

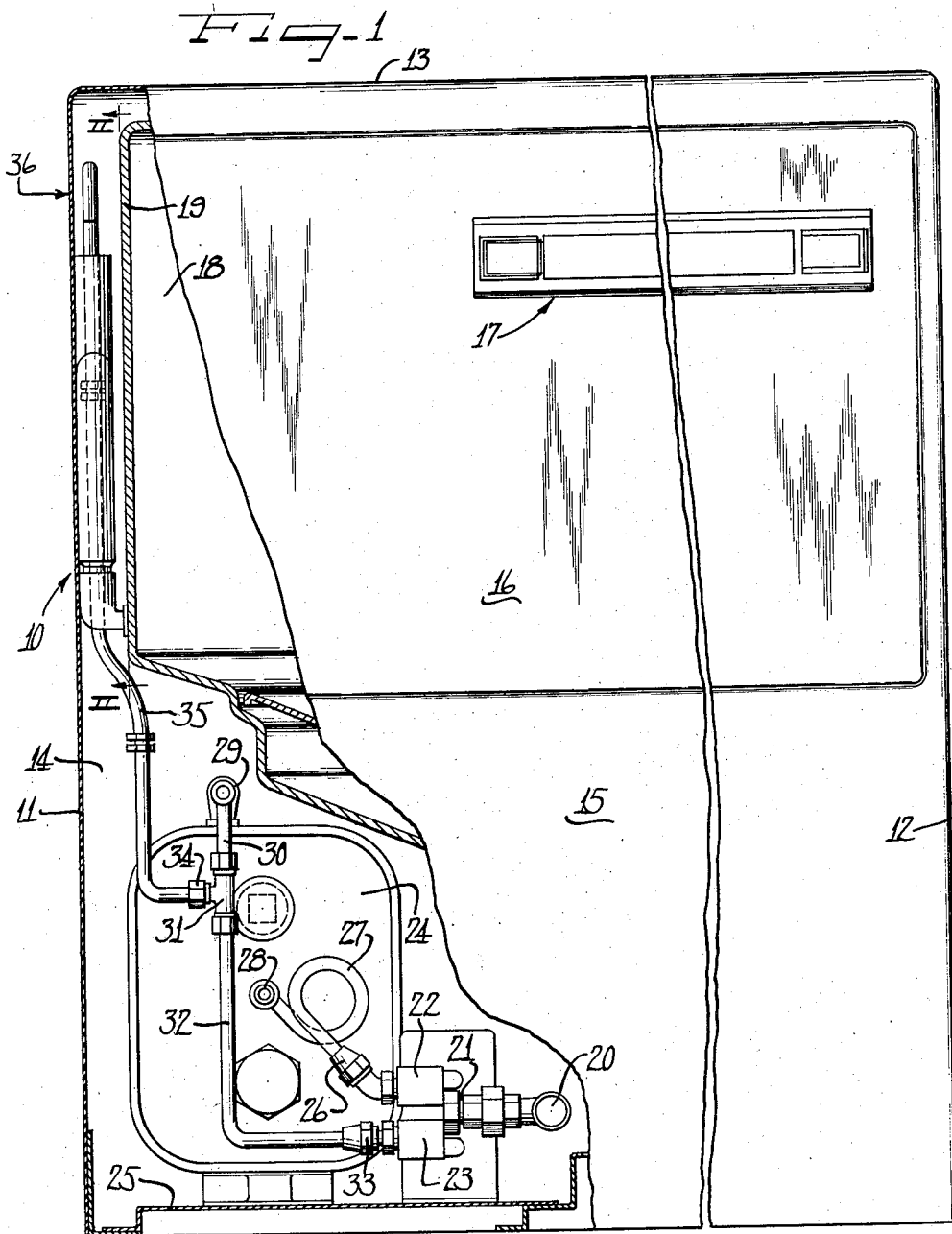
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WATER INLET CONTROL SYSTEM

