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(54) **POOL WATER HEATER**

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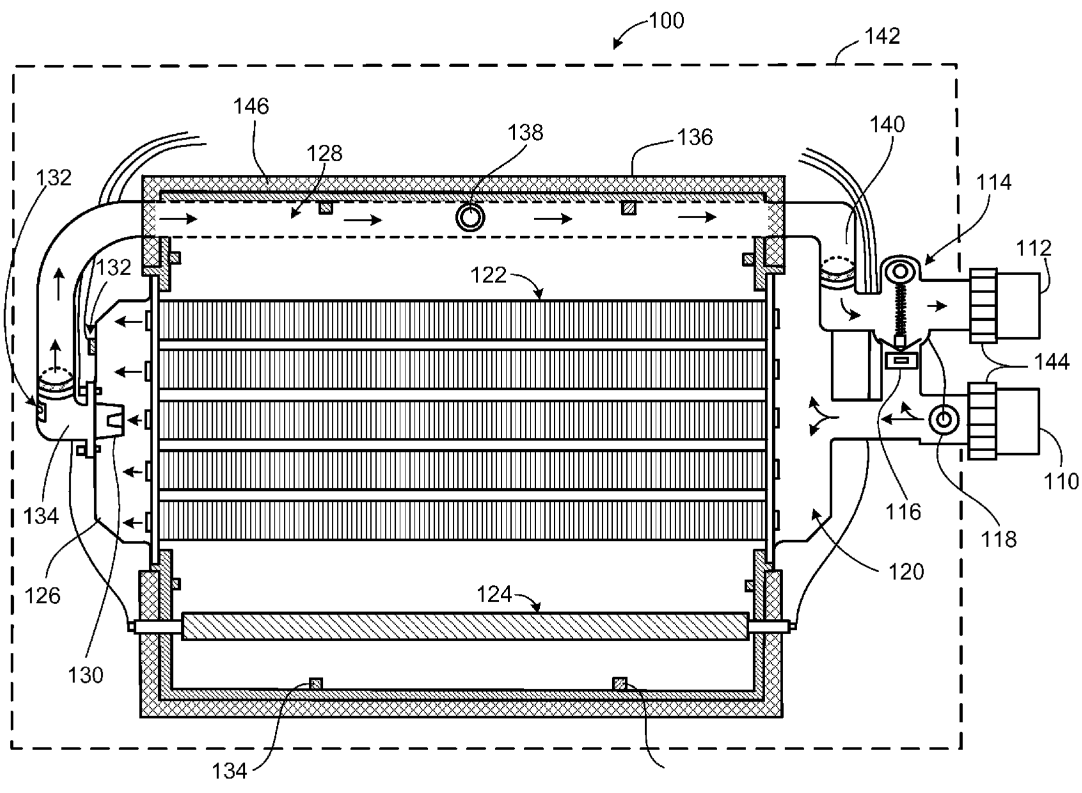
(57) **ABSTRACT**

An electric heater for heating pool water includes an enclosure, a pool water inlet and outlet, a heat exchanger disposed within the enclosure and comprising a plurality of metal pipes coupled to the pool water inlet and outlet, an electric heating element disposed within the enclosure and spaced apart from the plurality of metal pipes, and a conduit coupled between the plurality of metal pipes and the pool water outlet.



