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ADD-ON ELECTRIC HEATING

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PATENT

ADD-ON ELECTRIC HEATING

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FIELD OF THE INVENTION

[0002] The present invention relates to electrical devices. Specific embodiments involve residential and commercial heaters and/or water heaters and alternative methods of heating.

BACKGROUND

[0003] The discussion of any work, publications, sales, or activity anywhere in this submission, including in any documents submitted with this application, shall not be taken as an admission that any such work constitutes prior art. The discussion of any activity, work, or publication herein is not an admission that such activity, work, or publication existed or was known in any particular jurisdiction.

[0004] Patent Application number US20150104160 A1[1] claims a solar water heater that can go in the side or top ports for water heater and hot tubs. Patent number US6810206 B1[2] claims an electric water heating element able to be connected through the drain of a water tank and has a cord and a three prong plug. SunBandit[3] sells a hot water system that includes an electrically heated water tank powered by PV solar cells. A system consisting of the water tank and electrical control costs about $4,000 without solar panels.

[1] Photovoltaic DC Heater Systems http://www.freepatentsonline.com/20150104160.pdf
[2] Drain Plug Heater http://www.freepatentsonline.com/6810206.pdf

[0005] Another manufacturer, Butler Sun Solutions (www(.) butlersunsolutions (.)com /solar-heat-exchanger-wand-long) advertises a $600 heat exchanger that fits into the hot water output tube in a water heater, displacing the hot water out by 90º, allowing the water in the tank to be heated by an external source such as solar thermal energy. This configuration appears to be partly described in US6837303 B2.

SUMMARY

[0006] According to specific embodiments, systems and methods described herein present an inexpensive way to add electric heating capacity to any water heater through the insertion of an electric heating element into the drain of any hot water tank. Specific embodiments are useful for adding electrical heating capacity to a natural gas water tank, for example to take advantage of inexpensive or free electricity. Specific embodiments may also be useful for an electrical water tank to add additional electric heating from a different source without substantially altering the original function of the electric water tank.

[0007] With respect to the example above, free or reduced cost electricity can result from a variety of circumstances including when renewable energy is produced in surplus and is cheaper to use than to turn off. This can happen on a grid-wide basis such as in parts of Texas where electricity at night is free because of abundant wind power and low electrical load at night (Krauss, 2015)[4]; or for locally produced electricity not tied to the grid.

[0008] According to specific embodiments, "Add-On Electric Water Heating"™ provides consumers a capacity to practice demand side management by using surplus electricity to heat water. This can in some circumstances primarily save the user's costs of grid utilities and/or natural gas, or petroleum; or whatever the default heating fuel is. According to specific embodiments, the invention can also be used for stabilizing an electric power supply grid by storing electricity as thermal energy. In further embodiments, utilities or electricity or energy suppliers can control or influence consumers' Add-On Electric Water Heaters, and thereby stabilize the grid by using the

[3] SunBandit http://www(.)sunbandit.us

[4] Krauss, Clifford, and Diane Cardwell. "A Texas Utility Offers a Nighttime Special: Free Electricity." *The New York Times.* The New York Times, 08 Nov. 2015. Web. 01 Sept. 2016.

bank of controlled water heaters as a dispatchable load in order to compensate for changes in demand or variable electrical sources such as wind.

[0009] According to specific embodiments, the present design provides that much of or all of the entire heating element can pass through the drain port into the interior of the hot water tank, and sealed in a threaded "T" adapter that allows the heating element to be operated while displacing the drain 90 degrees, but maintaining its function. Specific embodiments can use various electrical sources, including AC and DC power sources and may include a swivel adapter to allow the heating element and "T" drain to be screwed into the tank.

[0010] Example implementations according to specific embodiments allow the user to heat water in a pre-existing water tank with electricity for under $200 in hardware, requiring 1-4 hours for installation.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagram of a heating element with thick steel leads attached to the "T" by means of a swivel adapter extending through the drain.

Figure 2 is a diagram illustrating the heating element in a natural gas water tank. The element is inserted through the drain pipe of the water heater tank and bends upwards so it does not hit the flue or other parts of the tank. The thermostat in this case is thermally connected to the inner water heater vessel under the insulation.

Figure 3 is the outside of an electric water tank showing an electric thermostat hooked up in series with an electric heating element that is inserted through the drain of the water tank. There is a factory-installed heating element between the drain port and the thermostat that is not affected by installation of the Add-On Electric Water Heater .

Figure 4 shows a bent electric heating element that can be inserted into a natural gas water tank without hitting the flue or internal obstacles of the tank.

Figure 5 shows an electric heating element screwed into a swivel adapter than can be inserted into a ¾" inner diameter drain of a water heating tank. The metal heating element is visible extending to the right and bending downward. This arrangement would

not allow for the continued use of the drain because of the lack of a 90 degree "T" connection for the new drain.

