US 20050066433A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2005/0066433 A1

Phillips (43) Pub. Date: Mar. 31, 2005

(54) SYSTEM AND METHOD OF HEATING SWIMMING POOLS AND SPAS WITH STEAM

(76) Inventor: **Keith A. Phillips**, Scottsdale, AZ (US)

Correspondence Address:
QUARLES & BRADY LLP
RENAISSANCE ONE
TWO NORTH CENTRAL AVENUE
PHOENIX, AZ 85004-2391 (US)

(21) Appl. No.: 10/671,843

(22) Filed: Sep. 25, 2003

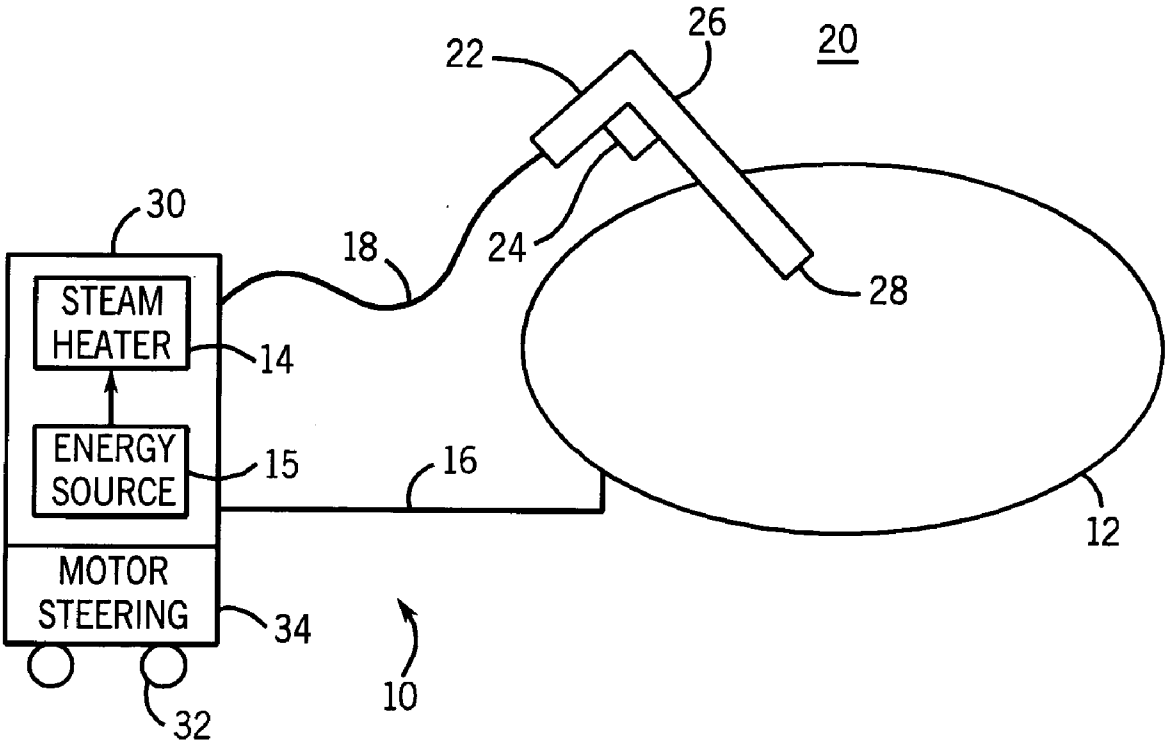
Publication Classification

(51) Int. Cl.[7] E04H 4/00

(52) U.S. Cl. 4/493

(57) ABSTRACT

A dual water heating system uses a pump for pumping water from a swimming pool or spa. A filter is coupled to an output of the pump for filtering the water. A water heater heats the water and returns heated water to the swimming pool or spa. A network of non-corrosive piping is disposed within the swimming pool support structure. A plurality of steam ports are coupled to exit points of the network of piping. A steam generator provides steam to the network of piping for transporting the steam to the steam ports and injecting the steam into the swimming pool or spa. An energy source supplies energy to the steam heater. A motorized or hand-push cart is used to transport the steam heater and energy source. The steam ports are provided along sidewalls or bottom surface of the swimming pool and spa support structure.



