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HOT WATER HEATERS

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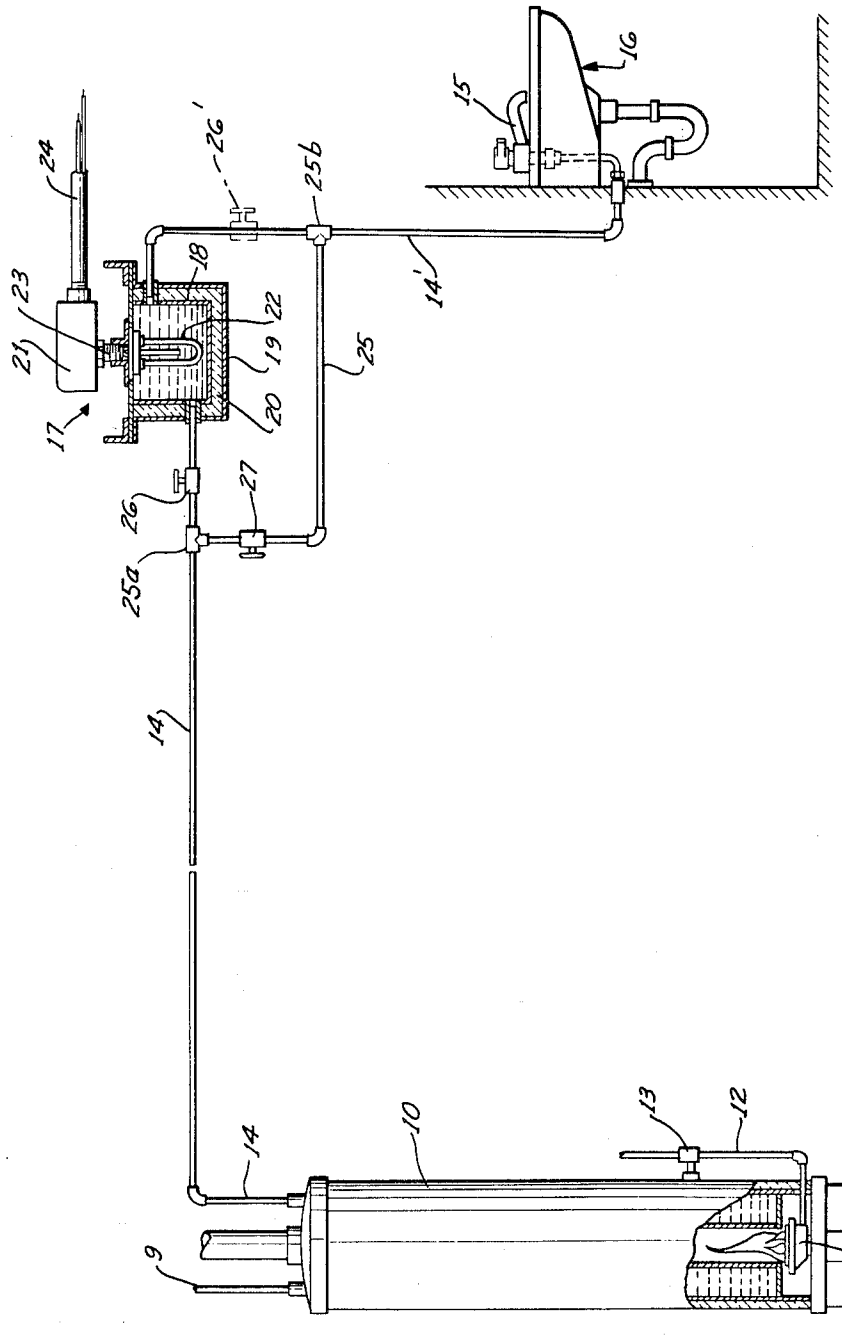

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HOT WATER HEATERS

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My invention relates to improvements in hot water generating systems and particularly to a device for providing an immediate source of hot water to a faucet which is located a substantially remote distance from a hot water tank.

When the hot water tank is located a considerable distance from the hot water faucet, the water must be allowed to run for a period of time before hot water is available. This results in great inconvenience to the person using the hot water faucet as well as involving the waste of a substantial amount of water.

