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WATER HEATING AND CIRCULATING DEVICE

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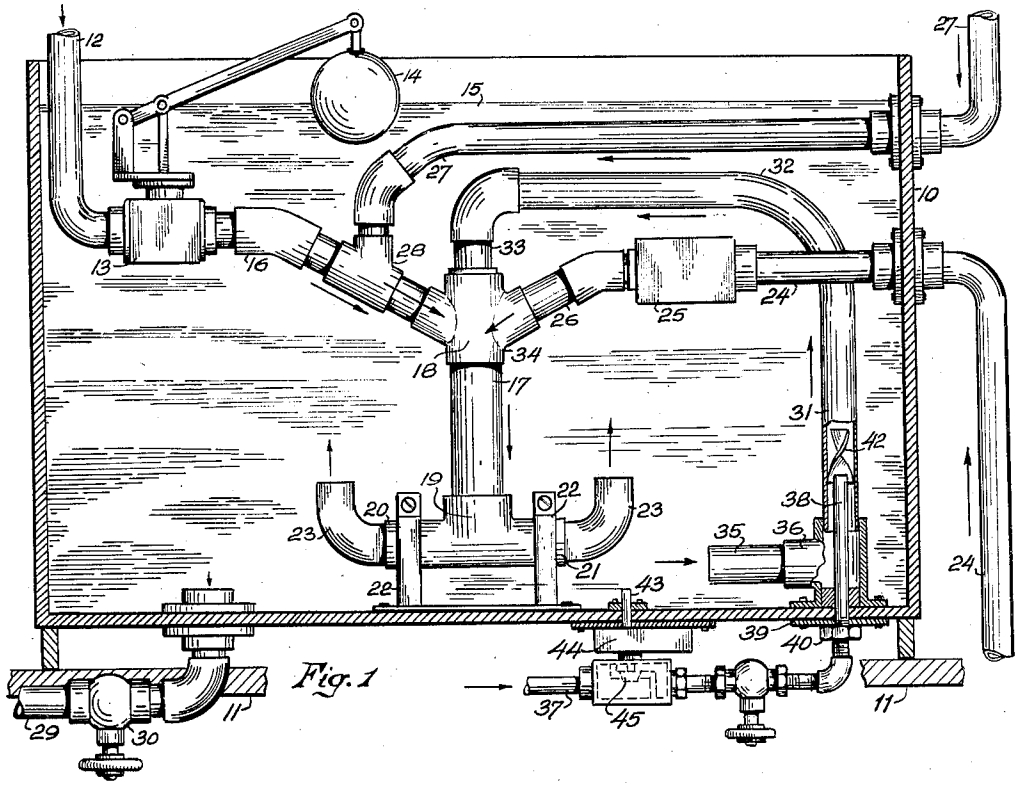


Fig. 1

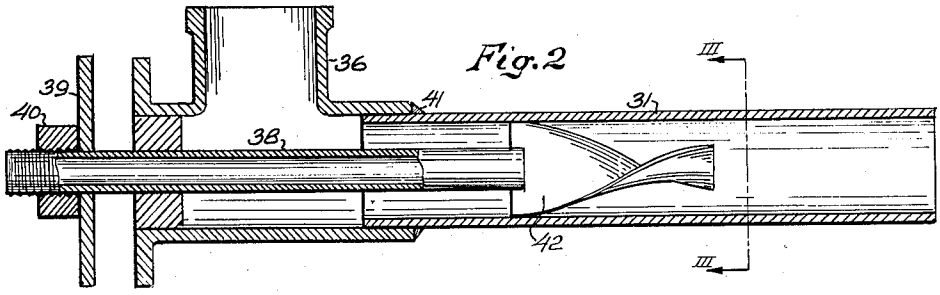


Fig. 2

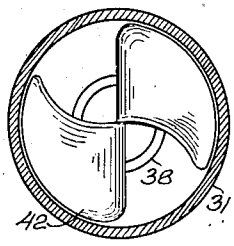


Fig. 3

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WATER HEATING AND CIRCULATING DEVICE

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3 Claims. (Cl. 261—77)

This invention relates to water heaters and more particularly to hot water circulating heaters, although certain features thereof may be employed with equal advantage for other purposes.

It contemplates more especially the provision of means for injecting a heat medium such as steam into a system for circulation through a water tank to uniformly elevate the temperature of its contents incident to effecting thorough circulation.