Figure 6 illustrates a consumer product heating element bent to a smaller radius of curvature by means of inserting a round template in the inner radius and pressing the template against a firm surface (such as the wood surface to the left). While under pressure, the heating element can be pressed together from below and above into a thinner heating element.

Figure 7 is a diagram of an integrated heating/mixing unit that connects to the cold (in) and hot (out) ports of a hot water tank.

Figure 8 shows a computer system that is programmed or otherwise configured as described according to specific embodiments herein.

DESCRIPTION OF SPECIFIC EMBODIMENTS

[0011] According to specific embodiments, an Add-On Electric Water Heater™ allows the user to heat water in a pre-existing water tank by inserting an immersion heating element through an existing port such as the drain or the hot water out port. Specific embodiments include a "T" adapter that can screw into the drain port and allow the immersion heater to go through and into the water tank, while maintaining a spigot on the side of the "T" for drainage purposes as in Figure 1.

[0012] In further embodiments. the heating element feedthrough is attached to the "T" with a swivel to form a watertight connection while allowing rotational independence so the orientation of the immersion heating element in the tank can stay fixed through insertion. In specific embodiments, it is desirable that the element maintain a fixed orientation during insertion so it does not hit the bottom of the tank, the flue in natural gas tanks or other obstacles.

[0013] According to specific embodiments, alternatively, the heating element can be inserted from above through the hot water (out) pipe, while displacing the hot water port by 90º as shown in Figure 6. According to specific embodiments, the heating element ideally extends substantially downward into the water tank to ensure full convective mixing of the tank's entire contents. This embodiment, allows for the connection of the heating element without a swivel because the heating element could be lowered vertically.

Alternatively, the heating element can attach horizontally through the side of the "T", allowing the hot water to exit from the top as is usual.

1.1 Modified standard electric immersion heating elements

[0014] Modification to standard electric immersion heating elements may be used in some embodiments to allow the element to fit through the adapter and drain port that has a smaller diameter, typically ¾" inner diameter. This can be done by bending the element. When bending the element, a crack may form, typically at the smallest radius of curvature. The crack may be patched by spot welding or soldering. In order to prevent the cracking of the metal housing, the tubing can be squeezed between two surfaces to ensure a constant radius of curvature, such as in Figure 6. A custom heating element can be manufactured industrially or homemade by coating resistive wires in high temperature insulation inside of metal tubing. For instance, glass beads are strung onto NiCr wire inside of stainless steel tubing or magnesium oxide can be used as an insulator between the NiCr wire and exterior tubing. Mortar can also be added to the interior and/or ends of the tubing. According to specific embodiments, accommodations for the tight radius turn in the heating element may be used such as using smaller diameter beads or flexible fiberglass in the area of the low radius turn.

[0015] Because part of the heating element that is closest to the swivel adapter is inside a pipe enclosure of the "T", the filament in the heating element near the base is ideally low resistance so as not to generate substantial heat in this region. This low resistance lead in specific embodiments extends from the swivel adapter to the section of heating element that is in inside the main body of the water tank, see Figure 1. The low resistance leads may be any low resistance metal or just much thicker metal that is the same as that of the heater filament, or additional wire added in parallel with the filament wire.

[0016] According to specific embodiments, an Add-On thermostat in series with the Add-On electric power source is added to control the add-on heating. An add-on electric thermostat can be added underneath the tank insulation allowing thermal contact between

the thermostat and the inner tank of the vessel. Alternatively, an add-on electric heater with an add-on thermostat integrated unit can be used.[5]

[0017] According to specific embodiments, the Add-On Electric Water Heater thermostat can be set to a temperature well above the set point for the factory-installed or otherwise usual thermostat of the water heater. This ensures that the building or consumer will always have hot water that is hot enough (determined by the normal operation temperature setting) while making optimal use of the available Add-On Electric Water Heating energy. If the water temperature is kept above the normal operating temperature by the Add-On Electric Water Heater, the factory-installed heater will normally be shut off in accordance with the normal operating thermostat control.

[0018] According to further embodiments, to maximize the thermal energy storage capacity of the water heater tank, the thermostat can be set higher than what is normally desired for people and/or pipes. For example, where water is usually kept at about 50°C for domestic use and the thermostat for the Add-On Electric Water Heater may be set to about 95°C.

[0019] According to specific embodiments, at high temperatures, a thermostat mixing valve is necessary at the output of the tank to protect the pipes and people. One mixing valve that may be used according to specific embodiments is the AMX 300 DirectConnect™ made by Honeywell[6], examples of which presently cost around $125. This allows cold water to be mixed with the heated water to yield the desired temperature, essentially increasing the water tank capacity.

[0020] According to specific embodiments, it is possible to provide the water heater, thermostat, and mixing in a single modular addition as shown in Figure 7. The water heater element is inserted through the hot water out port and consists of low resistance leads connected to a resistive loop that settles deep enough in the tank to ensure full convective mixing of all the water in the tank. The water heater also has an integrated thermostat that controls the temperature. Lastly, the hot water out (which can be as high or higher 100 Celcius because it is underpressure, surpressing boiling) is mixed with cold water in order to be appropriate for domestic hot water.

