Oct. 17, 1967 R. P. MILLER ETAL 3,348,019

PUSH BUTTON FAUCET WITH HEATER

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Fig. 1

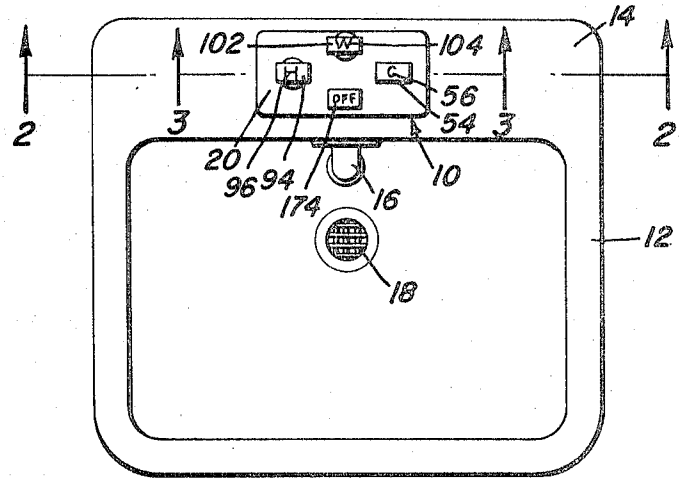


Fig. 4

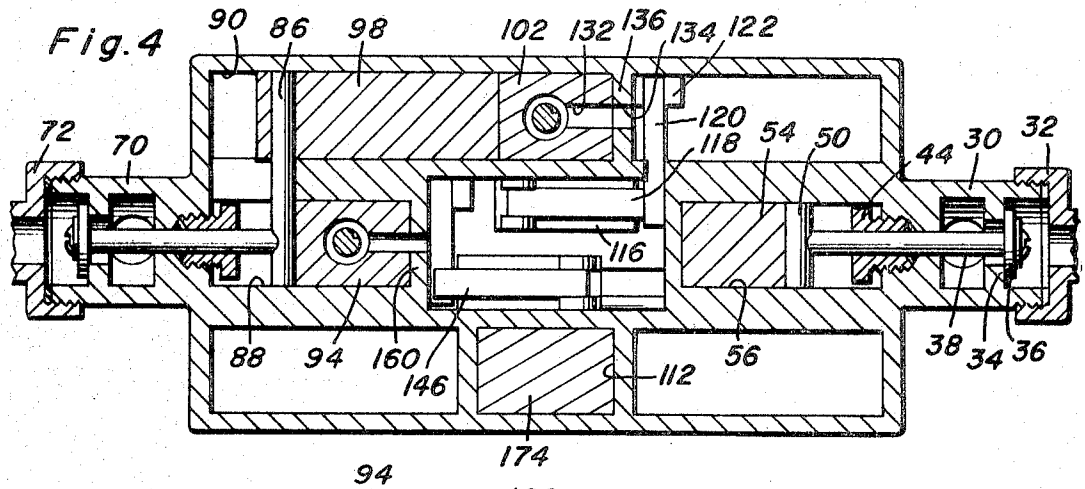


Fig. 5

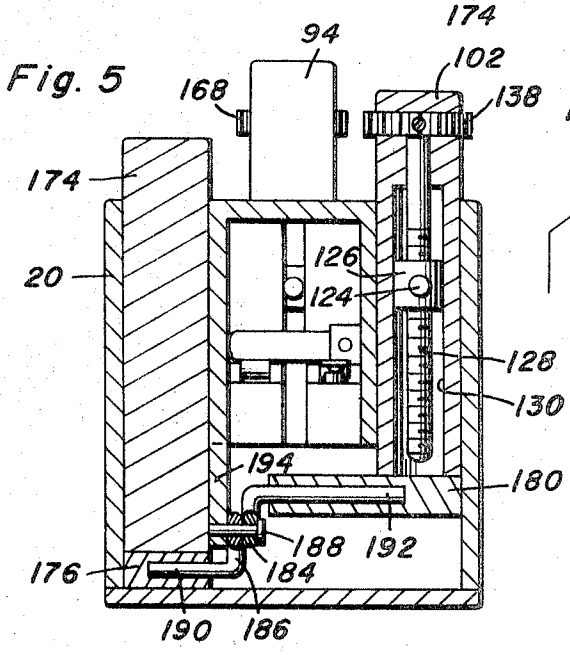
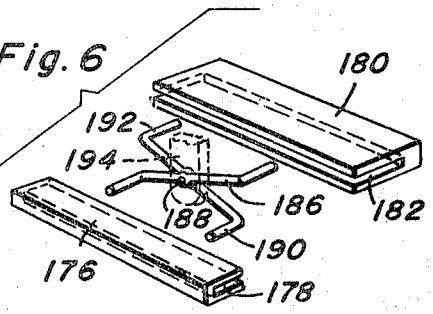


