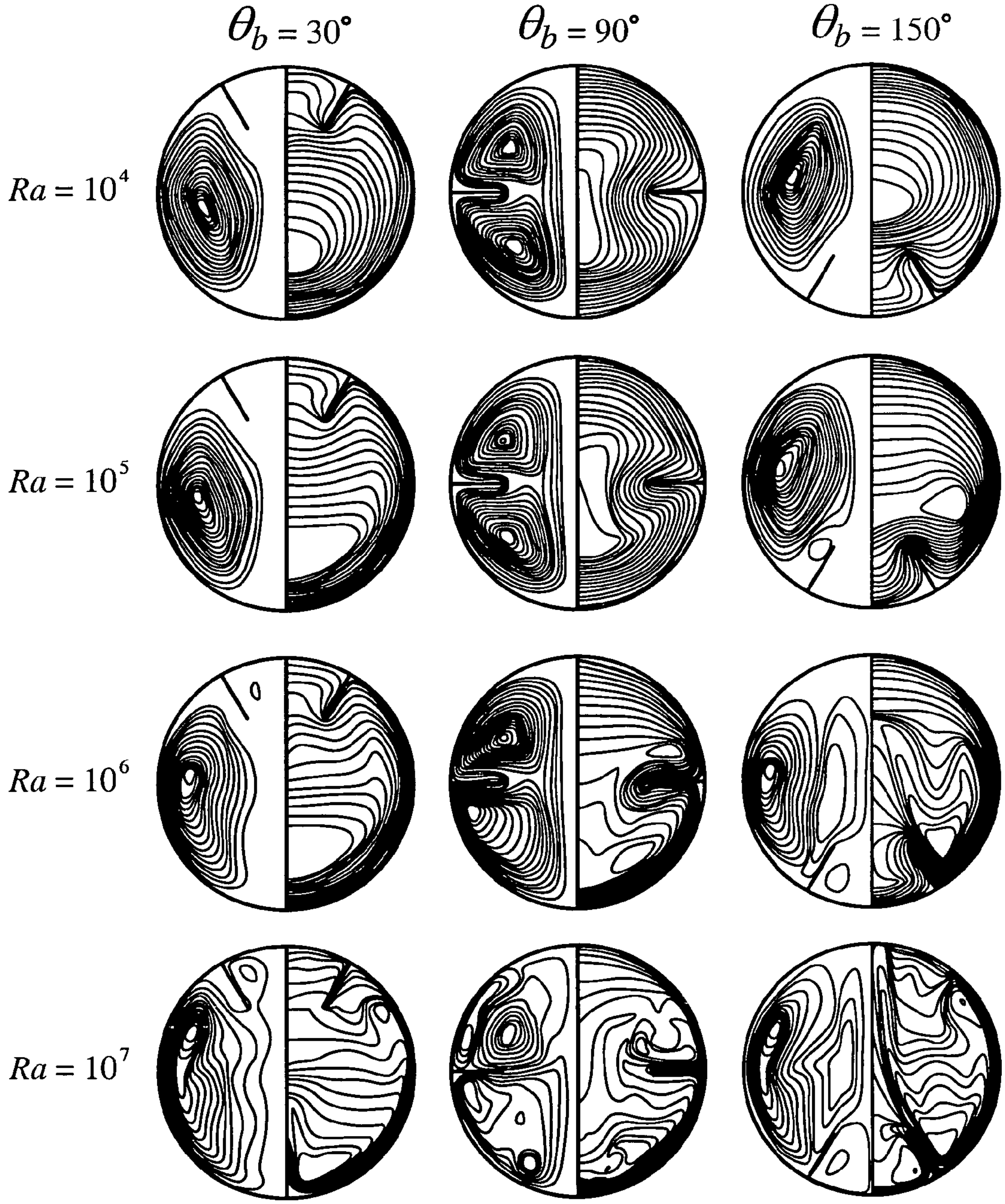



**Fig. 2**

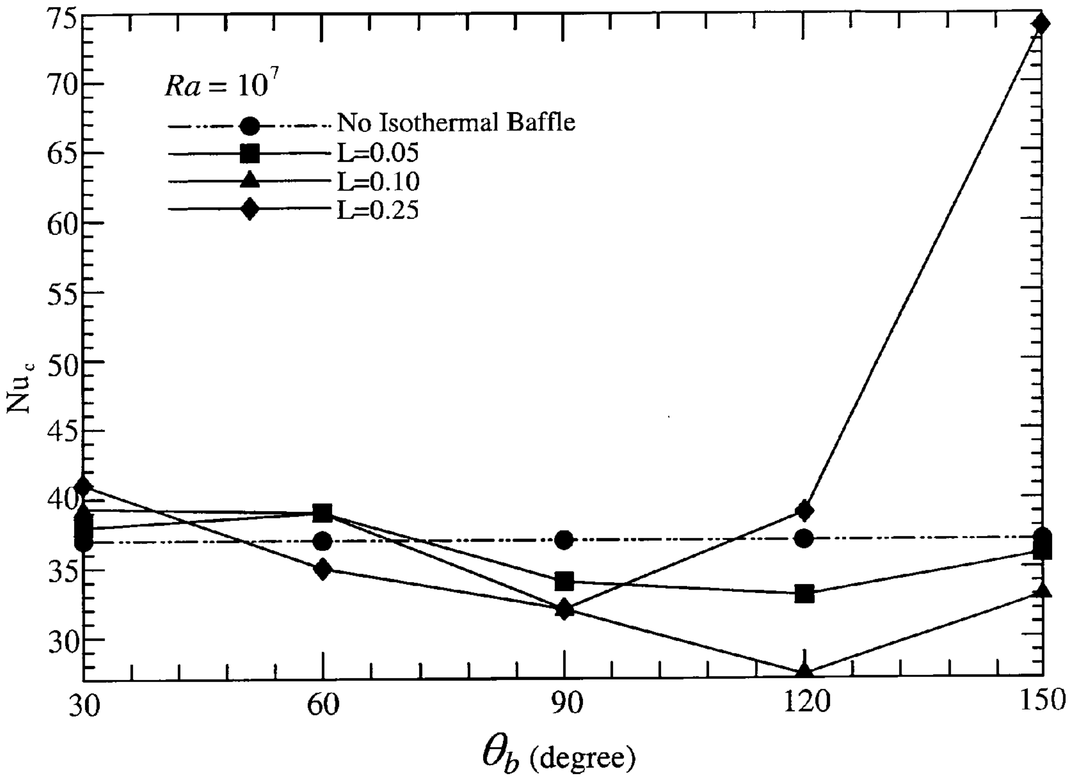

75
70
65
60
55
50
45
40
35
30
$Nu_c$
$Ra = 10^7$
No Isothermal Baffle
L=0.05
L=0.10
L=0.25
30
60
90
120
150
$\theta_b$ (degree)