[5] www(.)sespvt(.)com/24-Volt-600-Watt-Heater-with-Adjustable-Thermostat, or with higher power ratings would be https://www(.)alibaba(.)com/product-detail/immersion-heater-with-thermostat-for-electric_1845276463.html?s=p capable of up to 3000 W, available for $2-$5 from China.

1.2 Thermostat Control

[0021] The Add-On Electric Water Heater can be controlled (e.g., switched on or off) via any combination of the following: an installed thermostat directly, commands from a cell phone or the utilities, based on water temperature, time of day, or the spot price of electricity. Further Example Embodiments

Example I:

[0022] For example, the Add-On Electric Water Heater can be used in water tanks in areas such as parts of Texas where electricity is free at night because of abundant power from wind turbines and traditionally low night-time demand. A resident in Texas with a natural gas water heater heats water at night for free with an Add-On Electric Water Heater controlled by a timer. The natural gas water heater is set to 50°C, but the Add-On Electric Water Heater thermostat is set to 95°C requiring an output mixing valve to lower the output to the pipes and users to be 50°C thus increasing the water capacity.

Example II:

[0023] For example, the Add-On Electric Water Heater can be used on a house with a traditional electric water heater or natural gas water heater and has photovoltaic panels that are not grid connected but used to power DC loads during the day. The thermostat for the Add-On Electric Water Heater is set to 70°C not requiring the addition of a mixing valve at the output of the tank. When PV power is not otherwise used it could be directed to the Add-On Electric Water Heater to heat water, thus storing the otherwise wasted electricity as thermal energy. We recognize that for this example of an electric factory-installed water heater, it would be possible to direct the PV electricity to the factory-installed elements in the electric water heater. However, this modification may be much more costly than simply inserting the Add-On Electric Water Heater through the drain or hot water port with an added or integrated thermostat. And the user maintains the ability to use grid power when necessary.

Example III:

[0024] As a further example, the utility can use water heaters as a dispatchable load in order to stabilize volatility in grid electricity. The utilities could provide the Add-On water heaters to electricity consumers allowing the independent system operator (ISO) to control the heaters as per a contact worked out with the consumers. Such a contract would read

[6] https://forwardthinking(.)honeywell(.)com/related_links/water/**amx_300**/.../62_3113.pdf

that the utility could provide the Add-On water heaters for free (or at a reduced price) to the consumers, and use the Add-On water heaters in order to stabilize the grid electricity, allowing the consumer to receive free or reduced cost electricity in the process.

1.3 Semi-Permanent Conversion

[0025] According to specific embodiments, a natural gas water heater can be permanently or semi-permanently converted to all electricity. Natural gas water heaters lose considerable heat through the flue and keeping the pilot light on. Efficiency can be improved according to specific embodiments if the pilot light is extinguished and the flue is sealed and insulated, either permanently or during periods or seasons when it is expected the add-on electric heating will be sufficient. This can be done permanently; or on a temporary basis by a responsible user. Alternatively, one could implement a pilot light and flue that can automatically be closed.

2 Add-On Thermostat or Controller

[0026] As described above, according to specific embodiments. an Add-On controller can be queried, configured, or controlled remotely by either a user or an electric supplier, over a communication channel. Any suitable communications network can be used, such as a cellular or Internet network and wired or wireless.

[0027] Figure 8 shows a computer system that is programmed or otherwise configured as described according to specific embodiments herein. All or part of such a system can be included in an integrated Add-On thermostat controller system according to specific embodiments. Figure 8 shows a computer system 801 that is programmed or otherwise configured to perform communication and control as described herein. The computer system 801 can be in whole or in part integrated with or may comprise one or more hardware components separate from the system but in communication with the system.

[0028] The control system 801 according to specific embodiments includes a logic processing unit (CPU, also “processor” and “computer processor” herein) 805. An example computer system 801 generally includes memory or memory location 810 (e.g., random-access memory, read-only memory, flash memory) and can include electronic storage unit 815, communication interface 820 (e.g., network adapter) for communicating with one or more other systems, and peripheral devices 825, such as a thermostat interface cache, and/or communication adapters. The computer system 801 can be operatively

coupled to a computer network ("network") 830 with the aid of the communication interface 820. The network 830 can be the Internet, an Internet and/or extranet, or an intranet and/or extranet that is in communication with the Internet. The network 830 in some cases is a telecommunication and/or data network. The network 830 can include one or more computer servers including servers of an electricity provider.

[0029] The logic processor 805 executes a sequence of machine-readable instructions, which can be embodied in a program or software. The instructions may be stored in a memory location, such as the memory 810. The processor 805 can be part of a circuit, such as an integrated circuit. One or more other components of the system 801 can be included in the circuit. In some cases, the circuit is an application specific integrated circuit (ASIC).