Fig. 6



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Fig. 2

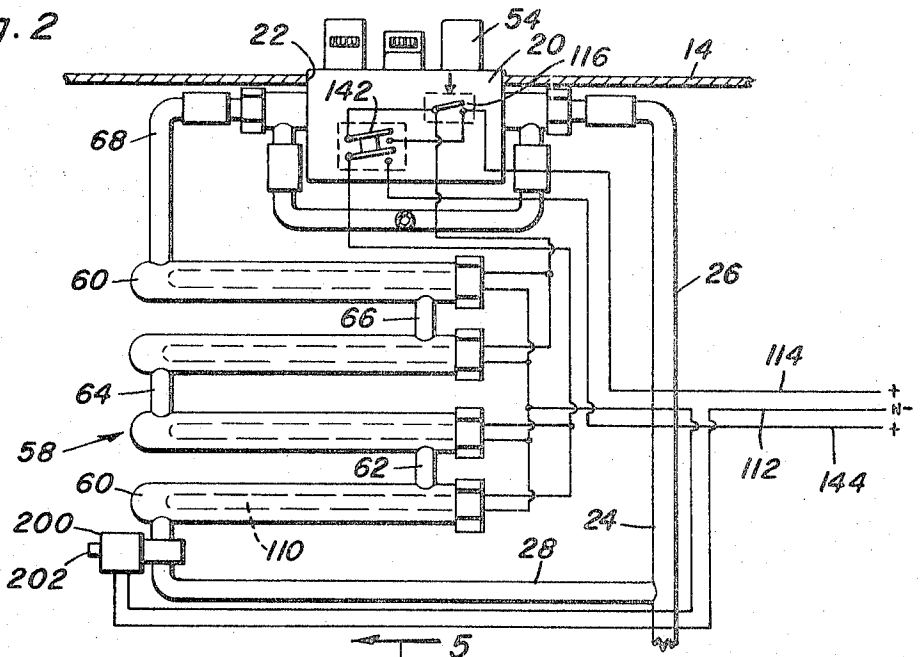


Fig. 3

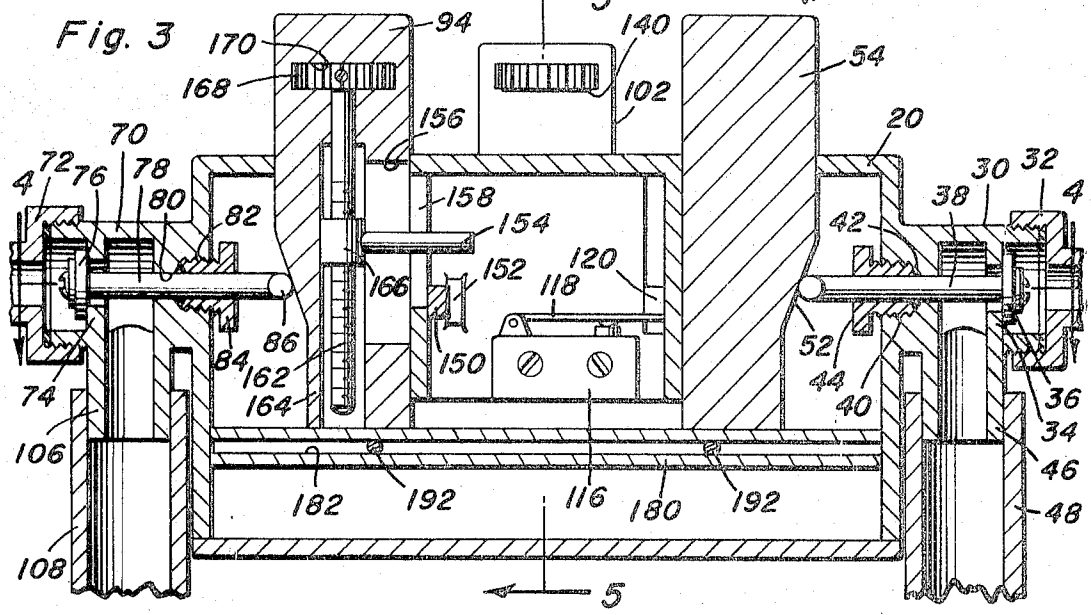
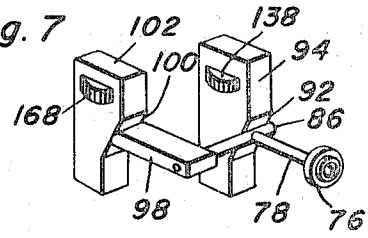