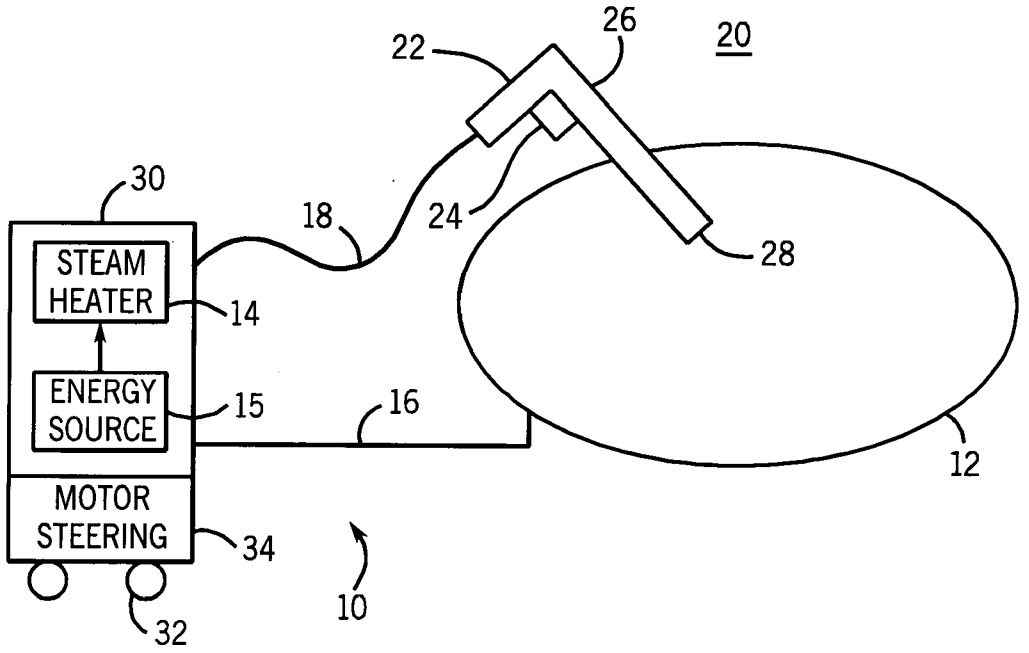

22
26
20
30
18
24
28
STEAM HEATER
14
ENERGY SOURCE
15
16
12
MOTOR STEERING
34
10
32

FIG. 1

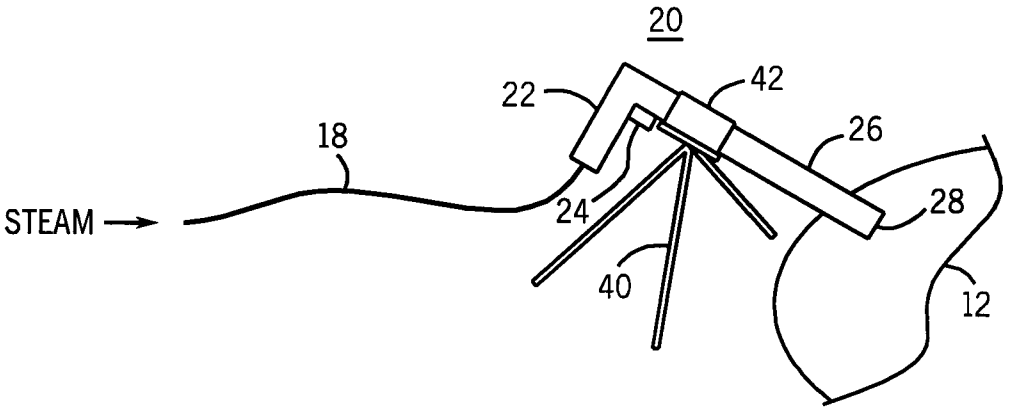

20
22
42
18
26
STEAM
24
28
40
12

FIG. 2

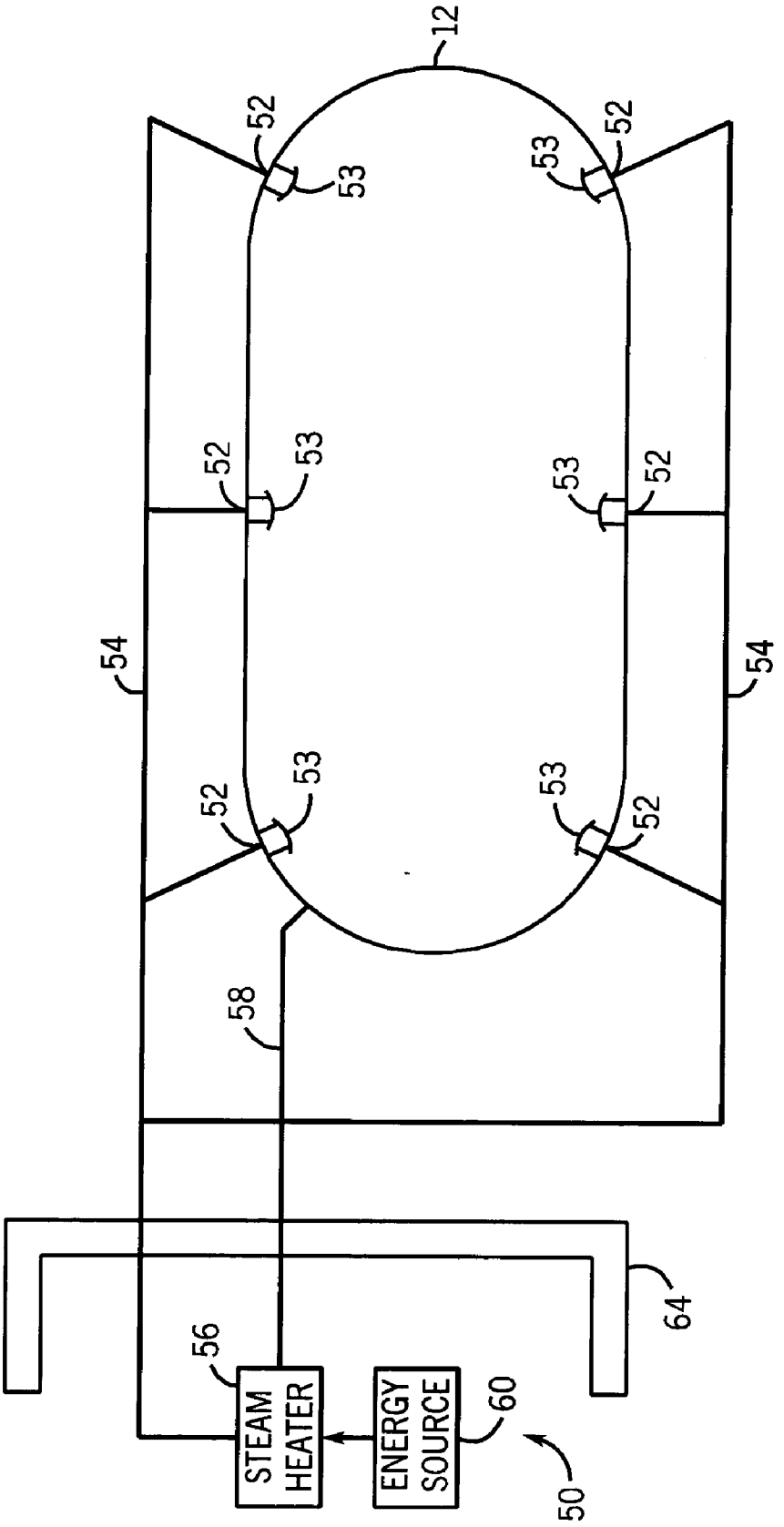


FIG. 3

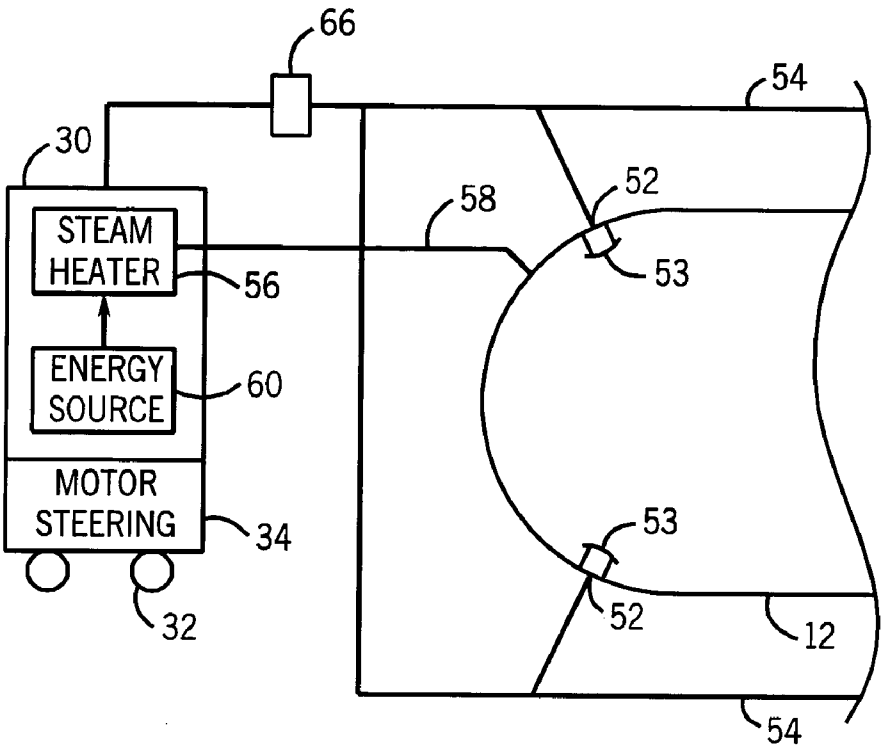