[0030] The computer system 801 can communicate with one or more remote computer systems through the network 830. For instance, the computer system 801 can communicate with a remote computer system of a user (e.g., operator). Examples of remote computer systems include personal computers (e.g., portable PC), slate or tablet PC's (e.g., Apple® iPad, Samsung® Galaxy Tab), telephones, Smart phones (e.g., Apple® iPhone, Android-enabled device, Blackberry®), or personal digital assistants. The user can access the computer system 801 via the network 830.

[0031] Methods as described herein can be implemented by way of machine (e.g., computer processor) executable code stored on an electronic storage location of the computer system 801, such as, for example, on the memory 810 or electronic storage unit 815. The machine executable or machine readable code can be provided in the form of software. During use, the code can be executed by the processor 805. In some cases, the code can be retrieved from the storage unit 815 and stored on the memory 810 for ready access by the processor 805. In some situations, the electronic storage unit 815 can be precluded, and machine-executable instructions are stored on memory 810.

[0032] The code can be pre-compiled and configured for use with a machine have a processor adapted to execute the code, or can be compiled during runtime. The code can be supplied in a programming language that can be selected to enable the code to execute in a pre-compiled or as-compiled fashion.

[0033] Aspects of the systems and methods provided herein, such as the computer system 801, can be embodied in programming. Various aspects of the technology may be thought of as "products" or "articles of manufacture" typically in the form of machine (or

processor) executable code and/or associated data that is carried on or embodied in a type of machine readable medium. Machine-executable code can be stored on an electronic storage unit, such memory (e.g., read-only memory, random-access memory, flash memory) or a hard disk. "Storage" type media can include any or all of the tangible memory of the computers, processors or the like, or associated modules thereof, such as various semiconductor memories, tape drives, disk drives and the like, which may provide non-transitory storage at any time for the software programming. All or portions of the software may at times be communicated through the Internet or various other telecommunication networks. Such communications, for example, may enable loading of the software from one computer or processor into another, for example, from a management server or host computer into the computer platform of an application server. Thus, another type of media that may bear the software elements includes optical, electrical and electromagnetic waves, such as used across physical interfaces between local devices, through wired and optical landline networks and over various air-links. The physical elements that carry such waves, such as wired or wireless links, optical links or the like, also may be considered as media bearing the software. As used herein, unless restricted to non-transitory, tangible "storage" media, terms such as computer or machine "readable medium" refer to any medium that participates in providing instructions to a processor for execution.

[0034] Hence, a machine readable medium, such as computer-executable code, may take many forms, including but not limited to, a tangible storage medium, a carrier wave medium or physical transmission medium. Non-volatile storage media include, for example, optical or magnetic disks, such as any of the storage devices in any computer(s) or the like, such as may be used to implement the databases, etc. shown in the drawings. Volatile storage media include dynamic memory, such as main memory of such a computer platform. Tangible transmission media include coaxial cables; copper wire and fiber optics, including the wires that comprise a bus within a computer system. Carrier-wave transmission media may take the form of electric or electromagnetic signals, or acoustic or light waves such as those generated during radio frequency (RF) and infrared (IR) data communications. Common forms of computer-readable media therefore include for example: a floppy disk, a flexible disk, hard disk, magnetic tape, any other magnetic medium, a CD-ROM, DVD or DVD-ROM, any other optical medium, punch cards paper tape, any other physical storage medium with patterns of holes, a RAM, a ROM, a PROM

and EPROM, a FLASH-EPROM, any other memory chip or cartridge, a carrier wave transporting data or instructions, cables or links transporting such a carrier wave, or any other medium from which a computer may read programming code and/or data. Many of these forms of computer readable media may be involved in carrying one or more sequences of one or more instructions to a processor for execution.

3 Conclusions

[0035] Thus, according to specific embodiments, the present invention is involved with methods and/or systems and/or devices that can be used together or independently to provide efficient use of electric power for heating as described herein. This description introduces a selection of concepts that are further described or can be further understood from other papers submitted with this application. Key features or essential features of the claimed subject matter are discussed throughout this submission, thus no individual part of this submission is intended to determine the scope of the claimed subject matter.

[0036] It is well known in the art that systems and methods such as described herein can include a variety of different components and different functions in a modular fashion. Different example specific embodiments and implementations can include different mixtures of elements and functions and may group various functions as parts of various elements. For purposes of clarity, embodiments of the invention are described in terms of systems that include different innovative components and innovative combinations of innovative components and known components. No inference should be taken to limit the claimed invention to combinations containing all of the innovative components listed in any illustrative embodiment in this specification. The general structure and techniques, and more specific embodiments that can be used to effect different ways of carrying out the more general goals are described herein. Although only a few embodiments have been disclosed in detail herein, other embodiments are possible and the inventor(s) intend these to be encompassed within this specification. The specification describes specific examples to accomplish a more general goal that may be accomplished in another way. This disclosure is intended to be exemplary, and the claims are intended to cover any modification or alternative that might be predictable to a person having ordinary skill in the art.