It is, therefore, an object of my invention to provide an immediately usable source of hot water at a hot water faucet which is located a substantial distance from the main hot water tank.

Another object of my invention is to provide such a device which is adaptable to all conditions of plumbing regardless of the distance from the main tank to the hot water faucet.

A further object of my invention is to provide such a device which is inexpensive to install and operate and highly durable in use.

A still further object of my invention is to provide a device of the above type which is compact and completely self-operating.

Other objects of my invention and the invention itself will be completely understood from the following description and the accompanying drawing in which said drawing:

The figure of the drawing is a semi-diagrammatic view of a hot water system incorporating the device of the present invention.

Referring now to the drawings, in all of which like parts are designated by like reference characters, at **10** I show a main hot water tank of relatively large capacity having a heating element **11**, herein shown as a gas burner. Although the tank illustrated is of the well-known under-fired type, it will be understood that any suitable method of heating hot water may be used. As herein shown and illustrated, the burner **11** is supplied with gas through a gas line **12**. A thermostat **13** is interposed in the line **12** and projects into the main tank **10** whereby the heat from said burner is controlled by increasing or decreasing the supply of gas in a conventional manner.

Water is supplied to the main tank **10** by means of an intake pipe **9** and hot water from said tank is discharged through an outlet pipe indicated at **14**. At **16** I show a typical wash basin installation having a hot water faucet **15** supplied by a water pipe **14'**. The pipes **14—14'** constitute the means by which hot water from the main tank **10** reaches the faucet **15**.

A small supplemental hot water heater **17** is interposed between the pipe **14** and the pipe **14'** and a portion of the water from the main tank **10** must pass through the said supplemental hot water heater before reaching the hot water faucet **15**. A by-pass pipe **25** is also provided by which a portion of the water from the tank **10** by-passes the small supplemental heater **17** and proceeds to the pipe **14'** and from thence to the faucet **15**. The said by-pass pipe **25** is connected into the pipe **14** at a T fitting **25***a* interposed between the said main tank **10** and the supplemental heater **17**, and is also connected to the pipe **14'** as indicated at the T fitting **25***b* interposed between the said supplemental heater **17** and the faucet **15**.

Although the hot water generating system of my invention as herein shown provides a supplemental heater **17** interposed in the pipes **14—14'**, it will be understood that said heater can alternatively be installed in the by-pass line **25** to obtain the same result which is that of having a supplemental heater connected in a parallel arrangement with the pipe leading from the main tank **10** to the faucet **15**.

The small supplemental water heater **17** preferably comprises a small supplemental tank **18**, an outer shell **19** spaced away from said supplemental tank, and heat insulation material indicated at **20** interposed between the tank **18** and the outer shell **19**. A conventional, preferably immersion type electric heating unit **21** is mounted on top of the supplemental tank **18**, said heating unit having an immersion type heating coil **22** projecting down into said tank. The heating unit **21** is also provided with a thermostat **23** electrically operated through the wiring as shown at **24** by which the water in the tank is maintained at a constant temperature, preferably substantially higher than the main tank **10**.

It will be understood from the above description that a certain amount of water from the main tank **10** is caused to pass through the supplemental tank **18** by means of the pipe **14** and from there to an outlet as by pipe **14'** which lead respectively into and out of said tank and that an additional amount of water from the tank **10** by-passes the supplemental tank **18** on its way to the faucet **15** by means of the by-pass pipe **25**.

In operation, all of the pipes **14**, **14'**, and **25**, as well as the tank **18** are filled with water. The amount of water to be contained in the supplemental tank **18** can be varied by varying the size of said tank, but in a typical installation, a capacity of four to six quarts would probably be sufficient. The water in the supplemental tank **18** is constantly maintained by the thermostat means at a relatively high temperature compared to that ordinarily desired at a hot water faucet, such as about 150°–180° F.

