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METHOD AND MEANS FOR MAINTAINING HOT WATER
TEMPERATURES IN SUPPLY PIPES
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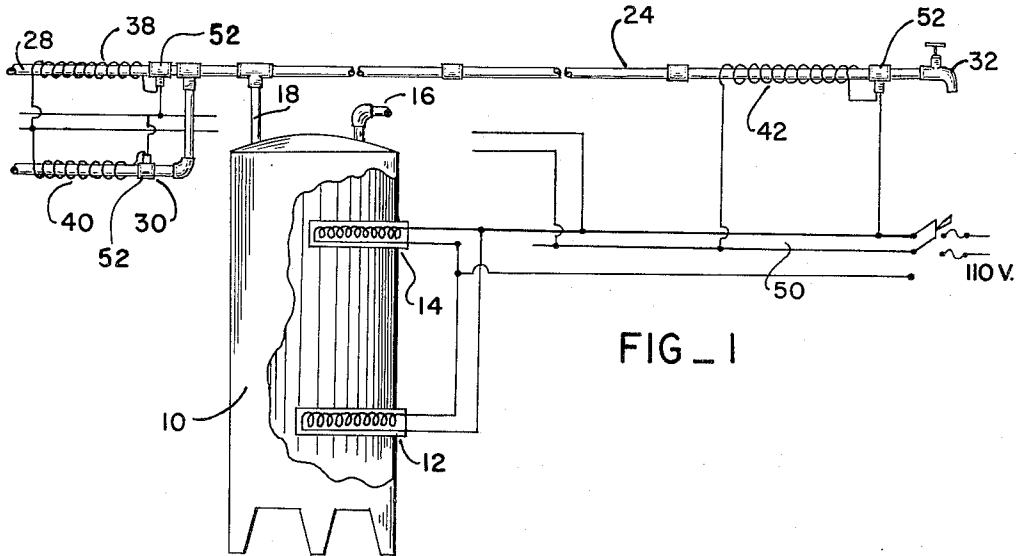


FIG. 1

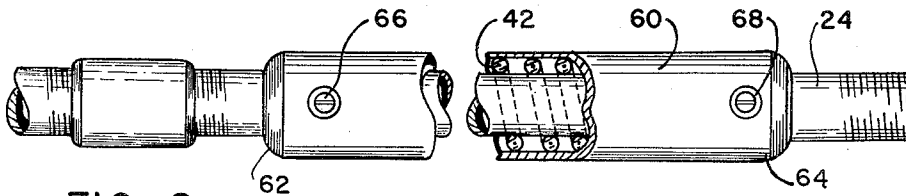


FIG. 2

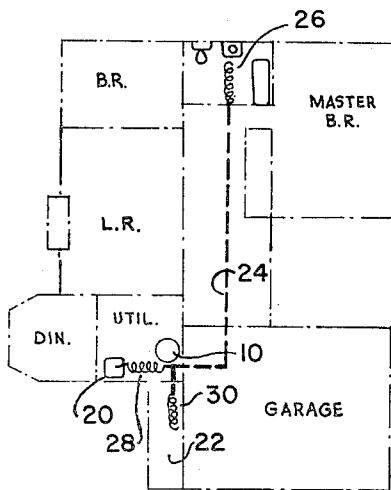


FIG. 3

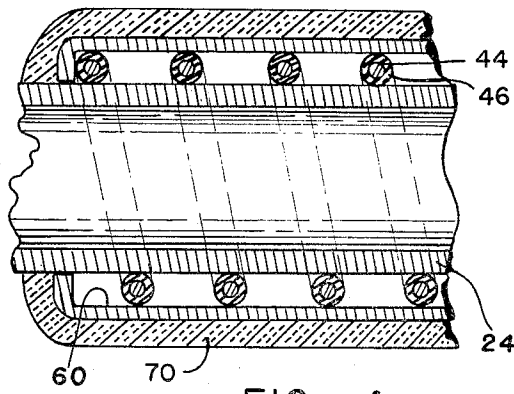


FIG. 4

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METHOD AND MEANS FOR MAINTAINING HOT WATER TEMPERATURES IN SUPPLY PIPES

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4 Claims. (Cl. 219—39)

This present invention is in the nature of an auxiliary heating means to make possible a new method of maintaining temperatures especially in hot water supply pipes, such as are used in residences, apartments, hotels and the like. This present method contemplates merely an auxiliary means for maintaining temperature in the hot water line, rather than initially raising the water to that temperature. The method is achieved by providing, preferably, a low temperature heating wire wrapped around the hot water supply pipes at a point near their discharge faucets. This means assures that as the user opens the faucet to draw hot water, he actually will get hot water instead of water that has cooled off since the former use of the faucet.