66
54
30
58
52
STEAM HEATER
56
53
ENERGY SOURCE
60
MOTOR STEERING
34
53
32
52
12
54

FIG. 4

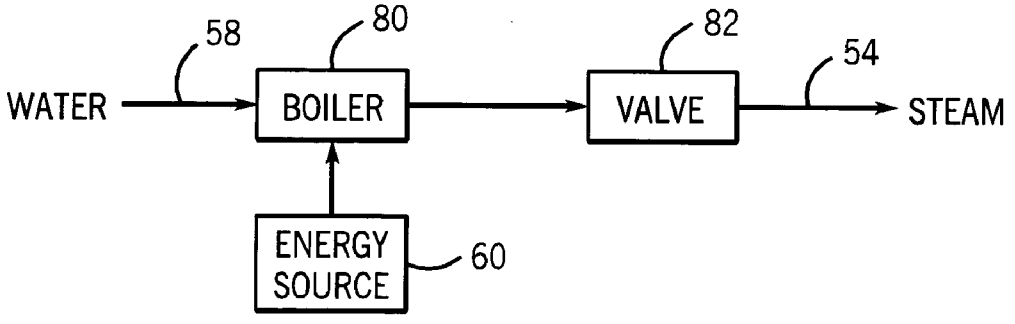

58
80
82
54
WATER
BOILER
VALVE
STEAM
ENERGY SOURCE
60

FIG. 6

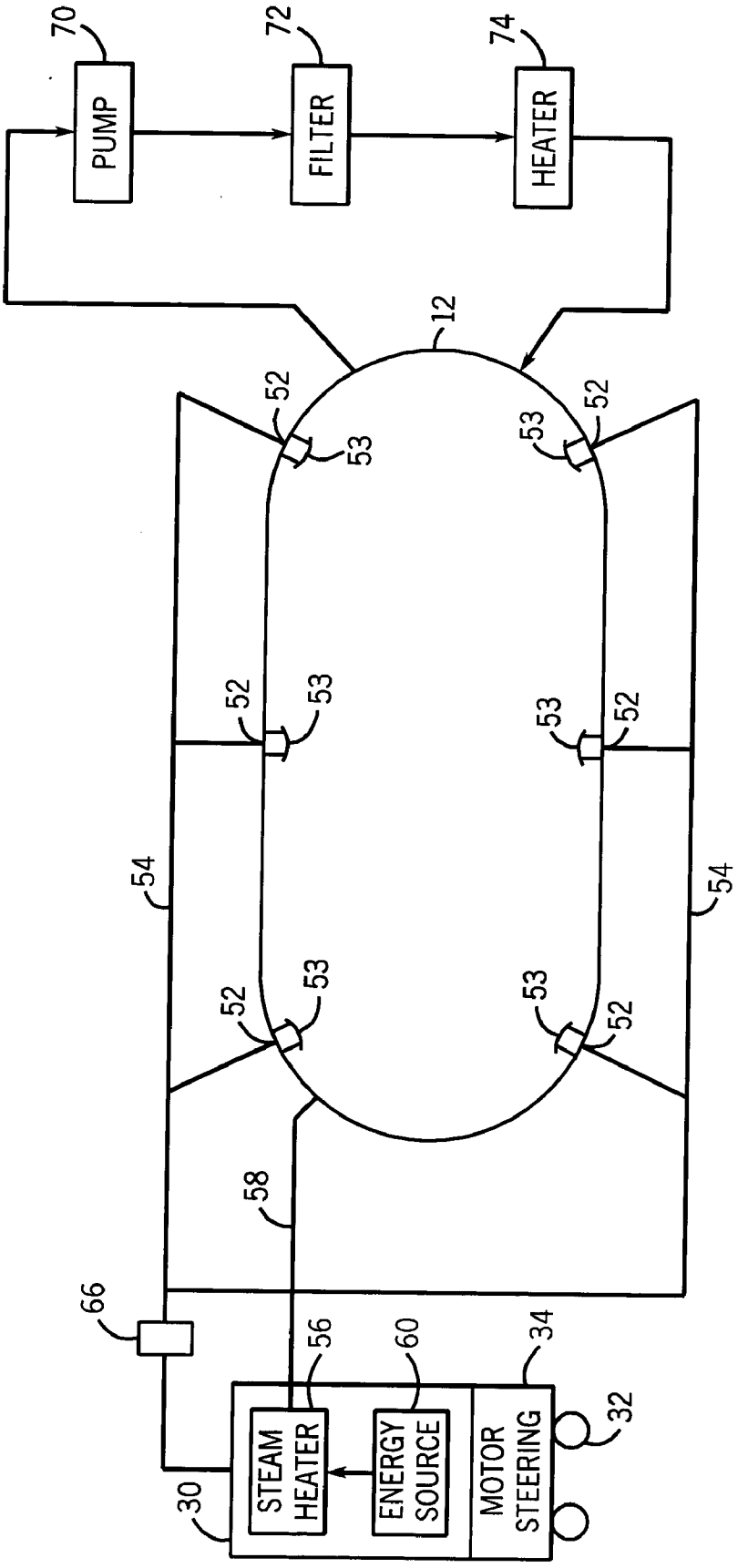

70
PUMP
72
FILTER
74
HEATER
12
52
53
54
58
66
56
60
34
32
30
STEAM HEATER
ENERGY SOURCE
MOTOR STEERING

FIG. 5

SYSTEM AND METHOD OF HEATING SWIMMING POOLS AND SPAS WITH STEAM

FIELD OF THE INVENTION

[0001] The present invention relates in general to water heating systems and, more particularly, to a system and method of heating swimming pools and spas with steam.