Fig. 7



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PUSH BUTTON FAUCET WITH HEATER

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7 Claims. (Cl. 219—309)

ABSTRACT OF THE DISCLOSURE

A water heating device including a push button faucet assembly having an inlet valve communicating with a heating device including a plurality of electric heating elements. A pair of push buttons are provided for selectively opening the inlet valve. Actuation of one of the push buttons also causes actuation of a switch to energize all the heating elements to produce a flow of hot water. Actuation of the other push button causes operation of a second switch to energize less than all of the heating elements, thereby producing a flow of warm water. Another inlet valve, controlled by a third push button, is provided in the assembly and communicates with a cold water line. Adjusting means are associated with the pair of push buttons for allowing the inlet valve actuated to open a preselected amount before the switches are actuated.

An object of the present invention is to provide a push button faucet combined with a heater associated with the water line in such a manner that when the push button is operated to open the faucet valve, the heater will be energized thus heating water as it flows to the faucet for discharge into a sink or the like.

Another object of the present invention is to provide a faucet with a heater incorporated therein in which a separate push button is provided for hot water and cold water together with a separate push button for providing warm water and a separate push button for closing both the hot water and cold water valves.

A further object of the present invention is to provide a push button faucet with heater incorporated therein together with a push button which will provide warm water with there being adjustment means for the hot water and warm water to vary the temperature of the water discharged through the faucet with the adjustment enabling the same temperature to be obtained when the push button is depressed.

Yet another object of the present invention is to provide a faucet with heater incorporated therein in which the temperature of the water discharged from the heater will be regulated by the degree of opening of the valve thus controlling the volume of flow of water through the heater for controlling the output temperature of the water by controlling the volume of flow through the heater. Also, the heater is provided with a plurality of units with the warm push button being connected to certain of the heater elements and the hot push button being connected to all of the heater elements.

Yet another object of the present invention is to provide a faucet which is relatively simple in construction, provided with a heater that is operated automatically upon opening of the faucet in a predetermined manner and which is relatively inexpensive to manufacture and maintain in operative position.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a top plan view of a sink or the like having the push button faucet of the present invention incorporated therein;

FIGURE 2 is a vertical sectional view taken substantially upon a plane passing along section line 2—2 of FIGURE 1 illustrating the heater construction and the association of the water lines and electrical control switches therewith;

FIGURE 3 is a detailed sectional view, on an enlarged scale, taken substantially upon a plane passing along section line 3—3 of FIGURE 1 illustrating further structural details of the push button controls, switches and other structural details of the faucet;

FIGURE 4 is a transverse, plan sectional view taken substantially upon a plane passing along section line 4—4 of FIGURE 3 illustrating the orientation and position of the various push buttons and control valves;

FIGURE 5 is a transverse, sectional view taken substantially upon a plane passing along section line 5—5 of FIGURE 3 illustrating further structural details of the warm push button and off push button;

FIGURE 6 is an exploded schematic perspective view of the mechanism for returning the push buttons to their retracted positions; and

FIGURE 7 is an exploded group perspective view illustrating the association of the hot push button and the warm push button for operating the control valve.