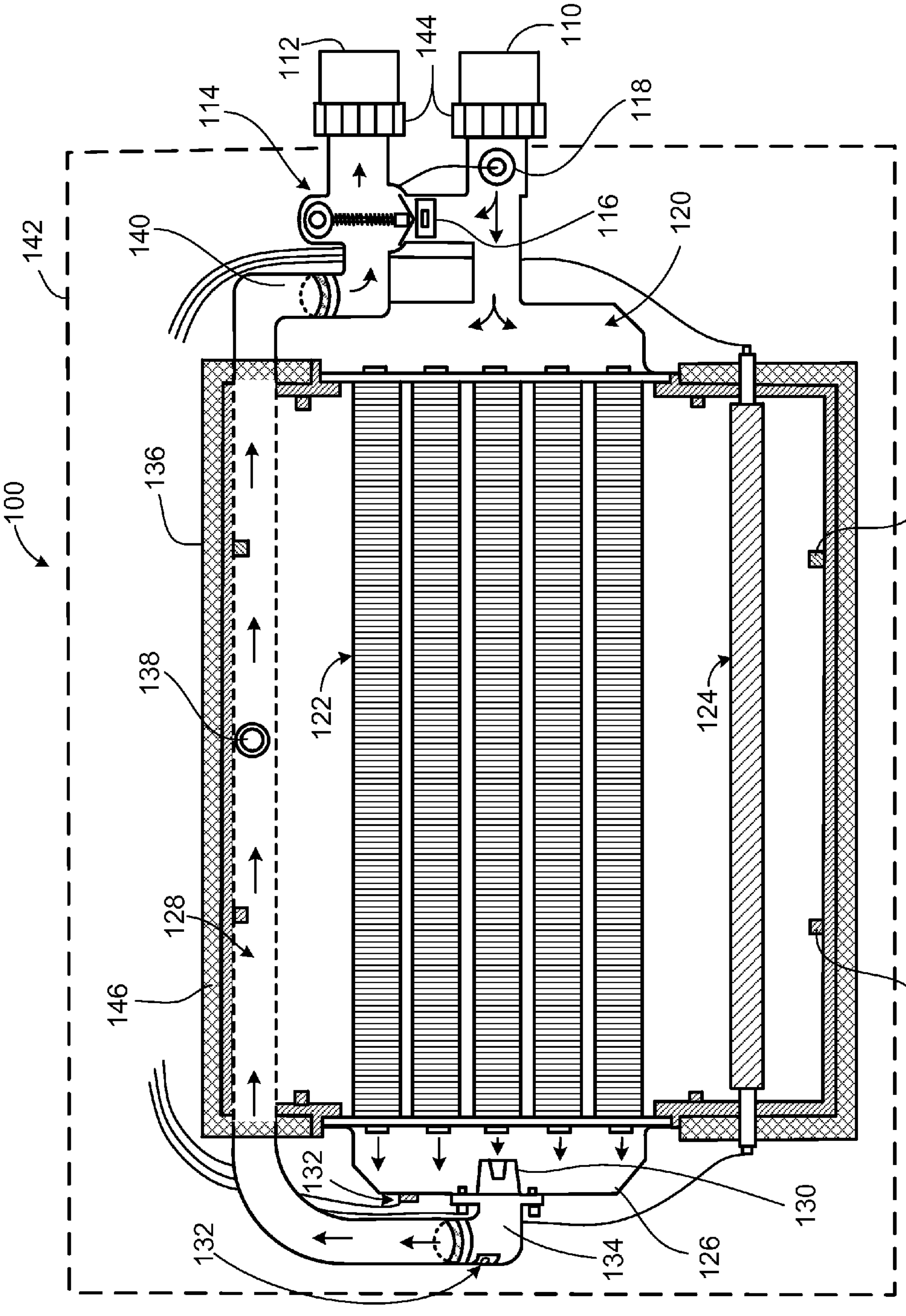

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FIG. 1

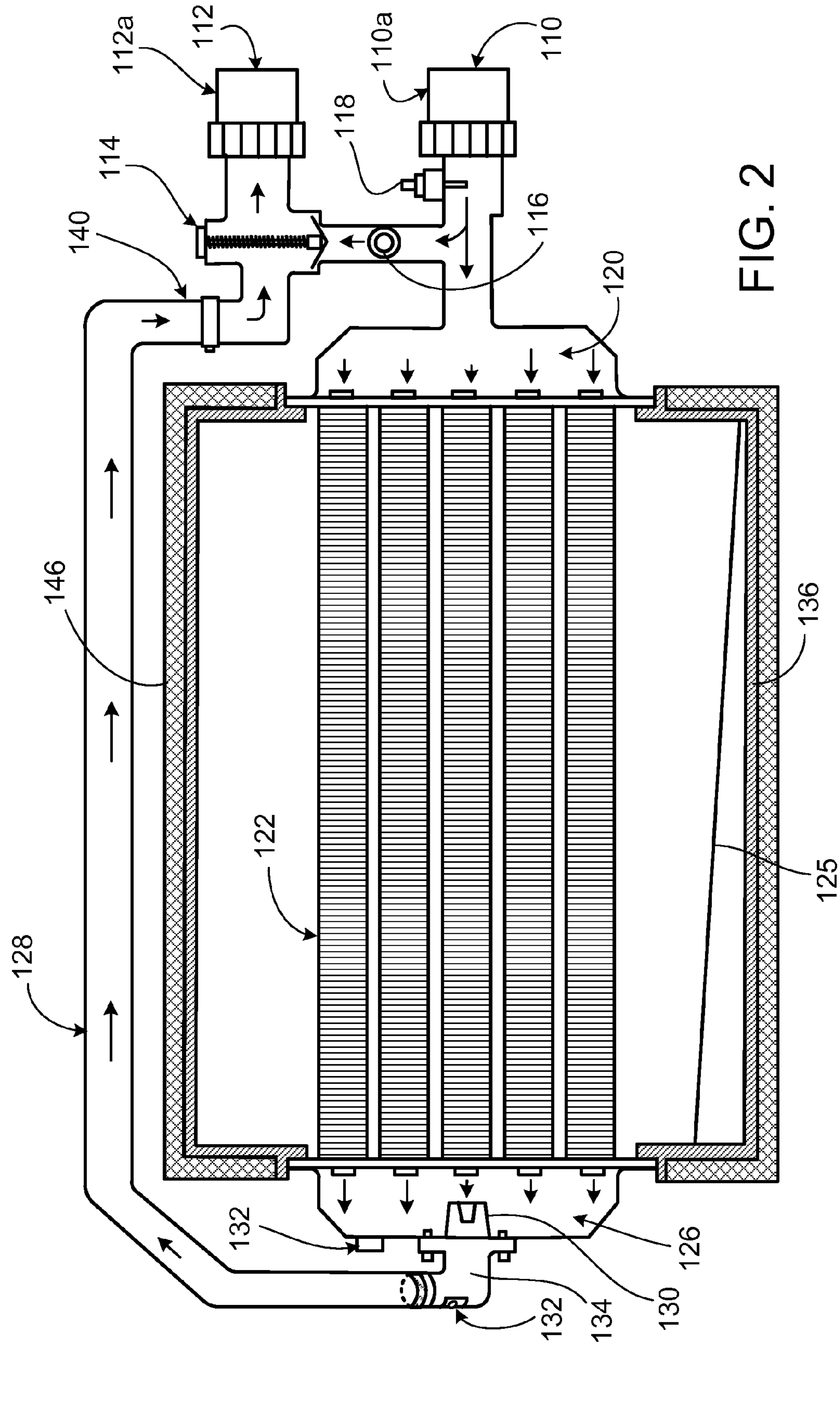
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FIG. 2