BACKGROUND OF THE INVENTION

[0002] People enjoy swimming pools and spas for family activities, therapy, exercise, recreation, and relaxation. Swimming pools are less popular in colder climates but still find uses in the summer months and indoor settings. In warmer climates, swimming pools are common in residences, hotels, and health clubs. Spas and hot tubs are found all types of climates.

[0003] In general, people tend to enjoy pools and spas more when the water is relatively warm. In swimming pools, some people find 75-80° F. water to be refreshing. Other people find 85-90° F. water to be more comfortable. In spas, the water is generally even warmer in the 100-105° F. range. Depending on the time of year and outside air temperature, it is often necessary to heat the pool and spa water to the desired temperature. Most if not all spas and hot tubs include heaters to raise the water to higher temperatures. In swimming pools, heaters have been used to extend the usable season and even make the pool a year-round attraction.

[0004] Swimming pool and spa heaters come in basic configurations where water is pumped from the main body of water and filtered. The most common types of filters are sand, diatomaceous earth, and cartridge. The filtered water is routed through heating chambers in the heater before returning to the main body of water. The heater can burn propane or natural gas as an open flame applied to the heating chamber to increase the water temperature. Electricity can also be used as an energy source to power a heating element in proximity to the heating chamber. The heating element transfers heat to the heating chamber which increases the temperature of the return water to the pool or spa. In another embodiment, the return water is routed through solar collectors to increase its temperature.

[0005] A common problem with conventional heating systems for swimming pools and spas is that the user must either keep the water at the desired temperature at all times, even when not in use, or the user must allow for the time needed to raise the temperature to a comfortable level. Keeping the water at a warm temperature continuously increases operating costs, wastes energy, and unnecessarily consumes natural resources. On the other hand, the process of raising the water temperature to a comfortable level when it comes time to use the pool can take a considerable amount of time. If the pool water is initially at a low temperature, say 50° F., it may takes many hours or an entire day to raise the temperature to say 85° F. depending on the energy transfer capacity of the heater and volume of the pool water. The pool user must plan ahead to have the pool ready to use at the intended time. The need to plan ahead limits the spontaneity and enjoyment factor associated with pool usage. Many times the user foregoes the use of the pool because it takes too long or requires too much preparation effort.

SUMMARY OF THE INVENTION

[0006] In one embodiment, the present invention is a water heating system comprising a steam heater for generating steam. A wand injects the steam into a body of water. A flexible tubing is coupled between the steam heater and wand to transfer the steam from the steam heater to the wand.

[0007] In another embodiment, the present invention is a water heating system for injecting steam into a body of water comprising a network of piping for disposing within a support structure containing the body of water. A plurality of steam ports are coupled to exit points of the network of piping into the body of water. A steam generator provides steam through an outlet which is coupled to the network of piping for transporting the steam to the steam ports and injecting the steam into the body of water.

[0008] In yet another embodiment, the present invention is a method of heating a body of water comprising the steps of providing a network of piping for disposing within a support structure containing the body of water, providing a plurality of steam ports on exit points of the network of piping into the body of water, and generating steam through the network of piping for transporting the steam to the steam ports and injecting the steam into the body of water.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] **FIG. 1** illustrates a portable steam heater for swimming pools and spas with hand-held wand;

[0010] **FIG. 2** illustrates the portable steam heater of **FIG. 1** with a stand to support the wand;

[0011] **FIG. 3** illustrates a fixed steam heater with a delivery system integrated into swimming pool and spa;

[0012] **FIG. 4** illustrates a portable steam heater and detachable coupling to the delivery system of **FIG. 3**;

[0013] **FIG. 5** illustrates a dual water heating system; and

[0014] **FIG. 6** illustrates block diagram of the steam heater.

DETAILED DESCRIPTION OF THE DRAWINGS

[0015] Referring to **FIG. 1**, a steam heater system **10** is shown for heating a body of water **12**. Swimming pools, spas, and hot tubs are examples of body of water **12** and range in size from few hundred gallons for spas to 20,000-40,000 gallons or more for swimming pools. In the interest of clarity, the elements shown in the figures are representative of the described function and are not necessary drawn to scale.

[0016] People find enjoyment in the use of swimming pools, spas, and hot tubs for family activities, therapy, exercise, recreation, and relaxation. While water-based activities are less popular in colder climates, these recreational facilities are still commonly used in the summer months and indoor settings. In warmer climates, swimming pools are found in residences, hotels, and health clubs. Spas and hot tubs are found all climates. The present invention involves the use of steam to rapidly heat swimming pool and spa water. By heating the water with steam, the swimming pool and spa can be heated very rapidly at will and only when needed thus saving energy and conserving natural resources.