[0037] It is intended that only those claims which use the words “means for” are intended to be interpreted under 35 U.S.C. § 112, sixth paragraph. Moreover, no

limitations from the specification are intended to be read into any claims, unless those limitations are expressly included in the claims.

[0038] Where a specific numerical value is mentioned herein, it should be considered that the value may be increased or decreased by 20%, while still staying within the teachings of the present application, unless some different range is specifically mentioned. Where a specified logical sense is used, the opposite logical sense is also intended to be encompassed.

WHAT IS CLAIMED:

1. An electrical add-on heating element comprising:
an immersion heater inserted into a port in a vessel;
an electrical power source;
wires connecting the immersion heater to the power source that can be inserted into a hot water tank, allowing the water tank to function as before, but with the additional capability of heating the water with this "Add-On Electric Water Heater."

2. The apparatus of claim 1 further comprising:
an electrical power source that is either AC or DC from any source including grid, photovoltaic solar cells, wind power, or any other electrical generation; or from an electrical storage medium such as batteries.

3. The apparatus of claim 1 further comprising:
electrical switch between the heating element and power source that will allow the electricity to power the heating element, turn the electrical power off, or route the electrical power elsewhere.

4. The apparatus of claim 3 further comprising:
an electrical switch controlled by a thermostat that measures the temperature of the water by any conventional means including thermocouples, bimetallic discs, bimetallic strips, electronic means or taking the temperature from the standard thermostat on the pre-existing vessel.

5. The apparatus of claim 4 further comprising:
further wherein the thermostat can be integrated into the heating element feed through, integrated as part of the heating element or a separate device inserted against the tank under the insulation.

6. The apparatus of claim 4 further wherein the thermostat is set to a temperature substantially higher than the factory installed thermostat is set, allowing the immersion heater to heat the water when the other heater is not engaged.

7. The apparatus of claim 6 further wherein the temperature of the water can be made substantially higher without harm to people or infrastructure through the use of a mixing valve, thereby increasing the capacity to store thermal energy. This temperature can be above 60°C and optimally between 80°C and 95°C. At a pressure of 90 psi the boiling

point of water is 160°C, allowing a more optimal storage temperature between 140°C and 155°C.

8. The apparatus of claim 7 further comprising the use of the drain port for insertion.

9. The apparatus of claim 7 further comprising the use of the hot water output port of the water tank.

10. The apparatus of claim 8 and 9 further comprising:

the insertion of a “T” or other branching pipe, allowing the continued use of a drain or hot water output, respectively with the addition of the Add-On Electric Water Heater.

11. The apparatus of claim 10 further comprising:

modification of the immersion heater by bending of immersion heater, or otherwise, to allow it to fit through the drain and prevent obstruction from the central flue (of natural gas water heater tanks) or bottom of tank; and/or including a section of the internal wire that is not sufficiently resistive to result in a section of the heating element that does not substantially heat the water where heating is not desired; and/or making the immersion heating element narrower than usual in order to allow passage through the pre-existing vessel port; and/or patching any cracks in the modified heating element (due to bending) through soldering, welding, adhesive or otherwise.

12. The apparatus of claim 10 further comprising:

a single modular device that attaches to the hot water (out) and cold water (in) pipes whereby the thermostat/heating unit is inserted into the hot water tank, extending substantially down into the tank as to result in full convective mixing of the tank’s contents;

such that the hot water out is mixed with cold water from the cold water in pipe in order to result in a temperature that is appropriate for domestic hot water.

13. The apparatus of claim 11 further comprising:

a swivel adapter to allow insertion of immersion heater without rotation.

14. An electrical immersion heater that can fit through a small pipe of inner diameter of 1.5” or less, optimally 1” or less, most optimally of ¾” or less, or possibly more optimally of ½” or less, as required by the factory installed ports.

15. The apparatus of claim 14 further comprising an electrical immersion heater that has low resistance leads extending into the immersion tubing in order to limit the hot portion of the heating element to a given distance from the swivel adapter.

16. The apparatus of claim 15 further comprising an electrical immersion heater made by means of wires of resistive metal (such as Nickel-Chromium wire) running through pieces of nonconducting material (such as glass beads or fiberglass) inside of metal tubing (such as stainless steel tubing).

17. The apparatus of claim 16 further comprising nonconducting material that is substantially transparent to light, including all wavelengths of light, especially infrared radiation, allowing for more effective heat transport from the wire to the metal housing (tubing).

18. The apparatus of claim 17 further comprising special construction to make a tight radius turn including but not limited to inclusion of beads of a small radius.

19. The apparatus of claim 14 used as a heating element in connection with any of claims from claim 1 through claim 13.

20. A technology limiting the flow of air through the flue of a natural gas water heater either permanently or temporarily thereby decreasing heat loss through the flue when the natural gas heating is not used such as inserting Styrofoam into the port, or a lid on the port.