**Fig. 3**

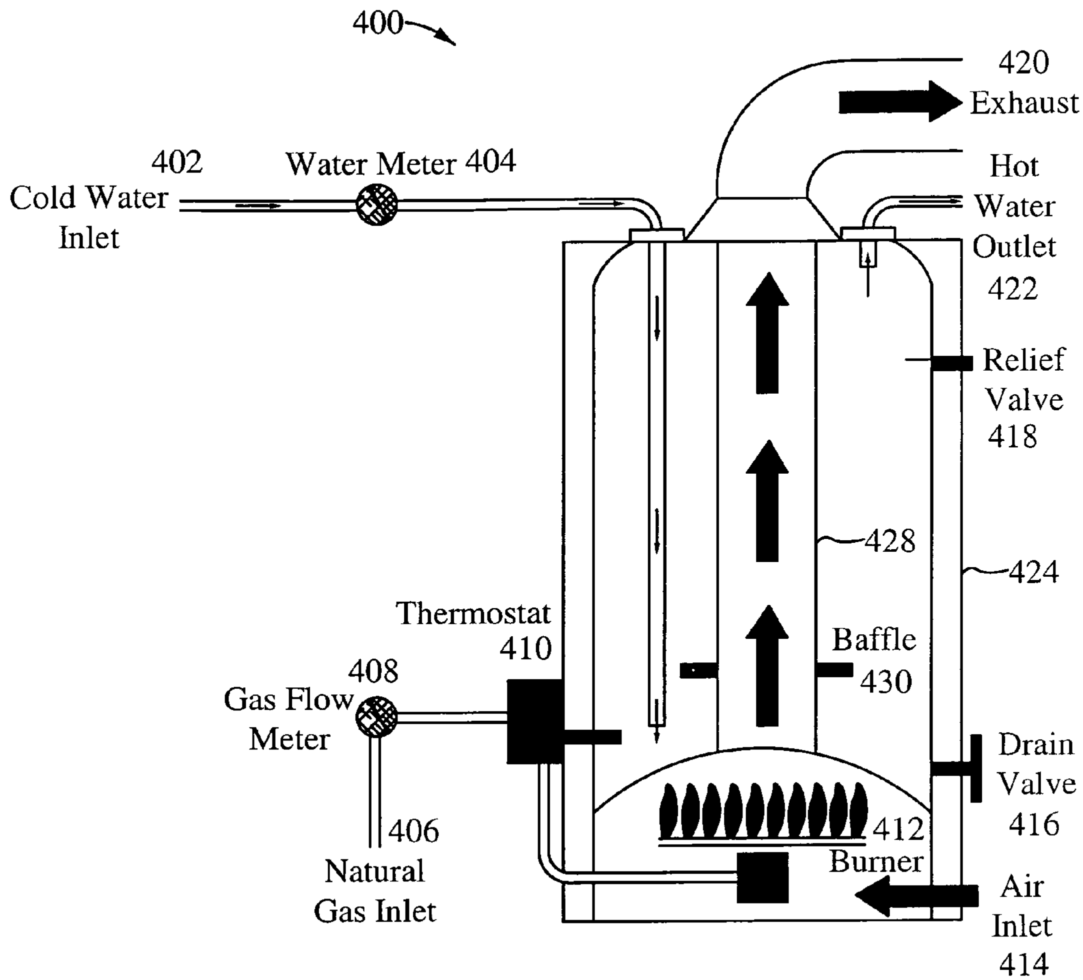

400
420
Exhaust
402
Cold Water
Inlet
Water Meter 404
Hot
Water
Outlet
422
Relief
Valve
418
428
424
Thermostat
410
Baffle
430
408
Gas Flow
Meter
Drain
Valve
416
406
Natural
Gas Inlet
412
Burner
Air
Inlet
414