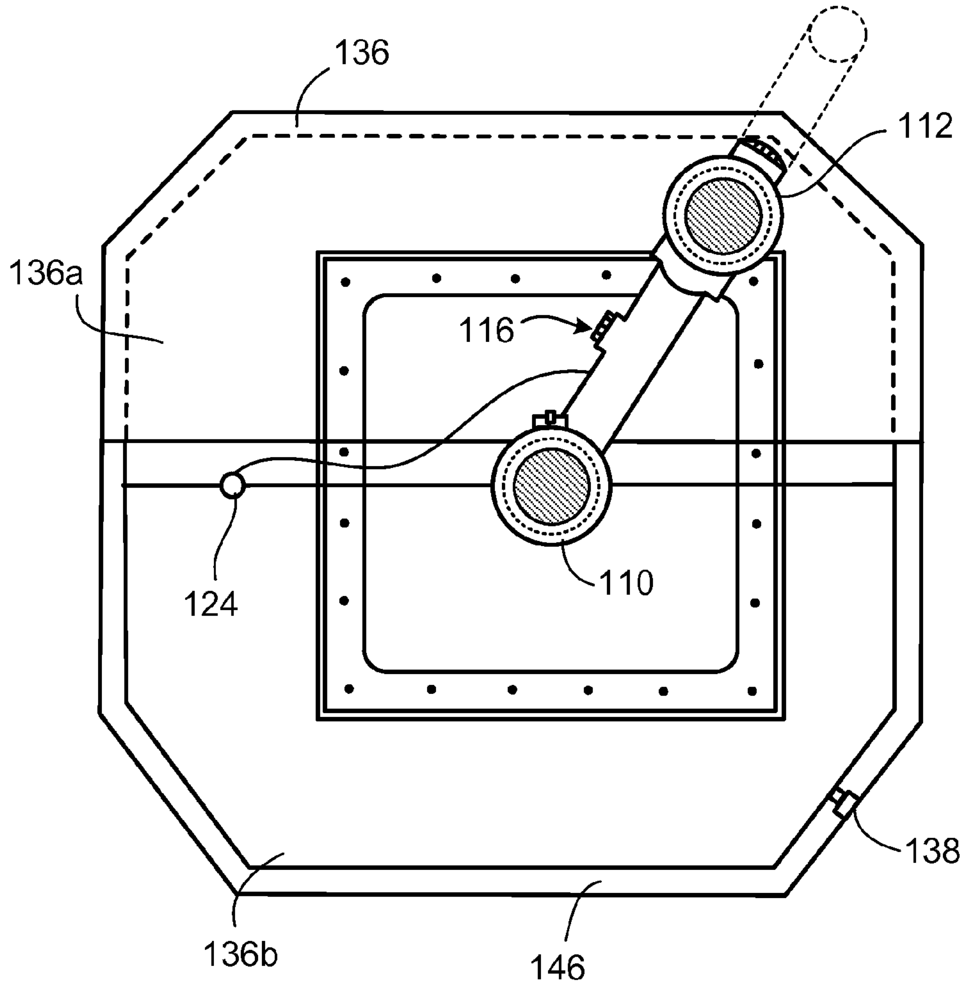

FIG. 3

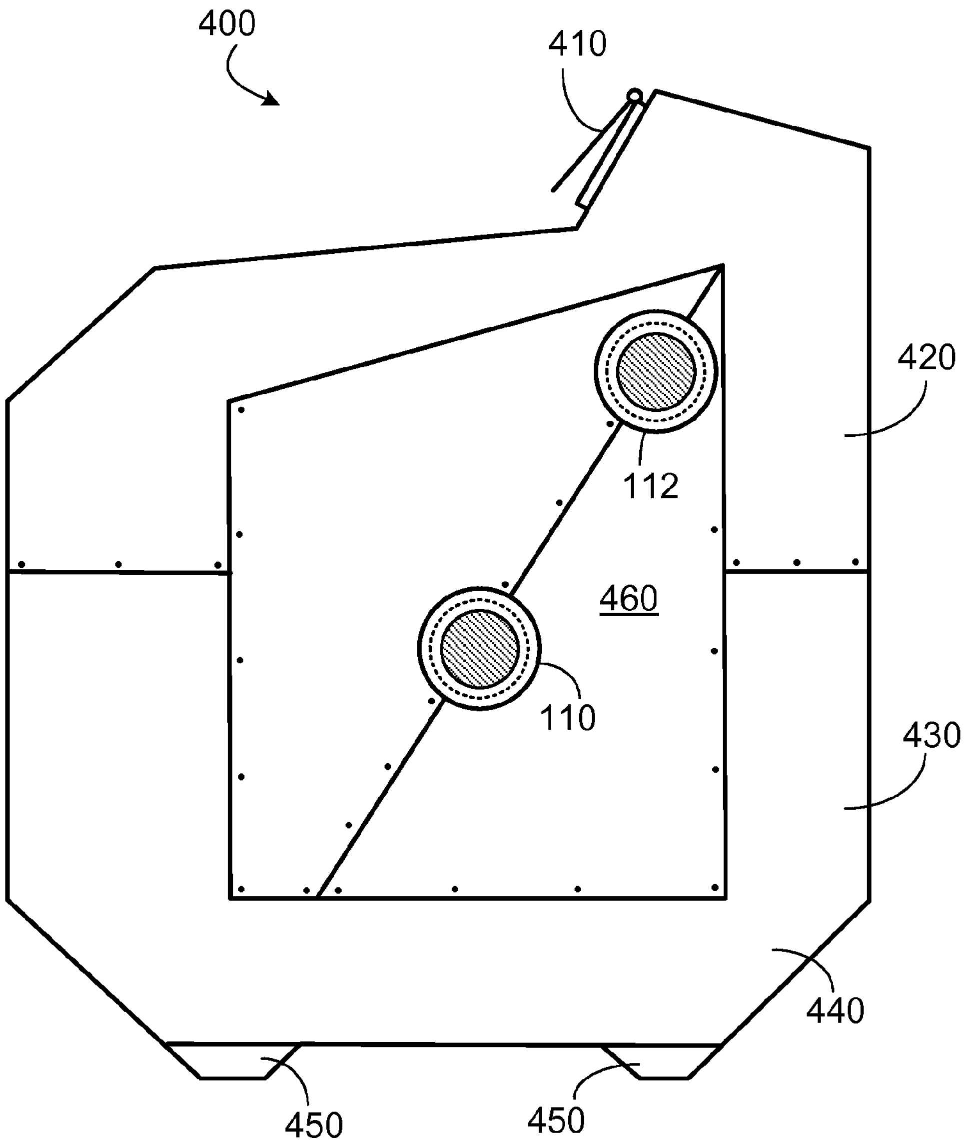

FIG. 4

POOL WATER HEATER

TECHNICAL FIELD

[0001] This specification generally relates to heating pool water.

BACKGROUND

[0002] Swimming pools have traditionally been heated using gas fired heaters. Gas fired heaters generally have a low efficiency rate, because a great amount of heat is lost to the environment. Therefore, the cost of heating pool water using gas heaters is expensive. An alternative to a gas heater is an electric pool heater, such as a heat pump. A heat pump takes warm air from the atmosphere and forces it through coils that transfer the heat to the pool water. Although more efficient than traditional gas heaters, heat pumps take a long period of time to heat up a large body of water. A second alternative to a gas heater is an electric heater that uses a heating element. These electric heaters tend to be more efficient than heat pumps because the heating element is in direct contact with the body of water. Although these electric heaters are more efficient, the size of the electric element needed to heat a large body of water makes this method of pool heating very expensive and impractical.

SUMMARY

[0003] In a general aspect, an electric heater for heating pool water includes an enclosure, a pool water inlet and a pool water outlet, a heat exchanger within the enclosure and including a plurality of metal pipes coupled to the pool water inlet and outlet, an electric heating element disposed within the enclosure and spaced apart from the plurality of metal pipes and a conduit coupled between the plurality of metal pipes and the pool water outlet.

[0004] Implementations of this aspect may include one or more of the following features. For example, the heat exchanger includes 20 to 25 metal pipes. For example, each of the plurality of metal pipes is copper pipes. For example, the electric heater further includes a thermal sensor to measure the internal temperature of the enclosure. For example, the enclosure includes a first insulated portion coupled to a second insulated portion.

[0005] Implementations may include one or more of the following aspects. For example, the electric heater further includes a first header and a second header, where the first header is in fluid communication with the pool water inlet and a first end of each of the plurality of metal pipes and the second header is in fluid communication with a second end of each of the plurality of metal pipes and the conduit.