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2 Sheets-Sheet 1



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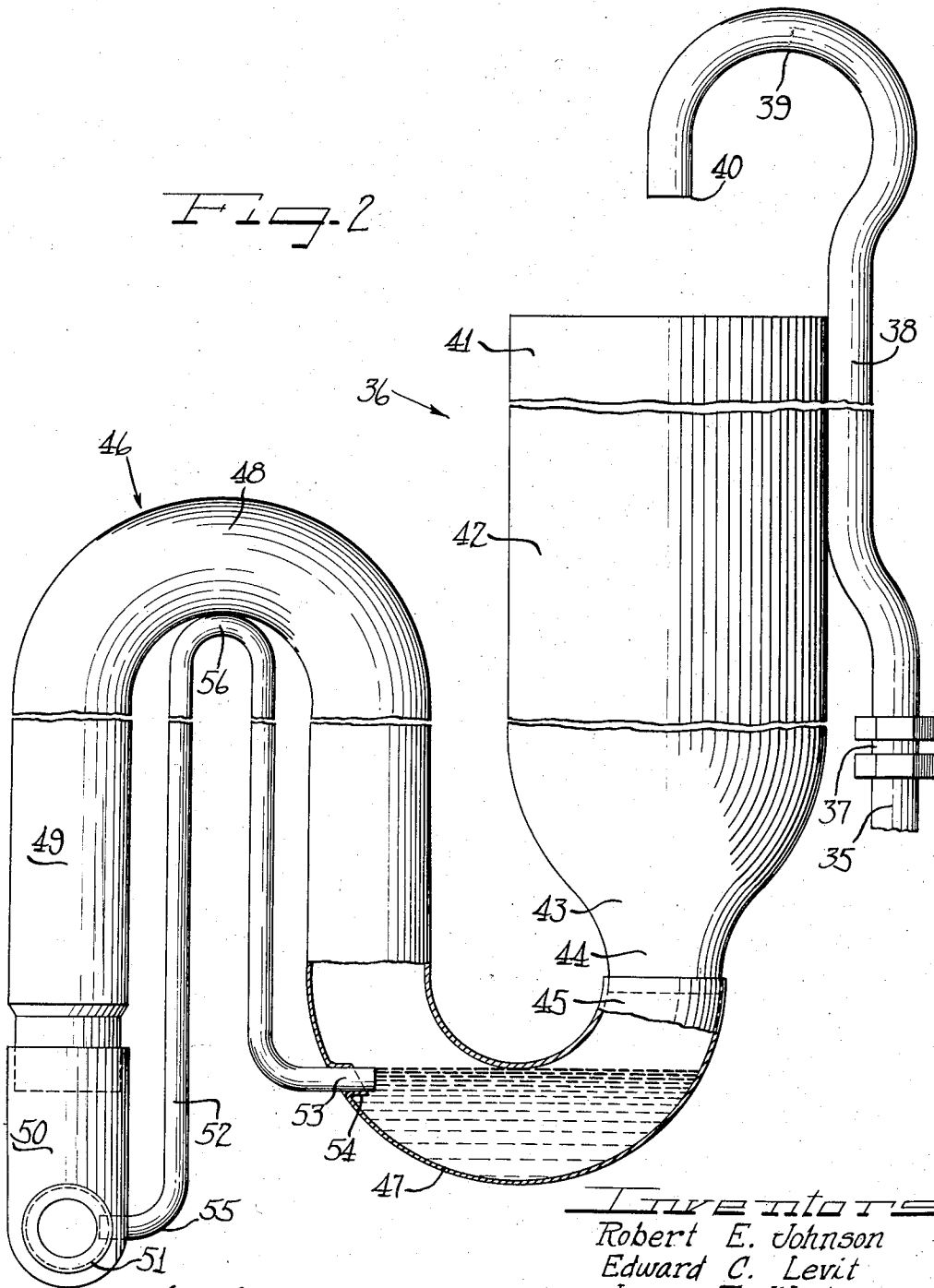
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Fig. 2



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WATER INLET CONTROL SYSTEM

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6 Claims. (Cl. 137—132)

The present invention relates to a fluid inlet control system and particularly relates to a system for controlling the temperature of inlet fluid to a washing mechanism and limiting the flow through the system.