**Fig. 4**

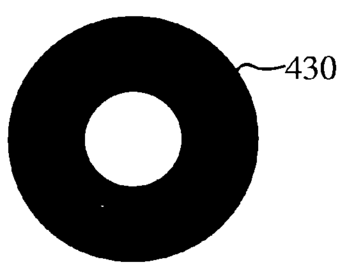

430

**Fig. 5**

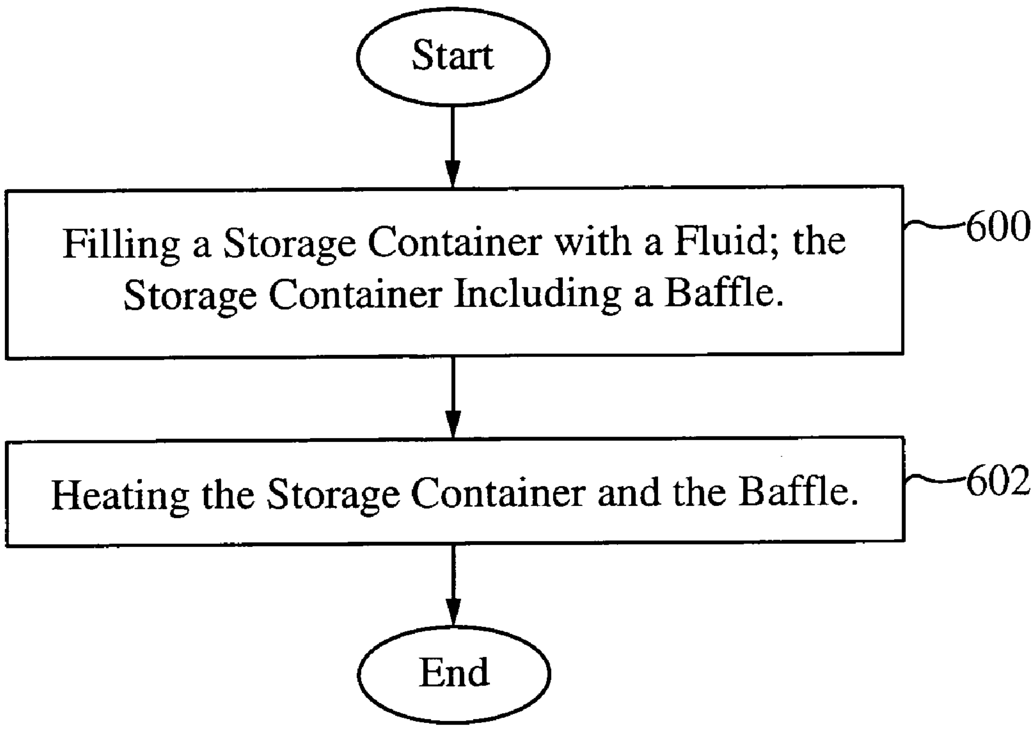

Start
Filling a Storage Container with a Fluid; the Storage Container Including a Baffle.
600
Heating the Storage Container and the Baffle.
602
End