[0006] Implementations may include one or more of the following aspects. For example the temperature-dependent flow thermostat is set to permit flow of heated pool water to the pool when the pool water heated by the exchanger reaches a temperature of about 125° F.

[0007] Implementations may include one or more of the following aspects. For example, the pool water inlet and the pool water outlet are in fluid communication with a bypass valve. For example, each of the plurality of metal pipes is the same length and is evenly spaced from each other. For example, each of the plurality of metal pipes has a diameter of about 0.5 to about 1 inch. For example, the electric heater further includes a condensation pan disposed within the enclosure.

[0008] In a general aspect, a method for heating pool water includes receiving pool water through an inlet of an electric pool water heater. The method includes flowing a portion of the pool water through a plurality of metal pipes spaced apart from an electric heating element. The method includes intermixing the portion of the pool water that has flowed through the plurality of metal pipes with a portion of the pool water flowing through a bypass valve. The method includes flowing the intermixed portions of pool water through an outlet of the electric pool water heater to the pool.

[0009] Implementations may include one or more of the following aspects. For example, the portion of the pool water that flows through the plurality of metal pipes is heated to a set temperature. For example, the pool water that flows through the plurality of metal pipes is heated to 125° F. For example, a temperature dependent thermostat is opened to allow the portion of the water that is flowed through the plurality of metal pipes to intermix with the portion of water that flows through the bypass valve when the water in the plurality of metal pipes is at the set temperature. For example, flowing a portion of the pool water through a plurality of metal pipes, including, receiving, by a first header, a portion of the pool water from the inlet and distributing, by the first header, the portion of the pool water to a first end of each of the plurality of metal pipes. For example, the portion of pool water from the inlet that is received by the first header is below a set temperature. For example, the plurality of metal pipes includes 20 to 25 pipes and the pipes have a diameter of about 0.5 to about 1 inch.

[0010] The details of one or more implementations are set forth in the accompanying drawings and the description below. Other features, objects, and advantages will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

[0011] FIG. **1** is a top view of an electric heater for heating pool water.