While it will be readily apparent that the system of the present invention is a system of general utility, it has been described and an embodiment thereof has been illustrated herein, in conjunction with an automatic dishwashing machine to exemplify a utilization of the present invention which is particularly advantageous. In automatic washing mechanisms, such as automatic dishwashing machines, it is frequently found highly desirable to be able to utilize and employ the water at varying controlled and selected temperatures. In dishwashing machines, particularly, it has been found to be highly desirable to utilize the water at three temperatures for washing and rinsing. In accordance with this invention, the dishes are first washed at a temperature about 130° F. to wash away most of the proteinous soils etc. which have a tendency to harden and set at higher temperatures. Thereafter, the dishes are washed at a temperature about 150° F. to effect a complete washing.

The rinsing operation is also conducted in two stages; the first stage being at a temperature about 130° F., the same as the first wash and the second stage of rinsing at a temperature about 180° F. The 180° F. rinsing has two purposes in addition to only completing the rinsing; but first sterilizing the dishes and second, raising the temperature of dishes sufficiently high to permit efficient, economical and high speed drying of the dishes.

To effect this three temperature operation in accordance with the system of the present invention, the dishwasher is connected to the hot water supply line of the home wherein it is installed, in the case of the domestic appliance. This supply line is then divided into two parts, each of which are solenoid valve controlled or otherwise adapted for automatic control. One of the branch lines leads directly to a fluid inlet arrangement for the dishwasher, also a part of this invention, while the other branch line feeds a water heating tank, the outlet of which is connected to the first mentioned branch line for feeding into the inlet mechanism.

By opening only the first branch line valve the dishwasher is supplied with line temperature water of about 130° F. By opening both branch line valves, water from the heater tank and water from the supply line are mixed and fed into the washing machine at a temperature about 150° F. By opening only the heater tank branch line valve water is supplied to the dishwashing machine at a temperature of 180° F. It should be understood, of course, that the temperatures set forth, herein, are exemplary and are not critical to the operation of the system of invention inasmuch as the system is operable to supply fluids of preselected temperatures. It is to be further understood that conjoint control of the branch line valves as mentioned herein means that the valves may be controlled so as to operate simultaneously or separately in a

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timed relationship so as to provide a mixture substantially at the desired temperature.

Additionally, since the heater tank utilized in the system of this invention, and the type of heater tank found most advantageous in the dishwashing machine art, is not a pressure tank.

There is also provided in the inlet mechanism, means to avoid dripping or flow of expansion water from the heater tank into the dishwashing machine. This is effected by providing the inlet mechanism with a gooseneck inlet and equipping the same with a syphon of lesser cross section to substantially reduce the water level in the gooseneck after controlled flow has been terminated. In such an arrangement, and in accordance with this invention, the syphon will reduce the water level in the gooseneck to the lowest level of the gooseneck thereby permitting expansion water to run into the gooseneck and be trapped therein. There is, thereby, provided space in the gooseneck sufficient to accommodate the expansion water and prevent dripping of the very hot expansion water and steam into the washing machine vat.

Accordingly, it is an important object, feature and advantage of this invention to provide a new and improved water flow control system. Another important object, feature and advantage of this invention is to provide a new and improved water inlet control system operable to control water flow at a plurality of selected temperatures.

Still another object of the invention is to provide a new and improved fluid inlet control system for automatic dishwashing machines operable to control the water for flow into the machine either from the supply line, from a heater tank in the machine, or from both the supply line and the heater tank.

Still another object, feature and advantage of this invention is to provide a new and improved fluid flow control automatically controllable to control flow of fluid at various temperatures.

Still another object, feature and advantage of the invention is to provide a new and improved fluid inlet system and mechanism operable to prevent overflow of expansion fluid flow into the mechanism to which the system and mechanism of the instant invention is added.

Still another object of the present invention is to provide a new and improved inlet control mechanism for fluids, wherein the mechanism includes a gooseneck flow device equipped with a syphoning device to reduce the fluid level in the gooseneck yet permitting the gooseneck to receive and hold overflow and expansion water.

Still other objects, features and advantages of the present invention will become readily apparent to those skilled in the art and others, from the following detailed description of the present invention and an embodiment thereof, from the claims and from the accompanying drawings in which each and every detail shown is fully and completely disclosed as a part of this specification in which like reference numerals refer to like parts and in which:

Figure 1 is a broken front elevational view of an automatic dishwashing machine with parts thereof broken away to better illustrate additional parts thereof embodying the principles of this invention; and

Figure 2 is an elevational view of the inlet mechanism of this invention and is shown as viewed from substantially along the line II—II of Figure 1.