Fig. 6

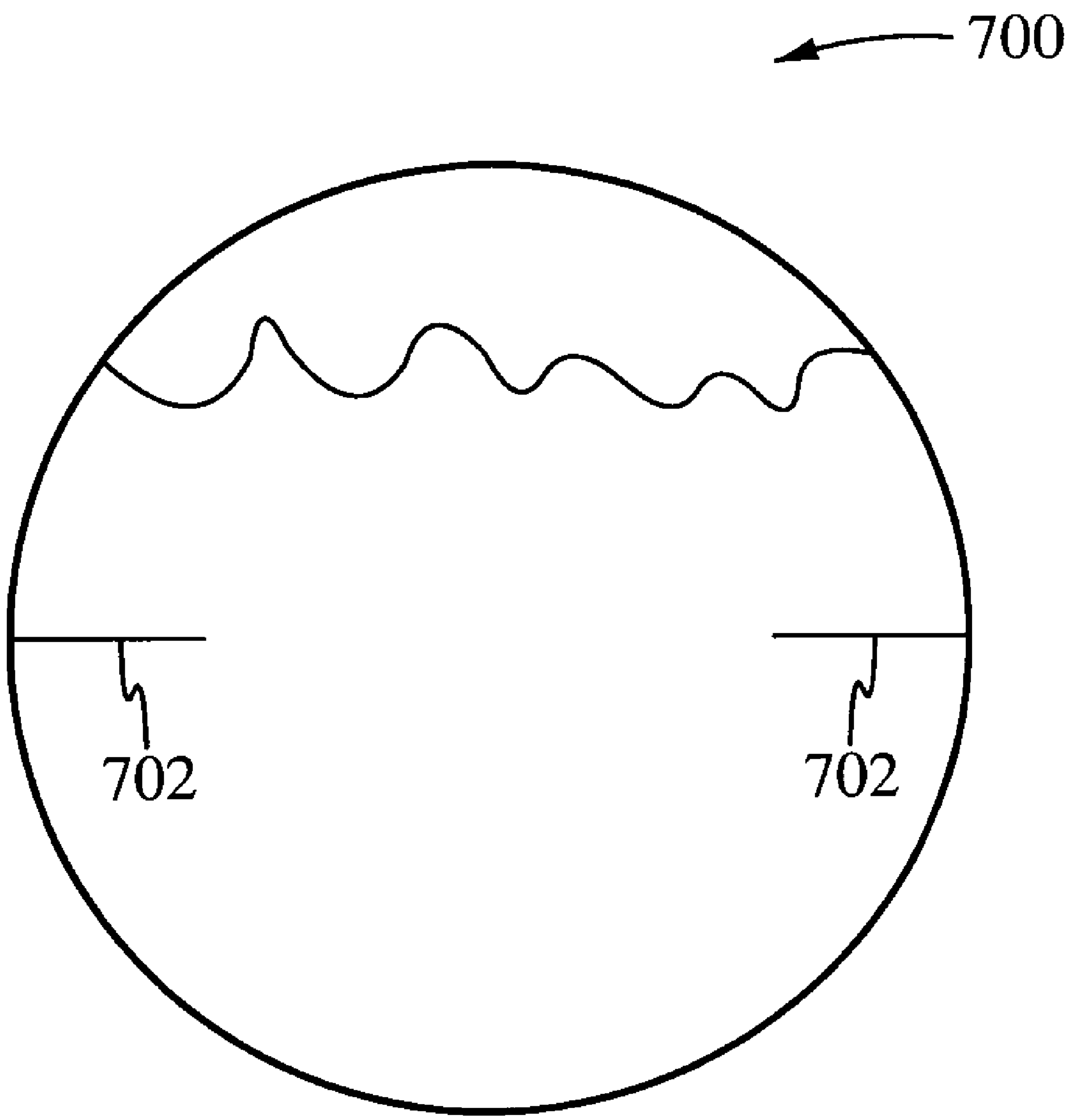



Fig. 7

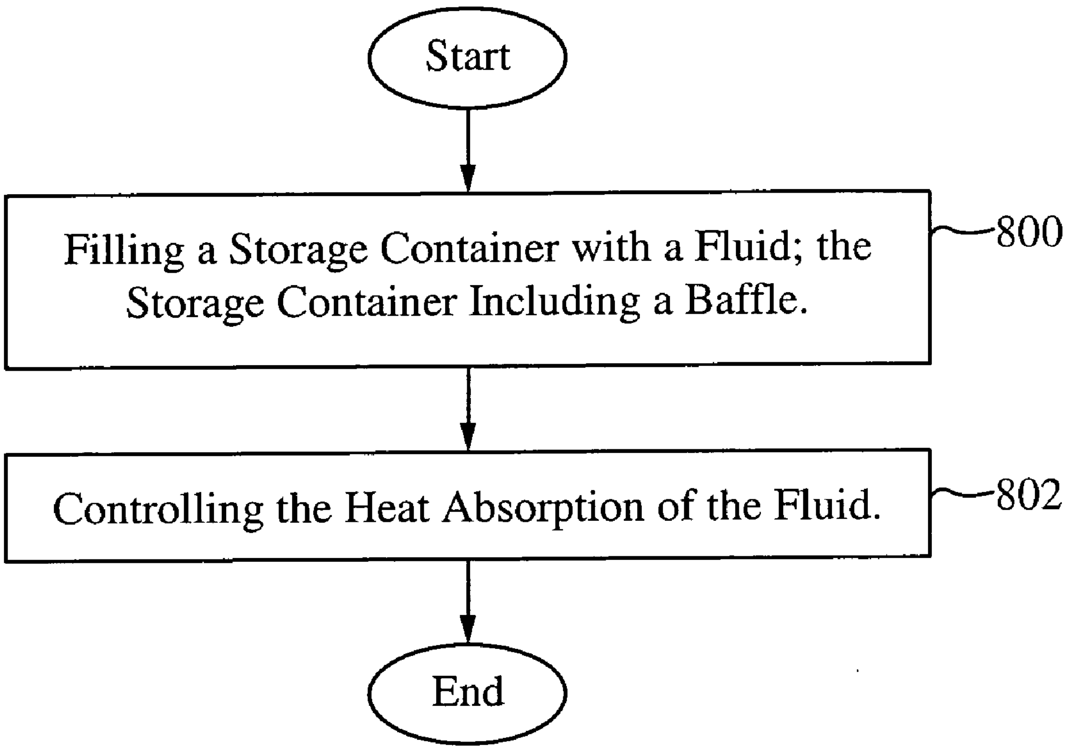

Start
Filling a Storage Container with a Fluid; the Storage Container Including a Baffle.
800
Controlling the Heat Absorption of the Fluid.
802
End

Fig. 8

# FLUID STORAGE CONTAINERS WITH BAFFLES

## CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application Ser. No. 60/934,635, filed Jun. 15, 2007 and entitled FLUID STORAGE CONTAINERS WITH BAFFLES; which is hereby incorporated herein by reference in its entirety for all purposes.

## FIELD OF THE INVENTION

[0002] The present invention relates to the field of fluid containers. More specifically, the present invention relates to the field of fluid containers containing a baffle for controlling heat absorption.

## BACKGROUND OF THE INVENTION

[0003] The demand for energy in general, and natural gas in particular, has been steadily rising over the past decades. Furthermore, the price of energy, has been rapidly increasing over the past few years. With these trends in mind, products which utilize less energy are always welcomed by consumers.

[0004] Natural gas-fired water heaters are simple units that store part of the energy released by burning of the fuel inside an insulated tank that is filled with water. A superior water heater is able to absorb a greater percentage of the thermal energy liberated by the burning of natural gas, and at the same time, exhibit low heat losses to the environment. Lowering heat losses through insulating the storage tank is widely practiced and promoted. Attempts to increase the heat absorption by the storage tank have been pursued through introducing helical swirl tapes to promote convective and radiative modes of heat exchange. Ways of improving heat absorption and preventing heat loss are continuously sought after objectives.