The user of modern housing, whether it is residential, hotels or apartments, has now become accustomed to having his wants generally supplied by the extensive technological developments in so many of the convenient devices that are in such common use. The majority of our modern dwellers take it for granted that they are living in a push-button age and that whatever they can reasonably want should be available to them and this has been largely achieved by the large number of devices that have been created to supply or to meet this need. One very common complaint, however, is that when it is desired to have hot water available, many times there is a very appreciable wait because the pipes adjacent the discharge faucet are filled with water that cooled down to the ambient air temperature, and it naturally follows that before hot water is available all of the cold water between the faucet and the source of hot water must be drained out of the supply pipes.

Economy, whether it is in the home or a commercial building, requires that water be heated by the most economical means, and that has been proved to be in or as part of the plant supplying general heat to the premises. Having water heated at a central point for use through a building requires that the heated water must be led over considerable distances through service supply pipes. When the water is in repeated usage, as in washing dishes or laundering and allied uses, the user merely turns on the faucet and has available hot water. On the other hand, when there are periods when water is not being used, then the water in the pipes cools down to the level of the ambient air, even though they may be insulated, and the disagreeable condition arises where there is no hot water immediately available. This is particularly objectionable when water is desired in a bathroom, for instance, especially when one is taking a shower bath and may have to re-adjust the water temperature several times during the beginning of his bath. There are innumerable cases on record where this change in temperature has resulted in serious physical injury to the bather. It is to overcome these deficiencies of the present equipment as noted, that I have provided a new method for maintaining the temperature of hot water in service pipes.

My invention contemplates that use will be made of a central heating unit for producing hot water in the quan-

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ties required in the premises served, and that auxiliary heating means will be applied to the exterior of the water supply pipes, which will maintain the pipes at a temperature substantially that of the desired temperature in the hot water system, in the range of 120° to 140° F. It is well recognized that there is a very appreciable difference between maintaining water at a given temperature level than to initially put the heat input into the water to bring it from a supply temperature up to the temperature desired in the premises. Economy requires that this initial input of heat to raise the temperature of the water initially is best supplied by a central heating plant, and the method of this present invention merely contemplates the maintaining of this temperature. It is desired to point out that this equipment is not to serve the purpose of a spot heater which has been employed in the past to initially heat the water, giving it its full temperature rise at or adjacent to the discharge faucet. Such arrangements are costly to install, and the high cost of electric current in such a large portion of our country prohibits the use of electric heating to make the initial heat input into the water to give it its optimum usable temperature.

The principal object of this present invention therefore is to provide a method and means to achieve the method for maintaining hot water up to its working temperature and to insure that it will be delivered to the user without delay when he turns on the hot water faucet.

A further object of this invention is to provide means for maintaining the hot water pipe and its contents at the temperature to which it has been raised by a normal hot water heating system.

A further object of this invention is to provide for the maintenance of the working temperature in a hot water system to the end that the hot water pipes, which normally are inclined to freeze ahead of the cold water, will be maintained at a temperature at all times to prevent any freezing of the pipes which may be in unprotected places, as in the walls or under the floor of a home.

A further object of this invention is to provide the convenience of instant hot water without any expensive or dangerous equipment.

Further objects, advantages and capabilities will be apparent from the description and disclosure in the drawings, or may be comprehended or are inherent in the device.

In the drawings:

Figure 1 is a diagrammatic view, illustrating in general the lay-out of a hot water system in a small home and showing the location of the electrical units which insure the workability of my present method;

Figure 2 is an enlarged fragmentary detailed sectional view to illustrate one form of the embodiment of the heating means which has proven to be acceptable for this special use;

Figure 3 is a diagrammatic view showing a typical house floor plan, and showing the distribution of the utilities and how my present equipment is employed therein; and

Figure 4 is a sectional view through a water pipe, illustrating a preferred arrangement of my temperature maintaining means.

Referring more particularly to the disclosure in the drawings, the numeral 10 designates a common form of hot water heater of the type employing usually a plurality of electric heating elements, as 12, 14. These elements are normally thermostatically controlled so that the water in storage will never be heated above a predetermined level. In ordinary homes the heating of water is rarely considered safe above 140°–160° F. Tank 10 has the usual cold water supply source, as 16, and the hot water discharge line, as 18. In the usual home this discharge line is usually divided into a number of circuits

to different points of use. As an example, a diagrammatic house plan is illustrated in Figure 3 in which it will be noted that the hot water tank 10 is installed so as to get relatively short runs to the kitchen sink, as 20, and the laundry trays or washing machine, as at 22. It almost invariably happens, however, that there will be one or more long runs of this hot water supply line, and in this illustration the same is shown in the long line, as 24, leading to the bathroom 26. It will be noted that the line to the kitchen, as 28, is relatively short and the line 30 to the laundry units has a slightly longer run.