As an exemplary embodiment of the present invention demonstrating a particularly advantageous utilization thereof, there is illustrated in Figure 1 an automatic cyclic operation domestic appliance type, automatic dishwashing machine operable to wash dishes and other flatware and other tableware including silverware and glassware etc., all of which are included in the term "dishes" as that term

is used in this specification and in the claims hereunder. The dishwashing machine is indicated generally at 10 and has a cabinet with side walls 11 and 12, a top 13, a back wall 14 and a front wall 15. The front of the cabinet is appropriately apertured to receive a hingedly mounted door 16 which, in the embodiment illustrated, carries the controls and handle, is indicated generally at 17. This front door opening type automatic dishwashing machine is internally equipped with a dishwashing vat or tub 18 bounded by appropriate walls, one side wall of which is designated at 19. Within the vat, which also has a front opening coincident with the front opening and door of the cabinet, there are one or more dishracks removably or fixedly mounted and configured to properly support the dishes placed therein for a proper washing operation, the placement probably being somewhat dependent upon the type of washing machine i.e. impeller type or spray type. If the machine is of the spray type, washing and rinsing water may be admitted into the vat and pumped through the spray system. If the machine is of the impeller type then the water is admitted into the vat and splashed onto the dishes. In either event water is usually admitted into the vat before being used.

In accordance with this invention the dishes are first washed with line temperature water, 130° F. This water is used to prewash or prerinse the major portion of the soil from the dishes. It has been found that proteinous soils are more easily removed at this temperature than at higher temperatures. At higher prewash temperatures certain foods, such as eggs and four paste etc. are firmly set on the dishes, making them extremely difficult to clean at later stages of operation of the washing machine.

Thereafter water is admitted into the dishwashing machine at a higher temperature for a second stage of washing. This higher temperature is about 150° F. and is arrived at by supplying a mixture of water from the supply line and the heater tank. This water temperature is most suitable for removing soils such as greases etc. which are more rapidly removed in hot water.

After the second washing operation there is a first rinsing operation which is conducted at line water temperature. This is followed by a second rinsing operation which is done with water about 180° F. directly from the heater tank. This temperature second and last rinsing promotes bacterial destruction and effectively sterilizes the dishes. It also effects quick drying of the dishes by raising the dishes to the high temperatures of the water so they will be hot enough to effect self drying.

To effect this mode of operation the dishwashing machine is equipped with water line inlet coupling 20 which is connected directly to the hot water supply line of the place of installation of the machine. This coupling 20 is in turn connected to and feeds into a plumbing divider network 21 for feeding the hot water into branch fluid systems. At the divider network each branch is provided with an automatically controllable valve such as a solenoid valve 22 and 23, respectively.

A thermostatically controlled water heater tank 24 is mounted on a base structure 25 for the dishwashing machine 10 adjacent to the branch valves 22 and 23. The outlet of one of the branch valves, valve 22 is connected, as at 26, to an expansion loop tube 27 feeding into an inlet coupling 28 on the tank 24. The outlet coupling 29 on the heater tank 24, at the top thereof, is connected with a supply tube 30 which connects into a T 31. Another arm of the T 31 is connected with a feed tube 32 the other end of which is coupled to the outlet coupling 33 of the other branch valve 23. The third arm 34 of the T is then connected to a water supply tube or pipe or hose 35 leading to the inlet control and safety mechanism, indicated generally at 36, through which the water is supplied to the washing machine.

By opening only the valve 23, water is thus supplied through the lines 32 and 35 and the inlet mechanism 36 to the vat 18 at hot water line temperatures. On the

other hand, by opening only the valve 22 water is supplied to the heater tank through the line 27 and 180° F. high temperature water is supplied from the hot water tank to the dishwashing vat 18 through the lines 30 and 35 and the inlet mechanism 36. When both valves 22 and 23 are opened, water flows through the line 35 from both the supply line and the hot water tank resulting in a mixed water of a temperature about 150° F. and this is then supplied to the vat 18 through the inlet mechanism 36. Thus, the mechanism, thus far described, permits, and is operable to effect water control for the method for washing as described herein above.

The water inlet mechanism 36 is best understood with reference to Figure 2 wherein it is shown in an enlarged view, uncomplicated by any other parts of the washing machine.