If the hot water faucet **15** has not been used for a considerable period of time, the water in the pipes **14** and **14'** as well as the pipe **25** will be cold. Under these conditions, actuation of the water faucet **15** causes water to flow both from the supplemental tank **18** and the pipe **25**, to be mixed at the T fitting **25***b* as it enters the pipe **14'**. The result of the mixing of the extremely hot water from the tank **18** and the cold water from the pipe **25** is to provide a water of usable temperature almost immediately at the faucet **15**. Experimentation has shown that under the above recited conditions, water will discharge from the faucet **15** at a temperature of approximately 120° F. It will be understood, however, that the temperature of the water at the faucet **15** can be varied depending upon the setting of the thermostat **23**, and the ratio of mixing at the T fitting **25***b* and any desired temperature can be provided.

In order to control the ratio of mixing between the hot water from the tank **18** and the cold water from the pipe **25**, I provide a pair of valves **26** and **27** interposed in the pipes **14** and **25** respectively. The valve **26** is located between the T fitting **25***a* and the supplemental tank **18** whereby the operation thereof effects water being supplied to said tank but does not effect

the flow of water through the by-pass 25. Flow through sa d pipe 25 is separately controlled by the valve 27. By individual adjustments of the valves 26 and 27, the ratio of mixing at the T fitting 25*b* can be established to further aid in providing water of optimum temperature to the faucet 15. It will be noted that the valve 26 could just as effectively be located in the pipe 14' between the supplemental tank 18 and the T fitting 25*b*, as indicated in dot-dash line at 26'.

It will be readily seen that the size of the supplemental tank 18 and the ratio of mixing between the valves 26 and 27 will depend upon the length of the pipe 14, the temperature of the water in said pipe, and the desired temperature of the water at the faucet 15. Said supplemental tank must contain sufficient hot water admixed with the cold water in the lines to supply the faucet 15 with water of the desired temperature until water from the main tank 10 reaches the supplemental tank 18 and the by-pass pipe 25 after which hot water will be supplied directly from the main tank. By restricting the flow at the valve 26, the supplemental supply of water can be made to last longer. If the water in the pipe 14 is unusually cold, this can be offset by restricting the flow at the valve 27 relative to the flow through the valve 26 to maintain proper water temperature at the faucet 15.

After said faucet has been open for a period of time, hot water from the tank 10 rather than the cold water from the line will, of course, pass through the supplemental heater 17, but it will flow so rapidly that very little heat will be picked up by the water from the heating unit 21. When the faucet 15 is turned off, the water present in the supplement heater 17 will be hot water from the tank 10, and it will, therefore, take very little time for said water to reheat to its preferably high temperature. Research shows that warm water remains in the pipes after the faucet has been turned off for a period of about 30 minutes on the average under the temperature condition recited herein. By the time the water in the pipes 14—14' and the by-pass 25 has had a chance to cool, the water in supplemental heater 17 will have fully recovered its predetermined temperature, the water in the supplemental tank 18 having been reheated to its predetermined temperature.

The supplemental heater 17 of my invention is small and compact and may be readily located either in the wall or under a sink or in any convenient place adjacent a hot water faucet. Once the thermostat 23 has been set for the desired temperature, and the ratio of mixing set for any particular installation, no further adjustment is necessary, and the heating device of my invention is thereafter completely self-operating.

The supplemental heater 17 is herein described and illustrated as having an electric, immersion type heating unit controlled by means of a thermostat, but any suitable regulating means may be used other than a thermostat, such as, for example, adjusting and controlling the amount of power input to the heating unit to hold the tank at a given temperature. Also, said heating unit could be heated by other controllable heating means, such as a gas burner. The only essential features of the supplemental heater are that it have sufficient capacity to provide hot water for mixing with the cold water until such time as hot water from the main tank reaches the faucet and that it be capable of rapid recovery.

It will be understood that many departures from the deails of my invention as it is herein described and illustrated may be made, such as changes in size and dimension, without, however, departing from the spirit of my invention or the scope of the appended claims.

What I claim is:

1. A hot water generating system comprising a main hot water tank of relatively large capacity, heating means for said main tank, a supplemental hot water tank of relatively smaller capacity, heating means for said supplemental tank, a faucet, a first pipe connecting said main tank to said supplemental tank, a second pipe connecting said supplemental tank to said faucet, a by-pass pipe connecting said first pipe to said second pipe whereby water from said main tank passes through both said supplemental tank and said by-pass pipe and is mixed at a junction of said second pipe and said by-pass pipe before discharge from said faucet.