[0012] FIG. **2** is a side view of the electric heater of FIG. **1**.

[0013] FIG. **3** is a side view of a front header of the electric heater of FIG. **1**.

[0014] FIG. **4** is a side view of a housing unit for the electric heater of FIG. **1**.

DETAILED DESCRIPTION

[0015] The present invention is directed to an electric heater for heating pool water. The electric heater receives pool water and flows the pool water through a heat exchanger that is heated by an electric heating element. The heated pool water that exits the heat exchanger is intermixed with pool water that has bypassed the heater and the intermixed water is returned to the pool.

[0016] As illustrated in FIG. **1**, the electric pool heater **100** includes a pool water inlet **110**, a pool water outlet **112**, a front header **120**, a heat exchanger **122**, an electric heating element **124**, a rear header **126**, each of which are enclosed, partially or wholly, within an enclosure **136**. A heat exchanger bypass valve **114** and a pool water thermistor **116** are positioned between the pool water inlet **110** and pool water outlet **112**. A conduit **128** connects the rear header **126** to the front header **120** and pool water outlet **112** via an elbow **134**. The pool heater **100** further includes a heated water thermostat **130**, high temperature limit switch(es) **132**, and a heat box thermistor **138**, each of which will be described in more detail below.

[0017] The electric pool heater **100** and its constituent components can be enclosed (partially or wholly) within a housing unit **142**. In some implementations, the housing unit **142** may be formed of two complimentary half sections that are joined together. In some examples, the housing unit **142** may be insulated. The pool water inlet **110** and pool water outlet **112** are connected to the body of water in the pool by pipes (not illustrated) and pipe unions **144**. The pool water inlet **110** introduces water from the pool into the heater **100**. A flow switch **118** is mounted on the pool water inlet **110** and monitors the flow of pool water into the pool water inlet **110**. The flow switch **118** also acts as a safety device by ensuring that the heater **100** does not operate, for example, if there is no flow of pool water to the heater **100**. The pool water outlet **112** transports water from the heater **100** back to the pool. The pool water outlet **112** is connected to a pipe that returns the heated water to the pool.

[0018] The pool water inlet **110** and the pool water outlet **112** are in fluid communication with a heat exchanger bypass valve **114**. The heat exchanger bypass valve **114** may be a spring loaded valve that allows some or all of the pool water introduced into the pool water inlet **110** to return to the pool via the pool water outlet **112**. For example, when there is no heated water returning from the heat exchanger, the pressure of the pool water flowing into pool water inlet **110** is high enough to cause the bypass valve **114** to open thereby allowing a large proportion if not a majority of the pool water to bypass the heater **100** and flow back to the pool. When, however, the pool water temperature falls below a desired temperature by an amount usually set by the heater installer or user, the pool water flows through the heat exchanger and is heated by the heater thereby causing a pressure differential by the water flowing through the pool water outlet **112** as compared to the pool water inlet **110**, thereby causing the valve **114** to close such that only a portion of pool water bypasses the heat exchanger.

[0019] The pool water thermistor **116** is coupled to the pool water inlet **110**, and measures the temperature of the pool water received by the pool water inlet **110**. The front header **120** is in fluid communication with the pool water inlet **110** and the heat exchanger **122**. The heat exchanger **122** includes a plurality of metal pipes or tubes. The heat exchanger **122** receives a portion of the pool water that enters the pool water inlet **110**. The front header **120** distributes the portion of the pool water that is received by the heat exchanger **122** to the plurality of metal pipes or tubes. The plurality of metal pipes or tubes may be composed of a variety of different metals. In some examples, the heat exchanger **122** comprises 20 to 25 metal pipes or tubes. In these examples, the plurality of metal pipes may have the same length and may be spaced evenly apart from each other. For example, the plurality of metal pipes can be about 2 feet in length and spaced about 1 inch apart from each other. In one implementation, each of the plurality of metal pipes is made from copper. Other metals may also be used, such as copper alloys (e.g., copper-nickel alloy), titanium, and stainless steel. In some other examples, the diameter of each of the plurality of metal pipes or tubes is about 0.5 and 1.0 inch, for example 0.75 inches.

[0020] As shown in FIG. **1**, the heat exchanger **122** is disposed within the enclosure **136**. The enclosure **136** is insulated by one or more layers of insulating material **146**. In some examples the enclosure is a metal heat box, for example an aluminum box. The heat box thermistor **138** is mounted to the inner wall of the enclosure **136**. The thermistor **138** measures the ambient temperature within the enclosure **136**. In some implementations, the enclosure **136** can be formed of two complimentary parts coupled together. The first part of the enclosure **136** can be removed to expose the plurality of metal pipes within the heat exchanger **122**. FIG. **1** is a top view of the electric heater **100** with the top part of the enclosure **136** removed. The two parts of the enclosure **136** can be coupled together using a plurality of fastener mechanisms **134**. For example, glue tabs and rivets can be used, either individually or in combination, to fasten the two complimentary parts of the enclosure **136** together. In other implementations, screws, bolts, or other fasteners may be used in conjunction with adhesive materials, but adhesives are not required. As illustrated in FIG. **1**, when the top part of the enclosure **136** is open, the plurality of metal pipes of the heat exchanger **122** and the electric heating element **124** are exposed such that, for example, a user can access the internal components for maintenance, cleaning, or the like.