## SUMMARY OF THE INVENTION

[0005] A fluid storage container with a baffle controls the heat absorption percentage of the container. Fluid that is heated adjacent to the surface of a container rises replacing colder fluid which sinks downward, regardless of the baffle. This behavior is able to lead to onset of oscillations in the temperature and flow fields. Due to blockage effect of a thin baffle, multi-cell recirculating vortex structures are observed. The number and strength of these vortices depend on the position and length of the baffle. For certain placements and lengths of the baffle, the time rate of the rise of the bulk temperature is increased or decreased.

[0006] In one aspect, a system comprises a container for storing a fluid and a baffle within the container, the baffle configured for controlling heat absorption in the fluid. Controlling heat absorption in the fluid includes increasing heat absorption in the fluid. Alternatively, controlling heat absorption in the fluid includes decreasing heat absorption in the fluid. The container comprises one of a cylindrical and a spherical shape. The container and the baffle comprise a conductive material. The container and the baffle comprise steel. The baffle comprises one of a ring shape and an extension of a wall of the container. In some embodiments, the baffle comprises a length of approximately 0.25 of the diameter of the container. In some embodiments, the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°. The baffle is positioned proximate to the bottom of the container. The baffle is movable. The baffle is foldable, thus allowing the appropriate degree of control of heat transfer that may depend on the liquid level maintained in the container.

[0007] In another aspect, a method of providing heated water comprises filling a storage container with water, the storage container including an internal baffle and heating the storage container and the baffle to heat the water. The container comprises one of a cylindrical and a spherical shape. The container and the baffle comprise a conductive material. The container and the baffle comprise steel. The baffle comprises one of a ring shape and an extension of a wall of the container. In some embodiments, the baffle comprises a length of approximately 0.25 of the diameter of the container. In some embodiments, the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°. The baffle is positioned proximate to the bottom of the container.

[0008] In another aspect, an apparatus comprises a cylindrical storage container for storing a fluid and a ring-shaped baffle coupled within the container, the baffle configured for increasing heat absorption in the fluid, wherein the container and the baffle comprise a conductive material. In some embodiments, the baffle comprises a length of approximately 0.25 of the diameter of the container. The conductive material comprises steel. In some embodiments, the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°. The baffle is positioned proximate to the bottom of the container.

[0009] In another aspect, a water heater comprises a container for storing a fluid, a heating element positioned below the container for heating the fluid within the container and a baffle within the container, the baffle configured for increasing heat absorption in the fluid. The water heater further comprises a cold water inlet and a hot water outlet coupled to the container, the cold water inlet for receiving cold water into the container and the hot water outlet for releasing hot water from the container. The container and the baffle comprise a conductive material. The container and the baffle comprise steel. The baffle comprises one of a ring shape and an extension of a wall of the container. In some embodiments, the baffle comprises a length of approximately 0.25 of the diameter of the container. In some embodiments, the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°. The baffle is positioned proximate to the bottom of the container.

[0010] In another aspect, a method of controlling heat absorption in a fluid comprises inputting fluid into a storage container, the storage container including an internal baffle and controlling heat absorption of the fluid with the baffle. The container comprises one of a cylindrical and a spherical shape. The container and the baffle comprise a conductive material. The container and the baffle comprise steel. The baffle comprises one of a ring shape and an extension of a wall of the container. In some embodiments, the baffle comprises a length of approximately 0.25 of the diameter of the container. In some embodiments, the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°. The baffle is positioned proximate to the bottom of the container.

[0011] In another aspect, a system for storing and transporting liquid natural gas comprises a container for storing the liquid natural gas and a baffle within the container, the baffle configured for reducing heat absorption in the liquid natural gas. In some embodiments, the container comprises one of a spherical shape, a polygonal cross section shape, a membrane design and a Moss™ design. The container and the baffle comprise a conductive material. The container and the baffle comprise steel. The baffle comprises an extension of a wall of the container. In some embodiments, the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0012]** FIG. **1** illustrates a schematic drawing of a baffle placed on the inner wall of a spherical container.

**[0013]** FIG. **2** illustrates pseudosteady-state streamline patterns and temperature contours with an isothermal baffle placed at various locations for varying Rayleigh (Ra) numbers.

**[0014]** FIG. **3** illustrates a graph of the dependence of the Nusselt number on the location of the baffle, $\theta_b$.

**[0015]** FIG. **4** illustrates a cross section view of a water heater with a baffle of an embodiment in accordance with the present invention.

**[0016]** FIG. **5** illustrates a top view of the baffle of an embodiment in accordance with the present invention.

**[0017]** FIG. **6** illustrates a flowchart of a method of utilizing a storage container with a baffle to efficiently provide heated water of an embodiment in accordance with the present invention.

**[0018]** FIG. **7** illustrates a spherical liquid natural gas container for storing and transporting liquid natural gas.

**[0019]** FIG. **8** illustrates a flowchart of a method of utilizing a storage container with a baffle to efficiently control the heat absorption of a fluid of an embodiment in accordance with the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

**[0020]** A storage tank with a baffle is able to control heat absorption into a fluid. For example, heat absorption is able to be increased so that less energy is required to heat water, or heat absorption is lessened so that a cooled fluid such as liquid natural gas is able to remain at the appropriate temperature for a longer period of time. The flow of the fluid is modified such as generating vortices by the baffle so that heat is more or less efficiently transferred into the fluid.