[0017] Steam heater or generator **14** draws energy from energy source **15** to generate steam. Energy source **15** may

be natural gas, propane, or other fossil fuel. Energy source **15** could also be electrical or solar. Steam heater **14** draws water from pool **12** through pipe or flexible tubing **16**. Alternatively, steam heater **14** could get its water from an external water supply. The combination of energy from energy source **15** and water from pool **12** allows steam heater **14** to generate superheated steam, i.e. steam above the boiling point of water. The steam is transferred through flexible tubing **18** to gun or wand **20**. Tubing **18** is made from non-corrosive material such as stainless steel having flexible linkages. Gun **20** is configured to be hand-held with a hand grip **22** and trigger assembly **24**. An operator holds hand grip **22** in one hand and operates trigger assembly **24** with his or her index finger. The second hand grasps barrel **26** for control and stable operation. The non-corrosive conduit continues through grip **22** and barrel **26** to transfer the steam to exit point **28**. Barrel **26** is made from graphite, plastic, or other polymer material for insulation from the superheated steam. Tubing **18** is also insulated to protect the operator from the hot steam.

[**0018**] The operator positions gun **20** such that exit point **28** is underwater in pool **12**. The operator then squeezes trigger **24** and causes steam to flow from steam heater **14** through tubing **18** and gun **20**. The steam is injected directly into pool **12**. The application of superheated steam to pool **12** causes the temperature of the water to increase rapidly. For example, in a 15,000 gallon pool with 212° F. steam injected into pool **12**, the water temperature increases at a rate of 10° F. per hour with a steam mass flow rate of 1300 lbs/hr. In the case of a 500 gallon spa, steam heater system **10** producing the same 212° F. steam will increase the water temperature at a rate of 60° F. per hour with a steam mass flow rate of 260 lbs/hr. The rate of increase in water temperature in pool **12** is much greater with steam injected into the water as compared to conventional pool heating systems. Steam heater system **10** provides a significant convenience for the operator and user of pool **12** in that the body of water can be heated much more rapidly making the swimming pool or spa ready for use with shorter notice. The rate of increase in water temperature is even greater with superheated steam greater than 212° F. The swimming pool and spa is heated at will very rapidly and only when needed thus saving energy, natural resources, and maintenance over heating systems that heat the water continuously.

[**0019**] Steam heating system **10** is a portable unit. Steam heater **14** and energy source **15** can be attached to a cart or dolly **30** with wheels or rollers **32**. Tubing **16** can be a flexible hose that is readily moved and laid over the edge into pool **12**. Tubing **18** and gun **20** are part of the portable unit. The portable steam heater can be moved from place to place by pushing cart **30** by hand. A motor and steering assembly **34** can be attached to cart **30** for maneuvering heavier capacity steam generating equipment. The operator controls motor and steering assembly **34** to drive cart **30** to the desired location. The portable steam heater system **10** is useful for hotels, clubs, and municipal pools that have more than one swimming pool or spa to maintain. One steam heater system **10** can service multiple swimming pools and spas.

[**0020**] Another feature of portable steam heater system **10** is shown in **FIG. 2**. Elements having a similar function are assigned the same reference number. In this case, wand or gun **20** is supported by brace or stand **40**. For larger bodies of water which take longer to heat, or in situations where the operator does not want to hold the hand-held version of gun **20**, brace **40** supports gun **20** while the steam is injected into pool **12**. Gun **20** is positioned in support channel **42** on brace **40** with exit point **28** well underwater and then locked or clamped securely in place. Trigger assembly **24** is engaged and locked and the superheated steam is pumped into pool **12**. The operator can observe from a comfortable distance or perform other duties while the water temperature of pool **12** is brought to the desired temperature. A warning sign can be placed on brace **40** to avoid accidents and prevent injury to swimmers, guests, and passersby when the steam heating process is underway.

[**0021**] Another steam heater system **50** is shown in **FIG. 3**. Pool **12** is built or modified to have a plurality of steam ports **52**. Steam ports **52** are positioned at regular intervals around the side walls well under the waterline or along the bottom of pool **12**. Steam ports **52** include a jet or orifice for injecting the steam into the water. Each steam port **52** also include a protective cover **53** that re-directs the steam-heated water and allows some area for cooling. The steam strikes protective cover **53** and is re-directed sideways into the main body of pool **12**. The steam-heated water cools rapidly when mixed with the pool water. Thus, by using protective covers **53**, swimmers and bathers are never directly exposed to the superheated steam jets.