Referring now specifically to the drawings, the numeral 10 generally designates the faucet construction of the present invention which is illustrated in association with a sink or basin 12 of conventional construction which has the usual horizontal flange or ledge 14 for supporting the faucet 10 and a discharge spigot 16 for discharging water into the sink or basin. A drain 18 is also provided in the sink or basin 12. The specific construction of the sink or basin may vary and forms no particular part of the combination except that the present invention is associated therewith in a manner in which the operating components of the faucet and heater are disposed in concealed relation under the ledge 14 with only a housing 20 for the faucet structure projecting through a suitable opening 22 in the flange 14 with the housing 20 being supported therefrom in any suitable manner.

Also, the faucet and heater assembly is connected to a water supply pipe 24 which separates into a cold water conduit or pipe 26 and a hot water conduit or pipe 28. This enables a single supply pipe 24 to be connected to the water system thus saving the cost and installation problems encountered in conveying cold water and hot water from a remote location in two separate pipes.

The cold water pipe 26 extends to one end of the housing or casing 20 and is connected to an externally threaded adapter 30 by a screw-threaded fitting 32 or the like such as the type of fitting normally employed for securing a water supply pipe to a faucet construction. The adapter 30 includes a valve seat 34 having a valve member 36 associated therewith for movement toward and away from the valve seat 34 in an obvious and well known manner. The valve member 36 has a valve stem 38 connected thereto which extends through a guide aperture 40 in an end wall of the housing 20. A sealing member 42 is provided for the stem 38 and a seal retaining and compressing nut 44 is provided for the seal material 42 whereby the stem 38 may reciprocate but will be sealed by the sealing material 42 so that water will not progress longitudinally of the stem 38 thus keeping the interior of the casing or body 20 dry. The adapter 30 is provided with a discharge tube 46 communicated with a conduit 48 that is connected with the spigot 16 in a well known manner.

The inner end of the stem 38 is provided with a transverse cross member 50 in the form of a cylindrical rod which provides a rounded surface for engagement with a vertically extending inclined cam surface 52 formed on one edge of the cold water push button 54 which slides within a vertical guide 56 which extends vertically in the

body 20 and the upper end of the push button 54 extends above the top surface of the body 20 as illustrated in FIGURES 1, 2 and 3 and the upper end of the push button 54 may have indicia such as the letter C on the upper surface thereof for indicating that this is the cold water faucet as indicated by reference numeral 56.

The hot water line 28 extends into a heater assembly generally designated by numeral 58 and which includes a plurality of tubes 60 which are serially interconnected. As illustrated, the heater tubes are disposed in horizontal parallel relation with one tube disposed vertically above the other. The hot water line 28 enters the lowermost tube 60 at one end thereof and a connecting line 62 interconnects the lowermost tube 60 with the next tube at a point remote from the entrance point of the hot water line 28. Connecting tubes 64 and 66 also serially interconnect the stack of tubes and the uppermost tube 60 is connected to a hot water pipe 68 which is connected to a hot water adapter 70 by a fitting 72 which is identical to the fitting 32 for the cold water. A hot water valve seat 74 is incorporated into the adapter 70 and a valve member 76 associated with the seat. The valve member 76 has a valve stem 78 connected thereto which extends into the interior of the body 20 through a guide aperture 80, a sealing member 82 and a packing nut 84. The inner end of the stem 78 is provided with a transverse cylindrical rod 86 rigid therewith which is elongated in that it extends transversely of a vertical guide passage 88 into and through a vertical guide passage 90 located inwardly thereof.