**[0021]** FIG. **1** illustrates a schematic drawing of a thin baffle **102** placed on the inner wall of a spherical container **100** with a diameter D. In some embodiments, the baffle **102** is an extended surface of the wall of the container **100**. The baffle **102** and the wall of the spherical container **100** have high thermal conductivity. In effect, the temperature of the baffle **102** is the same as that of the wall of the spherical container **100**, thus termed isothermal. The baffle **102** with a length l makes a right angle with the inner surface of the spherical container **100** and is positioned at polar angle $\theta_b$. In some embodiments, the baffle **102** is part of a cone with its apex coinciding with the center of the spherical container **100**. The flow and thermal fields are dictated by the Rayleigh (Ra) number, Prandtl (Pr) number, length of the baffle and its polar angle position. It has been found that the Pr number has little effect on the results. The Ra number, dimensionless length of the baffle (L=l/D) and polar angle position, $\theta_b$, have been varied to determine the best results.

**[0022]** FIG. **2** illustrates pseudosteady-state streamline patterns and temperature contours with an isothermal baffle (L=0.25) placed at various locations for varying Rayleigh (Ra) numbers. The Ra number variations include: $10^4$, $10^5$, $10^6$ and $10^7$, and the baffle's position variations include: $\theta_b$=30°, 90° and 150°. With the baffle positioned near the top at $\theta_b$=30° (left column), the increase of the Ra number brings about stronger convection and fluid flow within the clockwise rotating vortex as indicated by the denser packing of the streamlines next to the surface. This is accompanied by lifting of the eye of the vortex and its migration outward. For the highest Ra number used, two vortices occupy the top hemisphere. For this case, the top hemisphere is partially stratified with stable constant-temperature layers occupying it, whereas the thermal field within the bottom hemisphere is heavily affected by the stronger rotating vortex that occupies it. The flow fields for the cases with the longest baffle positioned near the bottom at $\theta_b$=150° (right column) exhibit many of the features with the baffle located at $\theta_b$=30°, but in reverse in addition to the appearance of another counter clockwise rotating vortex for a wide range of Ra numbers. It should be understood that the angle of the baffle can be any appropriate angle and is not limited to any specific angle described herein for illustrative purposes. The appearance of this counter clockwise rotating vortex is directly linked to the isothermal surface of the baffle and the resultant extra heat released into the fluid from this surface. A recirculating vortex that occupies the small space between the baffle and the symmetry line of the sphere is generally confined to the lower hemisphere for all the Ra numbers and more dramatically in the vicinity of the symmetry axis for the higher Ra numbers. Extremely pronounced modifications of the temperature fields are observed for the high Ra number cases showing that the stratifications are generally eliminated, and the extra heat added to the sphere is transported inside by a counter clockwise rotating vortex that is positioned next to the top surface of the baffle.

**[0023]** The overall effects of the complex flow and thermal fields shown in FIG. **2** on the heat absorption ability of the system described provide evidence that the baffle within the storage container significantly affects the efficiency of heat absorption. The heat absorption rate is measured by the Nusselt number and its dependence on the position of the baffle ($\theta_b$) with a thin isothermal baffle of different lengths (L=0.05, 0.10 and 0.25) for Ra=$10^7$ is presented in FIG. **3**. The reference case (the dashed line) is that of a sphere without a baffle. The short baffles tended to degrade the heat absorption by the fluid in the sphere. The 0.25 baffle when placed near the bottom of the sphere increased the amount of heat absorbed by the fluid by 103 percent. It should be understood that the length of the baffle can be any appropriate length and is not limited to any specific length described herein for illustrative purposes.

**[0024]** FIG. **4** illustrates a cross section view of a water heater **400** with a baffle **430** of an embodiment in accordance with the present invention. For the most part, the water heater **400** is a standard water heater with the addition of the baffle **430**. In some embodiments, the water heater **400** is cylindrically shaped and in some embodiments, the water heater **400** is spherically shaped. The water heater includes a cold water inlet **402** where cold water is received. In some embodiments, a water meter **404** is used to measure the water received. The water goes to a storage tank **424** of the water heater **400** to be heated. To heat the cold water, a burner **412** is included in the water heater **400**. The burner **412** is positioned below where the water is stored so that the burner **412** heats the water from beneath. Hot air from the burner **412** travels up a heating pipe **428** which also heats the water. The burner **412** receives gas through a natural gas inlet **406**. In some embodiments, a gas flow meter **408** monitors the flow of the gas into the burner **412**. An air inlet **414** is included in the water heater **400** to provide the burner oxygen to properly burn the gas. In some embodiments, a drain valve **416** is included in case the water heater **400** needs to be drained. In some embodiments, a relief valve **418** is also included in the water heater **400**. A thermostat **410** measures the water temperature, and in conjunction with the gas inlet **406** provides the burner **412** with the appropriate amount of gas to achieve the desired temperature. The water heater **400** also includes an exhaust pipe **420** coupled to the heating pipe **428** for allowing the exhaust of the burner **412** to escape. A hot water outlet **422** is where the hot water exits the water heater **400** (e.g. to sinks, showers and bathtubs through pipes in a person's house).