[0021] The electric heating element **124** is also disposed within the enclosure **136**. The electric heating element **124** can be spaced apart from the plurality of metal pipes of the heat exchanger **122** such that the electric heating element **124** does not come into contact with the pool water. As illustrated in FIG. **1**, the heating element **124** can be a single heating element that extends the length of the enclosure **136**. In some examples, the heating element **124** can be twisted in a coil arrangement. The heating element **124** can have a power rating of about 800 watts. The heating element **124** can be a metal heating element or a ceramic heating element. Although not shown in FIG. **1**, the heating element **124** is connected to a power source.

[0022] The rear header **126** is coupled in fluid communication with the end of each of the plurality of metal pipes of the heat exchanger **122** and the conduit **128**. The rear header **126** receives heated pool water from the plurality of metal pipes of the heat exchanger **122**. The rear header **126** receives the heated pool water from the plurality of metal pipes of the heat exchanger **122** and converges the heated pool water into the conduit **128** via elbow **134**. The heated water thermostat **130** is coupled to the rear header **126** and measures the temperature of the heated water that exits the heat exchanger **122**. In one implementation, there are two high limit switches **132**, one located in the elbow **134** and the other located in the rear header **126**. In another implementation, a single high limit switch **132** may be mounted in either the elbow **134** or the rear header **126**. Although not illustrated in FIG. **1**, the high limit switch(es) **132** is connected electrically to the heating element power supply. The high limit switch **132** causes the power to the heating element **124** to switch off, when, for example, the temperature of the water in the rear header **126** is higher than a set temperature. In some examples, the high limit switch cut off temperature is set at 130° F.

[0023] The elbow **134** connects the heated water from the rear header **126** to the conduit **128**. The heated water thermostat **130** measures the temperature of heated pool water at the rear header **126** and the water thermostat **130** opens to allow the heated water to flow to the conduit **128** when the water reaches a set temperature. The conduit **128** is in fluid communication with heat exchanger bypass **114**. In some examples, the water thermostat **130** opens when the water is at 125° F.

[0024] In operation, pool water flows into the pool water inlet **110** of the electric heater **100**. The pool water thermistor **116** that is coupled to the pool water inlet **110** measures the temperature of the incoming pool water. A desired pool water temperature is set by a user at a control panel **410** (FIG. **4**) that may be mounted to an external housing **142** of the electric pool heater **100**. The electric pool heater **100** helps to maintain the pool water temperature at a temperature range close to the desired temperature. For example, if the user sets the desired pool water to 75° F., the pool heater can aim to maintain the pool temperature between 74-76° F. When pool water flows into the pool water inlet **110**, most of the incoming pool water flows to the heat exchanger **122**. A small portion of the incoming pool water pushes up against the spring loaded heat exchanger bypass **114** and returns to the pool through the pool water outlet **112**. When the pool water thermistor **116** measures the incoming pool water temperature, and the measured temperature of the water is within the temperature range of the desired pool water temperature, the heating element does not switch on. The incoming pool water fills up the plurality of metal pipes of the heat exchanger **122**, and the water thermostat **130** remains closed. As flow of pool water into the pool water inlet **110** continues, the incoming pool water pushes up against the spring loaded bypass valve **114**. The pool water then flows up through the bypass valve **114** to the pool water outlet **112** and back to the pool. Pool water continues flowing into the pool water inlet **110** and through the heat exchanger bypass valve **114** to the pool water outlet **112** until the pool water thermistor **116** detects that the temperature of the incoming pool water is less than the set desired temperature.

[0025] When the pool water thermistor **116** detects that the incoming pool water is below the set temperature, the electric heater **100** powers on when all the safety devices are satisfied. If all the safety devices are not satisfied, the electric element is not powered on. The flow switch **118** and the high limit switch(es) **132**, for example, act as safety devices. The flow switch **118** monitors the flow into the electric heater **100**. When the flow switch **118** determines that the flow is below a set flow value, the flow switch safety check is not satisfied. For example, when the filter pump to the pool is off, the flow switch safety check is not satisfied. The user may be notified that the flow switch safety check is not satisfied at the control panel **410** (FIG. **4**). In some examples, a light emitting diode (LED) at the control panel **410** (FIG. **4**) may light red if the flow switch safety is not met. The high limit switch(es) **132** also act as a safety device. The high limit switch(es) **132** shut off the power to the heating element if the water that exits the plurality of heating tubes in the heat exchanger is at a temperature higher than a set temperature. In one implementation, the set temperature is 135° F.

[0026] If all of the safety devices are satisfied, then the electric heating element **124** is switched on. The electric heating element **124** begins to heat up the enclosure **136**. The temperature of the enclosure **136** is increased to a set temperature. For example, the enclosure is heated to 200° F. In a preferred implementation, the inner wall of the enclosure **136** is lined with one or more layers of insulation **146**. The temperature of the enclosure **136** is measured by the heat box thermistor **138**, and is maintained at the set temperature. Although not illustrated in FIG. **1**, an element relay is used to cycle the heating element **124** on and off to maintain the temperature of the enclosure **136** at the set temperature. As described earlier, the heat exchanger **122** is disposed within the enclosure **136**, and includes a plurality of metal pipes or tubes. As the heating element **124** heats up the enclosure **136**, the pool water in the plurality of metal pipes of the heat exchanger **122** is also heated. Heat from the electric heater **124** is transferred to the pool water in the plurality of metal pipes of the heat exchanger **122**. In some examples, each of the plurality of metal pipes is a finned tubed copper pipe. The rate of heat exchange in the heat exchanger **122** is high due to the number of metal pipes and the diameter of each pipe. In some examples, the diameter of each of the plurality of metal pipes in the heat exchanger **122** is less than an inch and the heat exchanger comprises more than 20 metal pipes. In these examples, each metal pipe contains a small volume of pool water that can be heated up faster than a tube with a larger diameter that holds a larger volume of water. A plurality of metal pipes in the heat exchanger **122** allows more heat to be absorbed by the pool water in the pipes at a lower enclosure temperature.