[**0022**] A network of non-corrosive pipes or conduit **54** is contained within the support structure of pool **12** and connects steam heater **56** to steam ports **52**. The support structure includes the soil, rebar, concrete, gunite, decking, and inner pool surface which forms the shell of pool **12**. The network of pipes **54** and steam ports **52** with protective covers **53** constitute the steam delivery system integrated into the swimming pool and spa support structure.

[**0023**] In one embodiment, steam heater **56** is a fixed unit, permanently coupled to pipes **54**. Water is drawn from pool **12** through tubing or pipe **58** for steam heater **56**. Energy source **60** provides energy to heat the water from pool **12**. The energy source can be electrical, solar, natural gas, propane, and other fossil fuel. The heated water is converted to steam. In a fixed configuration, steam heater **56** and energy source **60** are hidden behind a wall **64** for safety and aesthetic appearance. In the unlikely event that steam heater **56** should fail or burst, wall **64** will provide safety and protection for against serious injury to people.

[**0024**] The operator engages steam heater **56**. Energy from energy source **60** boils the water under pressure to create superheated steam. The steam flows from steam heater **56** through the network of pipes **54** and is injected into pool **12** through steam ports **52**. The steam is injected directly into pool **12** in and around protective covers **53**. The application of superheated steam to pool **12** causes the temperature of the water to increase rapidly. Again, the rate of increase in water temperature in pool **12** is much greater with steam injected into the water as compared to conventional pool heating systems. The distributed steam ports **52** of steam heating system **50** along the sidewalls or bottom of pool **12** provides a convenient and safe mechanism for injecting steam directly into the pool.

[**0025**] A significant portion of the cost for steam heating system **50** is attributable to steam heater **56** and energy source **60**. For installations having multiple swimming pools

and spas, a portable version of the steam heating system allows the unit to be moved around and shared. Accordingly, as shown in **FIG. 4**, steam heater **56** and energy source **60** are housed in portable cart **30**. A detachable coupling **66** is provided for quick and easy connect and disconnect between steam heater **56** and pipes **54**. The portable steam heater system is maneuvered around and connected via detachable coupling **66** to pipes **54** for different swimming pools and spas as needed.

[**0026**] In some applications, the steam heater system is the primary and sole heating source for the swimming pool and spa. In such cases, the steam heater system will replace the conventional pool heater. The rapid heating cycle of the steam heating system gives the user the option of not heating the swimming pool and spa during non-usage time. For example, residential swimming pools and spas are generally not heated at night and during the work week. In many situations, no one is using the swimming pool and spa during those times. A significant amount of energy can be saved by not heating the pool and spa water when not in use. When the user wants to heat the swimming pool and spa water, he or she fires up the steam heating system and raises the water temperature to a comfortable level in a short time. The steam heating system can be engaged during the weekends when the pool and spa are regularly used.

[**0027**] In other applications, especially in multiple pool and spa installations, a dual water heating system such as shown in **FIG. 5** is used. A conventional water heating system is capable maintaining the water at a given level. Water is pumped from pool **12** by pump **70** and run through filter **72** and conventional heater **74** back to pool **12**. In a dual water heating system, steam heating system **10** or **50** is used as a booster heating system to rapidly increase the water temperature to the desired level. In other words, given that the swimming pool and spa water is initially cold, the portable steam heater **50** is positioned and utilized to rapidly heat the water to a comfortable temperature. Once the water temperature reaches the desired level, the conventional heater **74** takes over to keep the pool water at the desired temperature. Portable steam heater **50** is disengaged or taken away. Heater **74** can be a smaller unit since it is only maintaining the water temperature that steam heating system **50** has established. In multiple pool and spa installations, the portable steam heating system **50** is taken to the next pool or spa to repeat the rapid preheating process. Again, once the water temperature reaches the desired level, the conventional heating system takes over and maintains the water temperature. The portable steam heater system is moved to the next job. The dual water heating system is convenient in multiple pool and spa installation in that the portable steam heating system **50** does not have to be repeatedly moved from location to location to continuously re-heat the water. Steam heater system **50** is used for its primary purpose, i.e. to rapidly preheat the pool and spa water and then allow the conventional heater **74** to take over.

[**0028**] Further detail of the steam heater is shown in **FIG. 6**. Using steam heater **56** as an example, a boiler **80** receives water from tubing **58**. Boiler **80** is heated from energy source **60**. An open flame from the burning natural gas or an electrical heating element boils the water under pressure in boiler **80** to generate steam. By increasing the temperature of the steam past 212° F., the steam becomes superheated. The steam in boiler **80** is kept at a temperature of 240° F. and pressure of 10 PSIG. The superheated steam is release by valve **82** into the network of pipes **54**.

[**0029**] In another embodiment, the steam heater can be implemented with an instant steam generator. The instant steam generator receives a continuously supply of water. Air is driven into a mixer-burner, combined with fuel, and ignited in a chamber. The water is sprayed into the hot gases exiting the chamber to create instant steam. The water is instantly converted to super-heated steam in an efficient manner. A blower provides a force behind the steam to move it rapidly down the conduit to the swimming pool.