**[0025]** The baffle **430** is coupled inside the storage tank **424** of the water heater **400**, and in some embodiments, to the heating pipe **428** to help conduct heat to the water in the storage tank **424**. In some embodiments, the baffle **430** is circular, a thin piece of material or another shape. In some embodiments, more than one baffle is contained within the storage container. The baffle **430** comprises a conductive material such as steel. In some embodiments, the thickness of the baffle **430** is as thin as possible while still maintaining structural soundness. In some embodiments, the baffle is positioned at an angle such as 30°, 60°, 90°, 120° or 150°. The location of the baffle is able to be located near the bottom of the container, near the middle of the container or near the top of the container.

**[0026]** FIG. **5** illustrates a top view of the baffle **430** of an embodiment in accordance with the present invention. As described above, the baffle **430** is ring-shaped in some embodiments. In some embodiments, the ring-shaped baffle **430** is configured to fit around the heating pipe **428** (FIG. **4**). Thus, the inner diameter of the baffle **430** is sized accordingly. The outer diameter is sized such that the length between the inner diameter and the outer diameter maximizes the heat absorption of the water.

**[0027]** FIG. **6** illustrates a flowchart of a method of utilizing a storage container with a baffle to efficiently provide heated water of an embodiment in accordance with the present invention. In the step **600**, the storage container with the baffle is at least partially filled with a fluid such as water to be heated. In the step **602**, the storage container and baffle are heated. In some embodiments, heating occurs by burning gas at the bottom of the storage container where the flames of the burning gas directly contact the storage container. The heat is conducted through the storage container and into the water as well as the baffle. Additionally, hot air travels up a heated air pipe which is in contact with the baffle further heating the baffle which provides additional heat to the water. Furthermore, the baffle provides the fluid flow described above which further enhances heat absorption by the water.

**[0028]** In addition to a baffle within a water heater to improve heat absorption, there are many other applications for a container with a baffle. In general, a baffle is able to assist in controlling heat absorption. Instead of a baffle being used for heating a fluid more quickly, the baffle is also able to be used to prevent a fluid from heating quickly. Baffles within containers are able to be used in any industry, including, but not limited to, water heaters, and storage and transportation of liquid natural gas and liquid hydrogen.

**[0029]** FIG. **7** illustrates a spherical liquid natural gas container **700** for storing and transporting liquid natural gas. The container **700** includes one or more baffles which control the heat absorption of the liquid natural gas. Specifically, the baffles are configured to lessen or minimize the heat absorption by the liquid natural gas to prevent boiloff, thus allowing more of the liquid natural gas to remain. The spherical shape illustrated in FIG. **7** is for illustrative purposes. In some embodiments, the container **700** is able to be a polygonal cross section shape, a membrane design or a Moss™ design.

**[0030]** FIG. **8** illustrates a flowchart of a method of utilizing a storage container with a baffle to efficiently control the heat absorption of a fluid. In the step **800**, the storage container with the baffle is at least partially filled with a fluid. In the step **802**, the baffle controls the heat absorption of the fluid. In some embodiments, if the fluid is heated, the baffle increases the heat absorption as described above. In some embodiments, if it is desired that the fluid temperature not rise quickly, the baffle will decrease the heat absorption of the fluid.

**[0031]** Furthermore, the shape, size, angle, orientation, material and any other feature of the baffle is not limited to those described above. As long as the desired effect is achieved, the baffle is able to be configured in any manner. For example, instead of a steel baffle, the baffle is able to comprise a low conducting material, such as a hard plastic which has similar qualities as steel. Moreover, the qualities of the container are not limited to those described above. For example, the shape of the container is able to be cylindrical, spherical, polygonal cross section or any other shape.

**[0032]** In some embodiments, the baffle is movable and/or configurable. For example, the baffle is able to be made of a material with a specific buoyancy so that the baffle rises and falls as desired. In another example, the baffle is foldable so that the length of the baffle is variable, thus allowing the appropriate degree of control of heat transfer that may depend on the liquid level maintained in the container. Other implementations such as a motor-driven baffle are able to be implemented so that the baffle is configurable. These implementations are able to be used to change the position, length, angle, orientation or any other quality of the baffle.

**[0033]** For clarity, the baffle within the container is able to be implemented regardless of the quantity of fluid in the container. For example, although water heaters are filled entirely or almost entirely with water; liquid natural gas containers usually are 75% filled. The baffle within either container still controls the heat absorption as desired.

**[0034]** To utilize a storage container such as a water heater with a baffle, a user need not perform different actions compared with a storage container without a baffle. For example, if a user has a water heater with a baffle within his house, when the user turns on hot water for washing dishes or taking a shower, the user simply turns the hot water handle/lever and hot water comes out of the faucet. These actions are no different than if the hot water heater did not have a baffle.

**[0035]** In operation, a storage container with a baffle is able to control heat absorption such as to heat water more quickly and efficiently, thus saving time and energy. The baffle transfers additional heat to the water as well as allows the proper flow of the fluid to increase heat absorption into the water. If a user chooses to take a long shower, the hot water heater with baffle is able to heat the water quickly enough to provide hot water for a longer period of time. Additionally, since the water is heated more efficiently, less energy such as gas is used, thus decreasing wasted energy and saving the user money. For other applications such as liquid natural gas storage and transport, the baffle reduces boiloff by reducing heat absorption of the liquid natural gas. Depending on the application, the baffle within the container is able to control heat absorption as desired.