[0027] As mentioned above, the heated water thermostat **130** is coupled to the rear header **126**. The heated water thermostat **130** measures the temperature of the heated water that exits the heat exchanger **122**. When the temperature of the heated water reaches a set temperature, heated water thermostat **130** opens to allow the water in the heat exchanger **122** to flow into the elbow **134** and into the conduit **128**. The high limit switch(es) **132** act a safety device, for example, by shutting off power to the heating element **124** if the heated water exceeds a set temperature. In some examples, the high limit switch(es) **132** shut off the power to the heating element **124** when the temperature of the heated water exceeds 135° F. As the water thermostat **130** opens to allow the heated water to flow to the conduit **128**, pool water that enters the heater **100** through the pool water inlet **110** flows in to fill the plurality of metal pipes of the heat exchanger **122**. At the same time, the heated water thermostat **130** may detect that the water in the heat exchanger **122** might drop below a set temperature and closes. While this is occurring, the heated water in the conduit **128** flows through the conduit piping towards open valve **140**. In some examples, the conduit **128** is an insulated pipe that transports heated water to the pool water outlet **112**. Simultaneously, a portion of the incoming pool water presses against the bottom of the spring loaded bypass **114** and flow up towards the pool water outlet **112**. The incoming pool water intermixes with the heater water from the conduit **128** before flowing back to the pool.

[0028] The process of heating water in the heat exchanger **122**, as described above, is repeated until the pool temperature thermistor **116** determines that the incoming pool water at the pool water inlet **110** is within the range of the set temperature. The flow of pool water through the heater **100** is continuous, if the pool water is above the set temperature and no further heating of the water is required, the incoming pool water is passed through the bypass valve **114** and flows back through the pool water outlet **112**.

[0029] Referring to FIG. **2**, and as discussed above, the electric pool heater **100** includes a pool water inlet **110** that is connected by pipe unions **144** to a pipe **110**(*a*). Pipe **110**(*a*) transports pool water to the heater **100**. In some implementations, the electric pool heater **100** may be located a short distance from the pumping system of the pool. The flow switch **118** is mounted to the inlet **110** and monitors the flow of pool water into the pool water inlet. When the flow switch determines that the flow in the pool water inlet is below a set flow value, the flow switch safety check is not satisfied. For example, when the filter pump to the pool is off, the flow switch safety check is not satisfied. The pool water outlet **112** is connected to pipe **112**(*a*) by pipe unions **144**. Pipe **112**(*a*) is in fluid communication with the pool. In some examples, pipes **110**(*a*) and **112**(*a*) are PVC pipes.

[0030] As discussed above, the heater **100** can include an enclosure **136**, which surrounds either partially, or wholly, the heat exchanger **122**, the heating element **124** and a condensation pan **125**. In one implementation, the enclosure **136** is an insulated enclosure. For example, the enclosure is a metal, such as aluminum or stainless steel, box that is surrounded by one or more layers of insulating material **146**. In some examples, the enclosure is a 2 feet by 2 feet square box. In some implementations, the enclosure can be formed of two complementary parts coupled together. As described with respect to FIG. **1**, opening a top part of the two part enclosure **136** exposes the plurality of metal pipes of the heat exchanger, as well as the electric heater element **124**. The heat box thermistor **138** is mounted to the inner wall of the enclosure **136**. The thermistor **138** measures the temperature within the enclosure **136**. The condensation pan **125** is located at the base of the enclosure **136**. The condensation pan **125** extends the length, or a portion thereof, of the plurality of metal pipes of the heat exchanger **122**. The condensation pan **125** collects any excess moisture that may be produced as the heat exchanger heats the pool water. In some examples, the condensation pan **125** is connected to a hose (not illustrated) that flows out to the ground beneath the heater. In other examples, the condensation pan **125** is a pan that can be removed by a user and emptied.

[0031] FIG. **3** illustrates the side view of the front header **120** of the electric heater **100**. In this example, the enclosure **136** is formed of two parts that are coupled together. The enclosure **136** is an insulated enclosure with a top part of the enclosure **136**(*a*) and a bottom part of the enclosure **136**(*b*) coupled together. In some examples, the enclosure **136** can be a metal box such as an aluminum box. The walls of the enclosure can be lined with one or more layers of insulation **146**. The two parts of the enclosure **136** can be coupled together using a plurality of fastener mechanisms (not shown). For example, glue tabs and rivets can be used, either individually or in combination, to fasten the two complimentary parts of the enclosure **136** together. In other implementations, screws, bolts, or other fasteners may be used in conjunction with adhesive materials, but adhesives are not required. The top part of the enclosure **136**(*a*) can be removed to expose the plurality of metal pipes within the heat exchanger **122**. In some examples the heat box thermistor **138** is mounted to the inner wall of the bottom part of the enclosure **136**(*b*). In other examples, the thermistor can be mounted to any section of the inner wall of the enclosure **136**. The heat box thermistor **138** measures the internal temperature of the enclosure **136**.