The transverse member 86 engages an inclined cam surface 92 on a hot water push button 94 that is slidable vertically in the guide 88. The push button 94 extends up through the top of the body 20 and the upper end thereof has indicia such as the letter H as designated by numeral 96 to indicate that this is the hot water push button. The laterally extending end of the rod 86 which extends into the guide passage 90 is connected with an operating arm 98 which slides horizontally in the passageway 90 and the end of the operating member 98 remote from the rod 86 is rounded and engages an inclined cam surface 100 on a warm push button 102 which is vertically reciprocal in the guide passage 90. The warm push button 102 also extends up through the top of the body 20 and has the indicia W on the upper end thereof as designated by numeral 104 to indicate that this is the warm water push button. Thus, when the hot water push button is depressed, the valve 76 will be moved away from the valve seat 74 thus permitting water to pass into the hot water discharge tube 106 which is connected with a hot water conduit 108 that is connected to the spigot 16 in a conventional manner. Also, if the warm push button 102 is depressed, the valve 76 will also be correspondingly opened. Inasmuch as the inclination of the cam surfaces 92 and 100 respectively are identical, depression of the push buttons 94 and 102 will open the valve 76 the same amount. Thus, when the push button 94 is fully depressed, the valve 76 will be fully opened and when the push button 102 is fully depressed, the valve 76 also will be fully opened.

Control of the temperature for the water flowing through the valve 76 when it is opened by depressing either the hot water button 94 or the warm water button 102 is accomplished by providing separate heating elements 110 in each of the tubular members 60 of the heater assembly 58. As illustrated, each of the heaters 110 has one side thereof connected to a ground line 112. Two of the heating elements 110 are connected to a supply line 114 that is connected to one terminal of a signal pole single throw switch 116 which has an operating lever 118 operated by a pivotal arm 120 that is pivotally supported between a pair of lugs 122 on the interior of the body 20. The operating member 120 is engaged by a control rod 124 that is rigid with a sleeve 126 threaded onto a threaded adjusting rod 128. The sleeve 126 is slidable in a longitudinal bore 130 formed in the warm push button 102 and the rod 124 extends out through a slot 132 formed in the push button

and also through a slot 134 appearing in a partition wall 136 in the body 20. The upper end of the adjusting rod 128 is provided with a knurled knob 138 which has a portion of the periphery thereof at diametrically opposed sides extending outwardly beyond the parallel side walls of the push button 102 and received in a transversely extending slot 140 thus precluding longitudinal movement of the rod 128 when it is rotated thus assuring that the position of the operating rod 124 will be varied in relation to the push button. Thus, by adjusting the position of the operating rod 124 in relation to the knob 102, the point of closing of the switch 116 will be adjusted thus enabling the degree of opening of the valve 76 to be controlled at the time the switch 116 is closed. As illustrated, the switch 116 is in the supply line 114 so that when the switch 116 is closed, electrical energy will be supplied to only the two uppermost heating elements 110 as illustrated in FIGURE 2. Thus, only one half of the heating capacity of the heating assembly is used or, if desired, the upper two heaters may be of less or more capacity than the lower two heaters. In any event, the depression of the warm button will energize the two uppermost heating elements 110 in the two uppermost tubular members 60 thus heating the water to a lesser degree than when the hot water button is depressed in a manner described hereinafter. The actual temperature of the warm water outlet may be governed by adjusting the vertical position of the operating rod 124. Thus, the valve 76 may be fully opened before the two uppermost heaters are energized or it may be opened only a slight amount when the two uppermost heaters are energized thereby enabling variation in the volume of water flow thereby controlling the temperature of the water discharged through the water spigot. Accordingly, if a particular temperature of warm water is desired, once the warm water control has been adjusted, each time the warm water control button is pushed down, the same temperature of warm water will be discharged from the spigot when the inlet water pressure and temperature remain constant.

The supply line 114 is also connected with a switch assembly 142 which is a single throw double pole switch with a supply line 144 also being connected to the switch 142. When the switch 142 is closed, power is supplied to all four of the heating elements 110 thus increasing the heating capacity of the heating assembly 58, and, of course, heating the water to a higher temperature than when only two of the heating elements were energized such as when the push button 102 was depressed assuming that the volume of flow remains constant.