[**0030**] A person skilled in the art will recognize that changes can be made in form and detail, and equivalents may be substituted, for elements of the invention without departing from the scope and spirit of the invention. The present description is therefore considered in all respects to be illustrative and not restrictive, the scope of the invention being determined by the following claims and their equivalents as supported by the above disclosure and drawings.

What is claimed is:

1. A dual water heating system, comprising:

a pump for pumping water from a body of water;

a filter having an input coupled to an outlet of the pump for filtering the water;

a water heater having an input coupled to an outlet of the filter and having an outlet for returning heated water to the body of water;

a network of piping for disposing within a support structure containing the body of water;

a plurality of steam ports coupled to exit points of the network of piping into the body of water; and

a steam generator for providing steam through an outlet which is coupled to the network of piping for transporting the steam to the steam ports and injecting the steam into the body of water.

2. The dual water heating system of claim 1 wherein the network of piping is made from non-corrosive material.

3. The dual water heating system of claim 1 further including:

an energy source supplying energy to the steam heater; and

a cart for transporting the steam heater and energy source.

4. The dual water heating system of claim 1 wherein the steam ports are provided along sidewalls or along a bottom surface of the support structure containing the body of water.

5. The dual water heating system of claim 1 further including protective covers disposed over the plurality of steam ports.

6. A water heating system, comprising:

a steam heater for generating steam;

a wand for injecting the steam into a body of water; and

a flexible tubing coupled between the steam heater and wand to transfer the steam from the steam heater to the wand.

7. The water heating system of claim 6 further including:

a pump for pumping water from the body of water;

a filter having an input coupled to an outlet of the pump for filtering the water; and

a water heater having an input coupled to an outlet of the filter and having an outlet for returning heated water to the body of water.

8. The water heating system of claim 6 wherein the wand includes a trigger assembly for enabling the steam to be ejected from an exit point of the wand.

9. The water heating system of claim 8 wherein the wand further includes:

a grip for grasping the wand;

a barrel coupled to the grip; and

a non-corrosive tubing within the barrel for transferring the steam to the exit point of the wand.

10. The water heating system of claim 6 further including:

an energy source supplying energy to the steam heater; and

a cart for transporting the steam heater and energy source.

11. The water heating system of claim 10 wherein the cart is motorized for transporting the steam heater and energy source.

12. The water heating system of claim 6 wherein the flexible tubing made from non-corrosive material.

13. The water heating system of claim 12 wherein the non-corrosive material is stainless steel.

14. The water heating system of claim 6 further including a stand for supporting the wand.

15. A water heating system for injecting steam into a body of water, comprising:

a network of piping for disposing within a support structure containing the body of water;

a plurality of steam ports coupled to exit points of the network of piping into the body of water; and

a steam generator for providing steam through an outlet which is coupled to the network of piping for transporting the steam to the steam ports and injecting the steam into the body of water.

16. The water heating system of claim 15 further including:

a pump for pumping water from the body of water;

a filter having an input coupled to an outlet of the pump for filtering the water; and

a water heater having an input coupled to an outlet of the filter and having an outlet for returning heated water to the body of water.

17. The water heating system of claim 15 wherein the network of piping is made from non-corrosive material.

18. The water heating system of claim 17 wherein the non-corrosive material is stainless steel.

19. The water heating system of claim 15 further including:

an energy source supplying energy to the steam heater; and

a cart for transporting the steam heater and energy source.

20. The water heating system of claim 19 wherein the cart is motorized for transporting the steam heater and energy source.

21. The water heating system of claim 15 further including protective covers disposed over the plurality of steam ports.

22. The water heating system of claim 15 wherein the steam ports are provided along sidewalls or a bottom surface of the support structure containing the body of water.

23. The water heating system of claim 15 further including a detachable coupling for connecting the outlet of the steam heater to the network of piping.

24. A method of heating a body of water, comprising:

providing a network of piping for disposing within a support structure containing the body of water;

providing a plurality of steam ports on exit points of the network of piping into the body of water; and

generating steam through the network of piping for transporting the steam to the steam ports and injecting the steam into the body of water.

25. The water heating system of claim 24 further including:

pumping water from the body of water;

filtering the water pumped from the body of water; and

heating the filtered water and returning the heated water to the body of water.

26. The method of claim 24 wherein the network of piping is made from non-corrosive material.

27. The method of claim 24 further including the steps of:

supplying energy to the steam heater from an energy source; and

transporting the steam heater and energy source on a cart.

28. The method of claim 24 wherein the steam ports are provided along sidewalls or along the bottom surface of the support structure containing the body of water.

29. The water heating system of claim 24 further including the step of disposing protective covers over the plurality of steam ports.

* * * * *