[0032] FIG. **4** is a side view of an external housing unit **400** for the electric heater **100**. As mentioned earlier, the electric pool heater **100** can be contained within a housing unit. FIG. **4** is the view of the housing unit **400** from the side of the electric heater **100** with the pool water inlet **110** and pool water outlet **112**. In the example illustrated in FIG. **4**, the housing unit **400** can be formed of two complimentary halves, a top section **420** and a bottom section **430**. In some examples the housing unit **400** can be an insulated housing unit. For example, the inner walls of the top section **420** and bottom section **430** of the housing unit **400** can be lined with one or more layers of insulation. In other examples, the housing unit **400** is not insulated. The housing unit **400** may be formed of a metal, for example aluminum. The bottom section **430** of the housing unit can be formed in a pentagonal shape. As illustrated the bottom section **430** can have sloped corners **440**. In addition, the top section **420** can include sloped sections to allow, for example, rain water to run off the housing unit **400** as opposed to collecting on the top of the unit **400**. The housing unit **440** can be mounted on or include one or more leg sections **450**.

[0033] The housing unit **400** can include a side panel **460** that can have a circular cut out for each of the pool water inlet **110** and the pool water outlet **112**. In some examples, the side panel **460** can be removable. The top section **420** of the housing unit can have a raised sloped corner to accommodate the conduit **128** of the electric heater than transports heated water to the pool water outlet **112**. In some examples, the top section **420** of the housing unit is removable. The user control panel **410** can be mounted to the top section **420** of the housing unit **400**. The control panel **410** can include a power switch, a temperature control, and a mode control. In some examples, the control panel **410** can include a digital display that displays the temperature selected by the user. The control panel **410** can also display the current pool temperature. In some implementations, the control panel **410** can include an LED that represents each safety device. For example, if the flow switch detects that the flow is lower than a selected flow value, the LED that represents the flow switch at the control panel can light up red alerting the user of low flow.

[0034] A number of implementations and alternatives have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the disclosure. For example, while the illustrated examples and descriptions refer to an electric pool water heater, the heater described herein may be applied to other sources of water, including drinking water. In addition, the heater described herein may find application in certain industrial or manufacturing scenarios as well. Accordingly, other implementations are within the scope of the following claims.

1. An electric heater for heating pool water comprising:

an enclosure;

a pool water inlet and outlet;

a heat exchanger disposed within the enclosure and comprising a plurality of metal pipes coupled to the pool water inlet and outlet;

an electric heating element disposed within the enclosure and spaced apart from the plurality of metal pipes; and

a conduit coupled between the plurality of metal pipes and the pool water outlet.

2. The electric heater of claim **1** wherein the heat exchanger comprises 20 to 25 metal pipes.

3. The electric heater of claim **1** wherein each of the plurality of metal pipes comprises copper.

4. The electric heater of claim **1** further comprising:

a thermal sensor to measure the internal temperature of the enclosure.

5. The electric heater of claim **1** wherein the enclosure comprises a first insulated portion coupled to a second is insulated portion.

6. The electric heater of claim **1** further comprising:

a first header and a second header,

wherein the first header is in fluid flow communication with the pool water inlet and a first end of each of the plurality of metal pipes, and

wherein the second header is in fluid flow communication with a second end of each of the plurality of metal pipes and the conduit.

7. The electric heater of claim **6** wherein a temperature-dependent flow thermostat is coupled between the second header and the conduit and is in fluid flow communication with the second end of each of the plurality of metal pipes and the conduit.

8. The electric heater of claim **7** wherein the temperature-dependent flow thermostat is set to permit flow of heated pool water to the pool when the pool water heated by the exchanger reaches a temperature of about 125° F.

9. The electric heater of claim **1** wherein the pool water inlet and the pool water outlet are in fluid flow communication with a bypass valve.

10. The electric heater of claim **1** wherein each of the plurality of metal pipes is the same length and is evenly spaced from each other.

11. The electric heater of claim **1** wherein each of the plurality of metal pipes has a diameter of about 0.5 to about 1 inch.

12. The electric heater of claim **1** further comprising a condensation pan disposed within the enclosure.

13. A method for heating pool water comprising:

receiving pool water through an inlet of an electric pool water heater;

flowing a portion of the pool water through a plurality of metal pipes spaced apart from an electric heating element;

intermixing the portion of the pool water that has flowed through the plurality of metal pipes with a portion of the pool water flowing through a bypass valve; and

flowing the intermixed portions of pool water through an outlet of the electric pool water heater to the pool.

14. The method of claim **13** wherein the portion of the pool water that flows through the plurality of metal pipes is heated to a set temperature.

15. The method of claim **14** wherein the pool water that flows through the plurality of metal pipes is heated to 125° F.

16. The method of claim **14** wherein a temperature dependent flow thermostat is opened to allow the portion of the water that is flowed through the plurality of metal pipes to intermix with the portion of water that flows through the bypass valve when the water in the plurality of metal pipes is at the set temperature.

17. The method of claim **13** wherein flowing a portion of the pool water through a plurality of metal pipes comprises:

receiving, by a first header, a portion of the pool water from the inlet; and

distributing, by the first header, the portion of the pool water to a first end of each of the plurality of metal pipes.

18. The method of claim **17** wherein the portion of pool water from the inlet that is received by the first header is below a set temperature.

19. The method of claim **18** wherein the plurality of metal pipes comprises 20 to 25 pipes and the pipes comprise a diameter of about 0.5 to about 1 inch.

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