21. The apparatus of claim 20 further comprising the ability to turn off the pilot light and completely occlude the flue opening, eliminating air-flow through the flue.

22. The apparatus of claims 21 further comprising the ability to open and close the flue in order to turn natural gas heating on and off.

23. The use of claim 22 in connection with claim 13 and/or claim 19.

24. The apparatus of any of claims 13, 19, and 23 or any combination thereof, further comprising a means to control the temperature settings or power to the heater including remote cell phone apps, computerized communicating thermostat, connection with the internet and communication with the utilities by any means including that of a “smart grid”.

25. The apparatus of claim 24 further comprising a means to stabilize the electrical grid by means of demand response, or demand side management, whereby consumers store surplus electrical energy as thermal energy.

26. The apparatus of claim 25 further comprising a means for utilities to take control of heating consumers' water, and thereby stabilize the grid by using the bank of controlled water heaters as a dispatchable load in order to compensate for changes in demand or variable electrical sources such as wind.

27. The apparatus of claim 1 further comprising:

a controller that activates the add-on electric heater in response to any one or any combination of: time, temperature, commands received of a communications medium, etc.

28. The apparatus of claim 1 further comprising:

a user input allowing a user to configure the controller.

29. The apparatus of claim 1 further comprising:

an internet or other communications interface allowing a user to monitor and/or configure and/or activate the controller.

30. The apparatus of claim 1 further comprising:

an internet or other communications interface allowing a third-party to monitor and/or configure and/or activate the controller.

ADD-ON ELECTRIC HEATING

ABSTRACT OF THE DISCLOSURE

Method and apparatus allowing use of an add-on electrical heating element.

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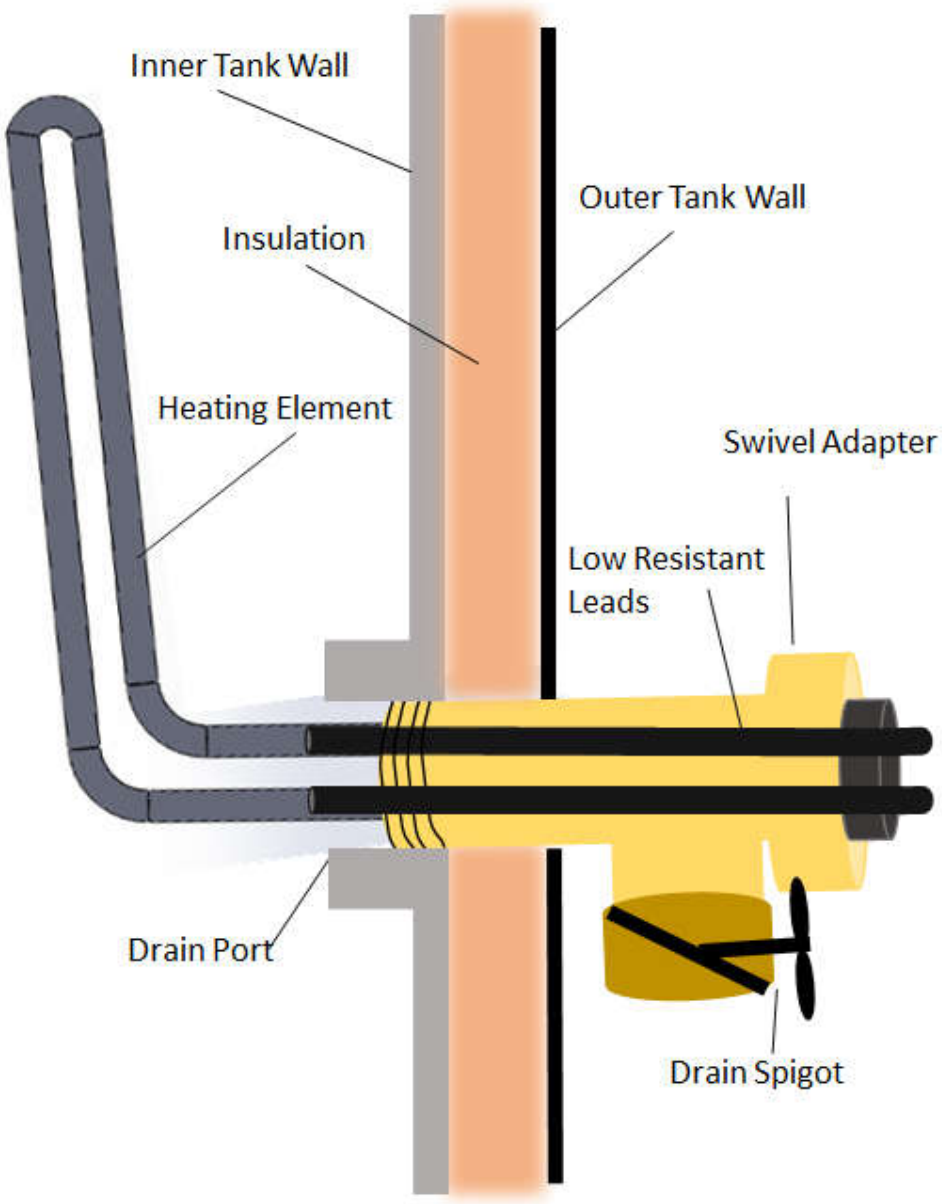

Figure 1 Heating Element with swivel adapter and steel leads.