Hot water is used in abundance in laundries and other commercial enterprises, and in consequence thereof it becomes an important item to provide such most efficiently and expeditiously from the standpoint of dependability, expense and labor. In laundries, hot water is supplied to the various washing machines by gravity from a tank which is situated upon or proximate to the roof of the building structure. This requires heat to be supplied from a remote source, and it has been found efficacious to employ steam both as a heating and circulating medium. Then, too, waste energy mediums such as the exhaust of steam engines and the condensate of steam heated machines such as laundry ironers, may be utilized to a great advantage in elevating the temperature of water for commercial laundry use.

One object of the present invention is to simplify the structure and improve the operation of devices of the character mentioned.

Another object is to provide a means for injecting a heat medium such as steam together with waste heat energy, ordinarily available and discarded, into a water tank to elevate the temperature of the contents as well as to effect the complete circulation thereof.

Still another object is the provision of means for effecting complete comingling between the particles of water confined in a tank incident to imparting an elevated temperature thereto.

A still further object is to provide a laundry hot water feeder system with a steam injector having means in association therewith for imparting twirling movement and circulation to water.

Still a further object is to provide a helical deflector plate in the path of injected steam for imparting twirling movement to the water which is comingled therewith for circulation and temperature elevation.

Other objects and advantages will appear from the following description of an illustrative embodiment of the present invention.

In the drawing:

Figure 1 is a sectional view in elevation of a water tank with its accessory connections embodying features of the present invention for supplying hot water to any suitable location responsive to the gravity discharge thereof.

Figure 2 is a sectional view of a steam injector embodying features of the present invention.

Figure 3 is a sectional view taken substantially along line III—III of Figure 2.

The structure selected for illustration comprises a water tank 10 of any suitable configuration and size to meet the requirements of any particular installation or commercial enterprise such as a laundry where hot water is used in abundance. The tank 10 is supported in an elevated position by any suitable structure such as the roof 11 of a building structure wherein the requirements for hot water are supplied by the tank 10. The tank 10 is furnished with water which passes from a source of supply through a pipe 12 having the discharge end thereof in communication with a valve housing 13 fitted with a float control 14 responsive to the water level 15 in the tank 10. Thus, the water level 15 in the tank 10 is maintained substantially uniform.

As shown, the valve housing 13 communicates with a pipe passage 16 which has connection with a down-flow mixing pipe 17 through the medium of a branched coupler 18. The vertical mixing pipe 17 preferably terminates in a T-union 19 which has horizontal water issuing arms 20 and 21 to distribute the flow of water from the supply pipe 12 to all portions of the tank 10. Brackets 22 are attached to the bottom of the tank 10 for vertically upward support to engage the arms 20 and 21, thereby maintaining the pipe 17 vertically erect against displacement. Suitably shaped elbows 23 may be detachably connected to the arms 20 and 21 to direct the issuing water along a varied circuitous path within the tank 10.

In order to utilize the waste heat in the exhaust gases of steam engines usually constituting the source of mechanical power in laundries, the engine exhaust communicates with a pipe 24 which is directed to the interior of the tank 10. An exhaust manifold 25 may be positioned in the tank 10 below the water level 15 for connection with the pipe 24, the other end of the manifold 25 having a pipe 26 connected therewith for communication with another branch of the coupler 18. Thus the exhaust heat of the steam engine may be absorbed by the water commingling

therewith as such passes through the supply pipe 12 to the mixing pipe 17.

As is customary, all laundry machines such as steam heated ironers, are equipped with steam traps to collect the condensate which is deposited therein. The condensate is possessed of heat energy which may also be utilized in elevating the temperature of the water supplied to the tank 10. This is accomplished by collecting the condensate from all sources of supply in a laundry, and causing the flow thereof through a pipe 27 which terminates in the water line 16 by connection thereto through a pipe elbow 28 prior to entry within the mixing pipe 17. This tends to elevate the temperature of the water issuing through the pipe 16 for eventual passage through the mixing pipe 17. In consequence thereof, water is supplied to the tank 10 at a temperature above the temperature of the water supply, thereby requiring less heat from an auxiliary thermal producing medium. A discharge pipe 29 communicates with the bottom of the tank 10 to effect the gravity discharge of the water from the tank 10 to any suitable appliance such as washing machines wherein hot water is necessary for cleansing operation. A valve 30 is placed in the discharge pipe line 29 to regulate the flow therethrough.