[0036] The present invention has been described in terms of specific embodiments incorporating details to facilitate the understanding of principles of construction and operation of the invention. Such reference herein to specific embodiments and details thereof is not intended to limit the scope of the claims appended hereto. It will be readily apparent to one skilled in the art that other various modifications may be made in the embodiment chosen for illustration without departing from the spirit and scope of the invention as defined by the claims. Specifically, it should be understood that the angle of the baffle can be any appropriate angle and is not limited to any specific angle described herein for illustrative purposes. Further, it should also be understood that the length of the baffle can be any appropriate length and is not limited to any specific length described herein for illustrative purposes.

What is claimed is:

**1**. A system comprising:

a. a container for storing a fluid; and

b. a baffle within the container, the baffle configured for controlling heat absorption in the fluid.

**2**. The system of claim **1** wherein controlling heat absorption in the fluid includes increasing heat absorption in the fluid.

**3**. The system of claim **1** wherein controlling heat absorption in the fluid includes decreasing heat absorption in the fluid.

**4**. The system of claim **1** wherein the container comprises one of a cylindrical and a spherical shape.

**5**. The system of claim **1** wherein the container and the baffle comprise a conductive material.

**6**. The system of claim **5** wherein the container and the baffle comprise steel.

**7**. The system of claim **1** wherein the baffle comprises one of a ring shape and an extension of a wall of the container.

**8**. The system of claim **1** wherein the baffle comprises a length of approximately 0.25 of the diameter of the container.

**9**. The system of claim **1** wherein the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°.

**10**. The system of claim **1** wherein the baffle is positioned proximate to the bottom of the container.

**11**. The system of claim **1** wherein the baffle is movable.

**12**. The system of claim **1** wherein the baffle is foldable.

**13**. A method of providing heated water comprising:

a. filling a storage container with water, the storage container including an internal baffle; and

b. heating the storage container and the baffle to heat the water.

**14**. The method of claim **13** wherein the container comprises one of a cylindrical and a spherical shape.

**15**. The method of claim **13** wherein the container and the baffle comprise a conductive material.

**16**. The method of claim **15** wherein the container and the baffle comprise steel.

**17**. The method of claim **13** wherein the baffle comprises one of a ring shape and an extension of a wall of the container.

**18**. The method of claim **13** wherein the baffle comprises a length of approximately 0.25 of the diameter of the container.

**19**. The method of claim **13** wherein the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°.

**20**. The method of claim **13** wherein the baffle is positioned proximate to the bottom of the container.

**21**. An apparatus comprising:

a. a cylindrical storage container for storing a fluid; and

b. a ring-shaped baffle within the container, the baffle configured for increasing heat absorption in the fluid, wherein the container and the baffle comprise a conductive material.

**22**. The apparatus of claim **21** wherein the baffle comprises a length of approximately 0.25 of the diameter of the container.

**23**. The apparatus of claim **21** wherein the conductive material comprises steel.

**24**. The apparatus of claim **21** wherein the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°.

**25**. The apparatus of claim **21** wherein the baffle is positioned proximate to the bottom of the container.

**26**. A water heater comprising:

a. a container for storing a fluid;

b. a heating element positioned below the container for heating the fluid within the container; and

c. a baffle within the container, the baffle configured for increasing heat absorption in the fluid.

**27**. The water heater of claim **26** further comprising a cold water inlet and a hot water outlet coupled to the container, the cold water inlet for receiving cold water into the container and the hot water outlet for releasing hot water from the container.

**28**. The water heater of claim **26** wherein the container and the baffle comprise a conductive material.

**29**. The water heater of claim **28** wherein the container and the baffle comprise steel.

**30**. The water heater of claim **26** wherein the baffle comprises one of a ring shape and an extension of a wall of the container.

**31**. The water heater of claim **26** wherein the baffle comprises a length of approximately 0.25 of the diameter of the container.

**32**. The water heater of claim **26** wherein the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°.

**33**. The water heater of claim **26** wherein the baffle is positioned proximate to the bottom of the container.

**34**. A method of controlling heat absorption in a fluid comprising:

a. inputting fluid into a storage container, the storage container including an internal baffle; and

b. controlling heat absorption of the fluid with the baffle.

**35**. The method of claim **34** wherein the container comprises one of a cylindrical and a spherical shape.

**36**. The method of claim **34** wherein the container and the baffle comprise a conductive material.

**37**. The method of claim **36** wherein the container and the baffle comprise steel.

**38**. The method of claim **34** wherein the baffle comprises one of a ring shape and an extension of a wall of the container.

**39**. The method of claim **34** wherein the baffle comprises a length of approximately 0.25 of the diameter of the container.

**40**. The method of claim **34** wherein the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°.

**41**. The method of claim **34** wherein the baffle is positioned proximate to the bottom of the container.

**42**. A system for storing and transporting liquid natural gas comprising:

a. a container for storing the liquid natural gas; and

b. a baffle within the container, the baffle configured for reducing heat absorption in the liquid natural gas.

**43**. The system of claim **42** wherein the container comprises one of a spherical shape, a polygonal cross section shape, a membrane design and a Moss™ design.

**44**. The system of claim **42** wherein the container and the baffle comprise a conductive material.

**45**. The system of claim **44** wherein the container and the baffle comprise steel.

**46**. The system of claim **42** wherein the baffle comprises an extension of a wall of the container.

**47**. The system of claim **42** wherein the baffle is positioned with one of an angle of 30°, 60°, 90°, 120° and 150°.

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