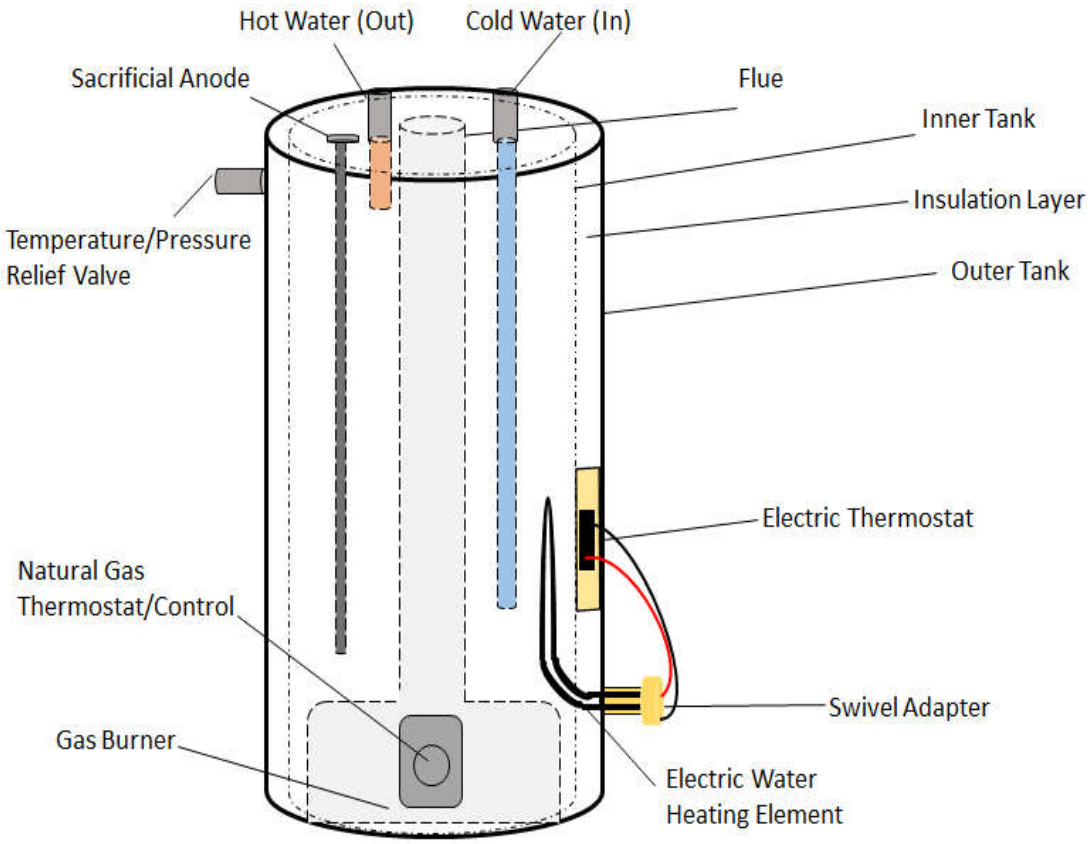

Figure 2: Natural gas tank with Add-On Electric Water Heater and thermostat in place on side of tank.