Obviously, it is necessary or at least highly desirable that the water confined within the tank 10 be circulated during the heating thereof to effect temperature elevation to the required degree prior to discharge through the valved pipe 29. To this end, a pipe 31 is disposed in vertical spaced parallelism with the side of the tank 10 so that a normally directed extension 32 thereof will provide a depending portion 33 which communicates with the interior of the tank 10, it being noted that the depending portion 33 is in threaded engagement with a branch 34 of the coupler 18, thereby leading directly to the mixing pipe 17. Another right angular or normally directed extension 35 is connected to the pipe 31 by means of an elbow 36 so as to serve as a water intake from the interior of the tank 10, and to effect water circulation with consequent temperature elevation. As a result, the pipe 31 serves as a by-pass for the water content of the tank 10 so that circulation may be effected to establish complete commingling between the water particles during the subjection thereof to a heating medium to be hereinafter described.

The heating medium, in this instance, comprises steam which is supplied from any suitable source through a pipe 37 which is comparatively much smaller in diameter than the pipe 31 for axial projection therethrough. The steam injecting pipe 37 has an extension 38 which is projected through a flange 39 in threaded engagement therewith, there being a nut 40 in engagement with the pipe extension 38 to contact the flange 39 in maintaining the axial alignment and communication of the injector tube 38 within the pipe 31. The injector tube 38 is confined within the union 36 for partial extension within the pipe 31 (Figure 2) which is joined thereto by welding or otherwise to provide a rigid hermetically sealed joint 41. As a result the steam flowing through the pipe 37 passes through the injector tube 38 for discharge within the pipe 31 which is filled with water from the bottom region of the tank 10, thereby effecting the passage thereof upwardly for discharge from the extremity 33 to the top region of the mixer pipe 17 so that endless circulation is established therein to the end of effecting complete commingling between the water particles during the subjection thereof to the steam which serves as a heating medium therefor, thereby elevating the temperature to a degree required for its intended purpose.

In order to impart twirling movement to the water in conjunction with the steam which serves as the vehicle therefor, a deflector plate 42 is fixed to the interior of the pipe 31 in the path of the discharge end of the injector tube 38 so as to compel the steam and water to follow a tortuous path. In the present embodiment the deflector plate 42 is of helical configuration to accomplish twirling movement of the water during its linear traverse through the pipe 31 for continuous circulation from and to the bottom and top regions, respectively, of the tank 10.

With the arrangement of parts above described, it will be apparent that novel means have been provided to impart an elevated temperature to water during the circulatory movement and particle comingling thereof to effect uniform temperature elevation. This is especially efficacious in situations of the character mentioned in that the water confining tank is at a point remote from any possible heating medium, thereby efficiently raising the temperature of the water to meet the requirements of commercial practice. Then, too, all available heat which is ordinarily wasted, is utilized for a productive purpose. Obviously, the degree of temperature elevation depends upon the quantity of steam injected during any predetermined interval of time and for that reason regulation is found necessary or at least highly desirable. To this end, a thermostat 43 of standard construction is fixed to the tank 10 for projection therethrough for direct subjection to the water confined therein. The thermostat controls are confined in a casing 44 which are operatively connected with a valve 45 in the steam supply tube or pipe 37. In consequence thereof, the thermostat 43 which may be set to respond at any predetermined temperature, controls the position of the valve 45 for regulating the passage of steam through the pipe 37, thereby controlling the temperature elevation within the required degree.

Various changes may be made in the embodiment of the invention herein specifically described without departing from or sacrificing any of the advantages of the invention as defined in the appended claims.

I claim:

1. In a water heater, the combination with a tank for confining water therein, of a water supply line in communication with said tank, a float control in said water supply line, means for enabling the discharge of water from said tank, steam injector means in communication with said tank, means for conveying steam engine exhausts into said tank, means for imparting a twirling movement to said steam for uniformly elevating the temperature of the water therein, and thermostatic means responsive to the temperature of the water to control said steam injector means.

2. In a water heater, the combination with a tank for confining water therein, of a water supply line in communication with said tank, means for enabling the discharge of water from said tank, means for conveying waste steam condensate to said tank, other means for discharging steam engine exhausts into said tank for circulation with the water supply responsive to a

steam injector means, and means for injecting steam in said tank for circulating the water therein to serve as a heating medium therefor, said steam injecting means comprising a pipe in circulating communication with the interior of said tank, a steam injector axially disposed in said pipe for circulating the water of said tank therethrough, and a helical deflector within said pipe in the path of said steam injector.

3. In a water heater, the combination with a tank for confining water therein, of a water supply line in communication with said tank, means for enabling the discharge of water from said tank, steam injector means in communication with said tank, and means for imparting a twirling movement to said steam for uniformly elevating the temperature of the water therein, thermostatic means responsive to the temperature of the water to control said steam injector means, and means for directing the waste condensate and engine exhaust to said water supply line.

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