As stated hereinabove, this inlet device is operable to retain the fluid to prevent any overflow or expansion water from the heater tank from flowing into the vat of the dishwashing machine.

For these purposes, the supply line 35 is coupled through a coupling 37 to an inlet mechanism supply tube 38 which extends well above the uppermost part of the remainder of the inlet mechanism 36 and is thence bent over in a 180° bend, as at 39, terminating with a free end outlet 40 which is opened and disposed also above the uppermost point of the remainder of the inlet mechanism. The actual spacing of the free end 40 of the inlet or supply tube 38 from the top of the remainder of the inlet mechanism is at least about one inch in order to conform to and abide by good engineering principles and the actual plumbing codes of many municipalities which require a free flow gap in mechanisms of this type as a check system against the backup flow in the event of water line pressure loss or failure and thereby prevent any backup flow of contaminated water into the main lines of the water supply system of the municipality or even the place of installation of the complete machine.

From the free open end or mouth 40 of the inlet feed pipe or tube 38, the washing or rinsing water runs directly into the inlet and 41 of a more or less flattened funnel-like and elongated entrance member 42. The lower end 43 thereof is tapered to a nozzle 44 mounted on the up turned inlet end 45 of a double reverse bent gooseneck indicated generally at 46. The gooseneck 46 has a pair of 180° vertical turns 47 and 48 therein thereby creating a trap in the lower turn 47. The maximum height of the upper turn 48 is below the upper end 41 of the inlet member 42 for the gooseneck and the final outlet run 49 of the gooseneck leads directly into an elbow-like coupling 50 joining the same to the inlet aperture on the vat by connecting therethrough a coupling 51.

In normal operation the fluid from the fluid system flows through the feed tube 38 and out of the free end 40 thereof into the member 42 and thence through the gooseneck 46 and through the coupling elbow 50 into the vat. When fluid flow from the system stops, the flow through the gooseneck will stop when the fluid reaches a level therein which is the same as a horizontal tangent to the inner radius of the upper 180° bend 48. Should any expansion water from the heater tank drip into the fluid, very hot water would then run over the gooseneck into the vat with a possibility of this occurring at extremely objectionable times such as when the user may have their hand within the vat whereby the user may be burned or during the drying period when the presence of steam would retard the drying operation.

In accordance with this invention, such a possibility is reduced and minimized to a point where it is even prevented by reducing the trap water level to a level within or near the lower bend 47 in the gooseneck. To effect such water level reduction and thereby provide for accommodating space to accept dripping and expansion water from the heater tank, a syphon tube 52 is attached to the gooseneck with the inlet end thereof 53 being

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sealed into an appropriately punched aperture 54 in the lower turn 47 in the region of the upper end thereof as adjacent to a horizontal tangent to the inner radius thereof. The outlet end 55 of the syphon tube 52 is at a level below the level of the inlet end 53 thereof and projects through an appropriate aperture in the elbow coupling 50 and is sealed to the sides of the aperture. In between the inlet 53 and the outlet end 55 of the syphon tube, the tube extends upwardly in an inverted U-shaped bend lying immediately within the inner radius of the upper turn 48 in the gooseneck.

With this arrangement, when the fluid stops running into the inlet mechanism 36, the water trapped therein will run through the syphon, which is of lesser cross-section than the gooseneck, until it reaches the level of the inlet end 53 for the syphon tube 52. By so doing a space within both the member 42 and the gooseneck 46 between the turns 47 and 48 as well as in the inlet extension of the syphon tube will be left for expansion water from a level between the inlet end 53 for the syphon tube and the U-bend 56 of the syphon tube. Such a space is sufficient to accommodate and receive all overflow, dripping and expansion water from the heater tank thereby providing a fully safe water inlet system for the washing machine as well as for any other mechanism to which the systems and the mechanisms of this invention may be applied.

It will be fully understood that numerous variations and modifications may be effected without departing from the true spirit and scope of the novel concepts and principles of this invention. We, therefor, intend to cover all such modifications and variations as may fall within the true spirit and scope of the novel concepts and principles of this invention.