2. A device for providing hot water immediately to a faucet positioned a remote distance from a main hot water tank connected by pipe means therewith wherein the water in said pipe means is cold, said device comprising a main hot water tank, heating means for said main tank, a faucet, a hot water heater of relatively small capacity adjacent said faucet, pipe means connecting said main tank to said hot water heater whereby a portion of the water from said main tank flows through said heater, means by which another portion of said water flows around said heater to re-enter said pipe means between said heater and said faucet whereby cold water from said pipe means is mixed with hot water from said heater to be discharged at said faucet.

3. A device for providing hot water immediately to a faucet positioned a remote distance from a main hot water tank connected by pipe means to said faucet when the water in the said pipe means is cold, said device comprising a main hot water tank, heating means for said main tank, a faucet, a hot water heater of relatively small capacity adjacent said faucet, pipe means connecting said main tank to said hot water heater whereby a portion of the water from said main tank flows through said heater, control means associated with said heater to maintain the water therein at a relatively higher temperature than that heated within the main tank, second pipe means connecting said heater to said faucet, means by which a portion of the water from the main tank bypasses said heater to re-enter the pipe means disposed between said heater and said faucet whereby cold water from said first pipe means is mixed in the second pipe means with hot water from said heater to be discharged at said faucet.

4. A hot water generating system for providing an immediate source of hot water to a faucet located a substanital distance from a main hot water tank and comprising a main hot water tank, heating means for said main tank, a faucet, a supplemental hot water tank of relatively small capacity located adjacent said faucet, an electric immersion type heater associated with said supplemental tank including thermostatic control means whereby water in said supplemental tank is maintained at a higher temperature than the water in said main tank, a first pipe connecting said main tank to said supplemental tank and a second pipe connecting said supplemental tank to said faucet, a by-pass pipe having a first connection means at one end thereof to said first pipe and a second connection means at the opposite end thereof to said second pipe whereby a portion of the water from said first pipe passes around said supplemental tank and is mixed with heated water from said supplemental tank in said second pipe to be discharged from said faucet, and valve means adapted to control the flow of water through said supplemental heater only.

5. A hot water generating system for providing an immediate source of hot water to a faucet located a substantial distance from a main hot water tank and comprising a main hot water tank, heating means for said main tank, a faucet, a supplemental hot water tank of relatively small capacity, said supplemental tank being located adjacent said faucet, means for heating said supplemental tank and maintaining the water therein at a higher temperature than the water in said main tank, a first pipe connecting said main tank to said supplemental tank and a second pipe connecting said supple-

mental tank to said faucet, a by-pass pipe having a first connection means at one end thereof to said first pipe and a second connection means at the opposite end thereof to said second pipe whereby a portion of the water from said first pipe passes around said supplemental tank and is mixed with heated water from said supplemental tank in said second pipe to be discharged from said faucet, a first valve in said first pipe between said first connection means and said supplemental tank for controlling the flow of water through said supplemental tank and a second valve in said by-pass pipe between said first and second connection means for controlling the flow of water through said by-pass pipe.

6. A hot water generating system for providing an immediate source of hot water to a faucet located a substantial distance from a main hot water tank and comprising a main hot water tank, heating means for said main tank, a faucet, a supplemental hot water tank of relatively small capacity located adjacent said faucet, said supplemental tank being located adjacent said faucet, means for heating said supplemental tank and maintaining the water therein at a higher temperature than the water in said main tank, a first pipe connecting said main tank to said supplemental tank and a second pipe

connecting said supplemental tank to said faucet, a by-pass pipe having a first connection means at one end thereof to said first pipe and a second connection means at the opposite end thereof to said second pipe whereby a portion of the water from said first pipe passes around said supplemental tank and is mixed with heated water from said supplemental tank in said second pipe to be discharged from said faucet, a first valve in said second pipe between said supplemental tank and said second connection for controlling the flow of water through said supplemental tank and a second valve in said by-pass pipe between said first and second connection means for controlling the flow of water through said by-pass pipe.

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