In order to insure full use of my present method, the various branch lines, as 24, 28 and 30, are provided with a heating coil normally adjacent the discharge faucet, as 32. The heating element, however, employed with this method is formed in a manner quite different from the usual water heater, and this is due to the fact that in this instance it is only necessary to maintain temperature at the time the faucet is opened and until such time as the full supply of hot water is readily available from the heating source 10. The heating elements, as 38, 40 and 42, are preferably formed of a low temperature so-called black heating wire. This is a form of wire that has been used for many years in hot houses and in nurseries where it is desired to maintain a given temperature in seed beds or the like over a long period. The wire itself, as 44, is normally a copper conductor, although in some instances other metals have been successfully employed. The conductor, however, which is a single conductor, is encased throughout its length in suitable electrical insulation 46. This is quite a departure from the ordinary heating element and is possible because the conductor is carefully balanced for length and its resistance so that it cannot, with the ordinary current supplied to it, rise above a relatively low temperature. In this present instance, a temperature of 160° to 180° F., is normally the maximum that is ever required. At these temperatures the wire itself, of course, does not take on the characteristic incandescent coloring or the red coloring of certain lower temperature elements, but retains its normal color even in darkness because of the relatively low temperature. The same low temperature characteristics, of course, make it possible for the insulation 46 to have a long expected life.

In use it has been found more desirable to merely wrap the insulated wire around the metal water conducting pipe, as 48, having only the necessary insulation to prevent shorting which is adequately provided by the insulation normally supplied as a coating on wire 44. In its simplest form it may be secured to the pipe by any convenient means.

In order to use the 110 volt current supply, it is normal to need a relatively long length of wire 44 in order that its maximum temperature cannot rise above the desired level. This, however, has another desirable characteristic in that it covers a considerable length of pipe and thereby heats a sufficient length of pipe so that it will maintain not only the temperature of the water within that portion of the pipe but, when properly proportioned, will supply a pipe heating means so that water that may have cooled off, as in pipe 24 between coil 42 and the hot water source 10, will be raised in temperature as it passes through the heated pipe 24 just prior to its discharge, as out through faucet 32.

A preferred circuit arrangement is shown in Figure 1 in which it will be noted that the electric circuit passes from one of the conductors and supply line 50 first through a thermostat 52 and then through the long line of heating wire 42, and then the extreme end is connected to the second conductor of the supply line 50. The thermostat has been found to be a very useful addition to this arrangement which, while it is not necessary to maintain the top temperature, it serves to disconnect the current from coils, as 38, 40 and 42, during the period where the normal water passing through the pipes is of

sufficiently high temperature to satisfy all requirements. Normally the thermostats, as 52, are set at a temperature somewhat below the normal temperature supplied by tank 10 and which temperatures maintain at the faucet substantially when the service is being used to an adequate degree. It is only when the temperature of the other water in the pipes has lowered to the point that the pipe itself cools down to a point where the thermostats 52 are actuated and cut in their heating circuit so as to maintain the water temperature substantially to the level normally used except where the differential required for this explained functioning of the thermostats.

The three coils, as 38, 40 and 42, normally are of about the same wattage, and this will mean that they should be of the same approximate length. It does, however, occur that in very long runs, such as is indicated in the long supply line 24, it might be desirable to extend the length of coil 42 so as to permit it to deliver higher wattage. This increased wattage will not of necessity increase the operating temperature of the heating wire 44, if proper proportioning is used in its design.

With the even increasing "do-it-yourself" work that is now being done by so many home owners, it is very desirable that the heating unit be very carefully produced and calibrated by competent people, as factory employees, and this has made it desirable to supply the heating unit made up after the showing of Figure 2, in which the water pipe, as 24, is wound throughout a portion of its length by a properly adjusted coil 42 and then an outer protective covering, as 60, is passed over the assembly. The outer covering is preferably metal of sufficient thickness to be a truly protective covering. Metal of the type normally supplied for electric light conduits and the like has proven very satisfactory, particularly in that they can be beaded over at the ends, as at 62 and 64, so as to form a tight enclosure which definitely locates the coil upon the pipe in its properly spaced relationship. The ends of coil 42 are brought out to suitable terminals, as 66 and 68, which may with full assurance of safety be connected to the normal 110 volt supply line. For use under extreme conditions, as in localities where it has been common to cover supply pipes, this structure may take on the form as shown in Figure 4 in which the basic unit of Figure 2 is employed and then a suitable fibrous insulation material, as 70, is installed around the heating unit, enclosing also the shielding covering, 60.