Figure 3

Figure 4

Figure 5

Figure 6

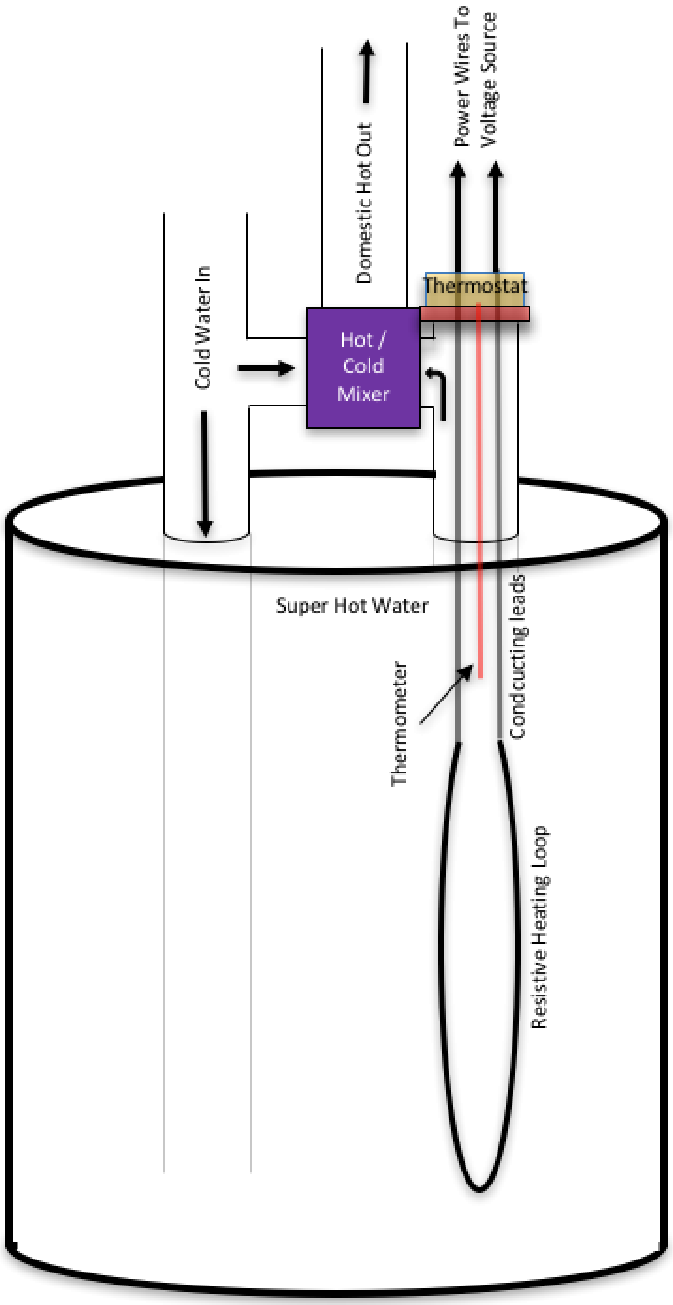
Power Wires To Voltage Source
Domestic Hot Out
Thermostat
Cold Water In
Hot / Cold Mixer
Super Hot Water
Thermometer
Conducting leads
Resistive Heating Loop

Figure 7

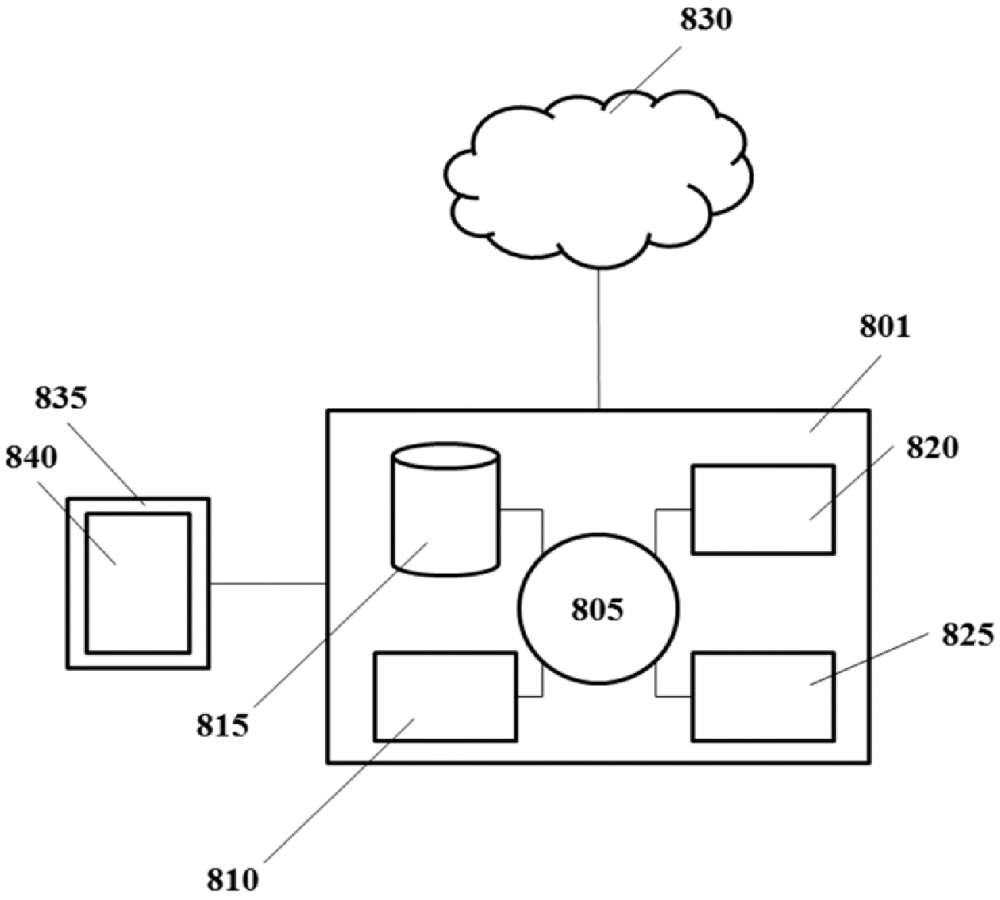

Figure 8