We claim as our invention:

1. An inlet arrangement operable to receive hot water from a hot water system and feed the hot water to a mechanism to use the same, the hot water system being of the type from which hot expansion water may issue after flow of water has been stopped, comprising, an inlet feed tube connected to the system and having a reversely bent upper portion terminating in a free end, a fluid receiving funnel-like guide member having an open upper end below said free end to receive hot water therefrom, a gooseneck having an upper reverse bend therein and a lower reverse bend therein forming a water trap, the lower reverse bend being connected to said guide member, means connected to said upper reverse bend and disposed below said lower reverse bend to direct hot water to the mechanism to use the same, the upper reverse bend being disposed below the open upper end of the guide member, and a syphon tube connected between said lower reverse bend and said means and having an intermediate portion extending substantially up to said upper reverse bend.

2. An inlet arrangement operable to receive hot water from a hot water system and feed the hot water to a mechanism to use the same, the hot water system being of a type from which hot expansion water may issue after flow of water has been stopped, comprising, an inlet feed tube connected to the system, a fluid receiving guide member disposed to receive hot water from the feed tube a gooseneck having an upper reverse bend therein and a lower reverse bend therein forming a water trap, the lower reverse bend being connected to said guide member, means connected to the upper reverse bend and disposed below said lower reverse bend to direct hot water to the mechanism to use the same, and a syphon tube connected between the lower reverse bend and said means and having an intermediate portion extending substantially thereabove.

3. An inlet arrangement operable to receive hot water from a hot water system and feed the hot water to a mechanism to use the same, the hot water system

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being of a type from which hot expansion water may issue after flow of hot water has been stopped, comprising, a gooseneck water tube having an upper reverse bend and a lower reverse bend therein, the lower reverse bend being adapted to receive water from the system, a coupling member connected to the upper reverse bend and disposed below the lower reverse bend to connect with the mechanism to use the hot water, and a syphon tube connected to the lower reverse bend and the coupling member and having a portion therebetween extending therefrom substantially up to said upper reverse bend, thereby to drain hot water from between said reverse bends and provide trap space for expansion water from said system.

4. An inlet arrangement operable to receive hot water from a hot water system and feed the hot water to a mechanism to use the same, the hot water system being of a type from which hot expansion water may issue after flow of hot water has been stopped, comprising, a gooseneck water tube having an upper reverse bend and a lower reverse bend therein, the lower reverse bend being adapted to receive water from the system, a coupling member connected to the upper reverse bend and disposed below the lower reverse bend to connect with the mechanism to use the hot water, and a syphon tube of less diameter than said gooseneck water tube connected to the lower reverse bend and the coupling member and having a portion therebetween extending substantially upwardly therefrom, thereby to drain hot water from between said reverse bends and provide trap space for expansion water from said system.

5. A hot water system for an automatic washing machine to be connected to a hot water supply line in the place of installation of the machine, comprising, means for connecting the system to the supply line, a divider network connected to said means and having a plurality of outlets, conjointly and selectively controllable valves connected in said outlets respectively, water heating means connected to certain of said valves and having a further outlet, means interconnecting the remaining of said valves and said further outlet, a feed tube connected to the interconnecting means and terminating in a free open end, a funnel-like guide member to receive hot water from said feed tube, a flow member having a pair of reverse bends therein including a lower reverse bend which is connected to the guide member and an upper reverse bend, a flow outlet from said upper reverse bend disposed below said lower reverse bend, and a syphon tube interconnecting said lower reverse bend and said flow outlet and intermediate thereof extending substantially upwardly from said flow outlet and said lower reverse bend.

6. A hot water system for an automatic washing machine to be connected to a hot water supply line in the place of installation for the machine, comprising, a divider network for connection to the supply line and having a plurality of outlets, conjointly and selectively controllable valves connected in said outlets respectively, water heating means connected to certain of said valves and having a further outlet, means interconnecting the remaining of said valves and said further outlet, a guide member to receive hot water from said interconnecting means flow conducting means connected to the interconnecting means and positioned to discharge into the guide member, means defining a separation between said guide member and said flow conducting means whereby water flowing into said guide member from said conducting means will not form a syphon flow, a flow member having a pair of reverse turns therein including a lower turn which is connected to the guide member and an upper turn, and a flow outlet from said upper turn disposed below said lower turn, and a syphon tube interconnecting said lower turn and said flow outlet and intermediate thereof extending substantially upwardly therefrom.

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