Other modifications will become apparent, once the plan is understood, as for instance, having an open calibrated coil of heating wire resiliently spaced and precoiled. Such a coil may be easily wrapped around a fluid pipe connected to a thermostatic controlled electrical supply and thus provide emergency protection for fluid supply lines.

In this present invention it is believed that a very useful method has been provided which will insure the economical maintenance of hot water at a usable level at all times without regard to the length of run of the supply pipe from the source of hot water nor the frequency with which the hot water is used. It is desired to make it clear that this plan does not contemplate an initial source or means for providing hot water in a home. It is believed that normally those fixtures that are used frequently will maintain their supply line at sufficient temperature so that this equipment will not be operated. However, experience has shown that even the shortest practical runs from a hot water tank to even a kitchen sink may at times cool down to a point where there is considerable delay in getting hot water from the faucet. This circumstance, of course, is greatly aggravated where a long run is experienced in the installation where a fixture is quite remote from the source of hot water, and in this latter case, particularly in the case of a bathroom where usage is not regular or frequent, this arrangement has proved to be a very great convenience and to offer a

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high degree of security against unexpected rises in temperature of the water which have, as a matter of experience, occasioned many serious injuries, and in some cases, fatalities.

There are certain corollary uses of this method such as maintaining gas or liquid pipe lines at a desired temperature. Examples may be: preventing the freezing of water in cold water pipes or in automatic cooling radiators and the like, maintaining standby equipment at a temperature ready to receive its normal load or maintaining air pressure lines at a temperature which will prevent excessive condensation or freezing. It is therefore believed that a very worthwhile contribution has been made in this field.

It is believed that it will be clearly apparent from the above description and the disclosure in the drawings that the invention comprehends a novel method and means for maintaining hot water temperatures in supply pipes.

Having thus disclosed the invention, I claim:

1. Means for maintaining hot water temperatures in a supply system in which a series of hot water faucets are spaced from a source of hot water and connected thereto by lines, comprising: a heater acting on a supply of water at said source operative to raise temperatures of the source water to approximately an optimum temperature; an electric heater operating on a portion of said line adjacent each hot water faucet and operative to heat water therein falling below the temperature of said source back to approximately the selected temperature, said electric heater including a low temperature, insulation covered, heating wire wound spirally about said line portion of the pipe limited in temperature to approximately the selected temperature of the water by the length, calibre and kind of wire, a tubular metal casing over the wire and constricted to the diameter of the line at its ends sealing the ends of the assembly, and fibrous insulation material covering the full outer surface of said metal casing.

2. Means for maintaining hot water temperatures in a supply system in which a series of hot water faucets are spaced from a source of hot water and connected thereto by lines, comprising: a heater acting on a supply of water at said source operative to raise temperatures of the source water to approximately a selected optimum temperature; an electric heater operating on a portion of said line adjacent each hot water faucet and operative to heat water therein falling below the temperature

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of said source back to approximately the selected temperature, said electric heater including a low temperature, insulation covered, heating wire wound spirally about said line portion of the pipe limited to a low temperature by the length, calibre and kind of wire, and a tubular casing over the wire and constructed to the diameter of the line at its ends sealing the ends of the assembly.

3. Means for maintaining hot water temperatures in a supply system in which a series of hot water faucets are spaced from a source of hot water and connected thereto by lines, comprising: a heater acting on a supply of water at said source operative to raise temperatures of the source water to approximately a selected optimum temperature; an electric heater operating on a portion of said line adjacent each hot water faucet and operative to heat water therein falling below the temperature of said source back to approximately the selected temperature, said electric heater including a low temperature, insulation covered, heating wire wound about said line portion of the pipe limited in temperature to approximately the selected temperature of the water by the length, calibre and kind of wire.

4. Means for maintaining hot water temperatures in a supply system in which a series of hot water faucets are spaced from a source of hot water and connected thereto by lines, comprising: a heater acting on a supply of water at said source operative to raise temperatures of the source water to approximately a selected optimum temperature; an electric heater operating on a portion of said line adjacent each hot water faucet and operative to heat water therein falling below the temperature of said source back to approximately the selected temperature, said electric heater including a low temperature, insulation covered, heating wire wound about said line portion of the pipe, and means for controlling the heat output of said heating wire to maintain the selected optimum temperature in the water discharged.

References Cited in the file of this patent

UNITED STATES PATENTS

1,543,012	Klimis	June 23, 1925
1,555,338	Vaughan	Sept. 29, 1925
1,905,343	Carpenter	Apr. 25, 1933
2,473,560	Bagley	June 21, 1949
2,593,459	Johnson	Apr. 22, 1952