For controlling operation of the switch 142, the switch 142 is provided with an actuating arm 146 operated by an arm 150 pivotally supported by a pivot lug 152. An operating rod 154 extends through a slot 156 in the operating button 94 and also through a slot 158 in a partition wall 160 in the body 20. A threaded rod 162 is disposed in a longitudinal bore 164 in the push button 94 and a sleeve 166 is threaded onto the rod 162 and the operating rod 154 is rigid with the sleeve 166 thus precluding rotation of the sleeve 166 when the rod 162 is rotated thus causing reciprocation of the rod 154 in relation to the threaded adjusting rod 162. The upper end of the threaded adjusting rod is provided with a knurled knob 168 which has a portion of the periphery at diametrically opposed points projecting outwardly through a transverse slot or recess 170 in the push button 94 thus enabling manual rotation of the rod 162.

As the push button 94 is depressed, the operating rod 154 will operate to close the switch 142 thus energizing all of the heater elements. The valve 76 will be simultaneously opened at either its full capacity or some capacity less than a full flow situation to enable adjustment of the temperature of the water entering the hot water pipe 68. Thus, with this construction, the temperature of the hot water discharged through the spigot when the hot water button is depressed may be varied.

In each of the hot water and warm water push button assemblies, the structure is so arranged that at any time the push button is depressed sufficiently to close the switch associated therewith, the valve **76** will be opened sufficiently to enable a predetermined flow of water thereby assuring that the temperature of the water will not increase to the extent that steam will be formed in the hot water heater assembly **58**. Additionally, a check valve may be provided in the line **28** or in the line **24** to prevent reverse siphoning and also, a safety device may be provided in the form of a relief valve having a discharge communicated with the drain so that in the event that electrical energy is provided for the heater without flow of water therethrough, any increased pressure within the heater tubes will cause the relief valve to open thus discharging such water into the drain line. Further, a safety pressure switch may be provided on the heater assembly so that in the event there is an increase of pressure, the electrical circuit will be interrupted, before the increase in pressure exceeds the pressures which the system can safely withstand.

Slidably disposed in a guide passageway **172** is a push button **174** for returning all of the other push buttons to their up position so that the valves **36** and **76** may close against their respective valve seats. Such valves will be normally held in closed position by the water pressure with the cam surfaces of the push buttons **54, 94** and **102** serving to open the valves in the desired manner. The off push button **174** is engaged with an elongated lower plate **176** which has a slot or groove **178** communicating with one edge thereof. The width of the plate generally is the same as the width of the push button **174** and underlies the push button and extends substantially throughout the length of the body **20**. A corresponding actuating plate **180** underlies the lower ends of the push buttons **54, 94** and **102** as illustrated in FIGURES 3 and 5. The plate **180** is provided with a groove or slot **182** communicating with the inner edge thereof and in opposed relation to the slot or groove **178**. Thus, the plate **180** underlies all of the push buttons **94, 102** and **54** and vertical movement of the plate will cause upward movement of the push buttons **54, 94** and **102** in order to return them to an elevated postiion so that the valves will be closed. When any of the knobs **94, 102** or **54** is depressed, the plate **180** will be correspondingly moved downwardly.

For interconnecting the plates **180** and **176**, a pair of crossed arms **184** and **186** are provided and are pivotally interconnected at their central point of intersection by a pivot pin **188**. One end of each arm **184** and **186** is offset toward the plate **176** and this end of each arm is designated by numeral **190**. The other end of each arm **184** and **186** is offset toward the plate **180** and this end of each arm is designated by numeral **192**. The ends **190** are received in the slot or groove **178** while the ends **192** are received in the slot or groove **182**. The pivot pin or bolt **188** not only pivotally interconnects the arms **184** and **186** but also extends into a partition wall **194** thus stationarily supporting the arms **184** and **186** at their point of intersection but permitting relative pivotal movement of the arms. Thus, as the plate **176** moves vertically, the plate **180** will be correspondingly moved vertically but in an opposite direction. Thus, as any one of the operating push buttons **54, 94** or **102** is depressed, the plate **180** will be moved downwardly thus spreading the ends **192** apart in the groove **182** and correspondingly spreading the ends **190** apart in the groove **178** thus elevating the plate **176** for elevating the off push button **174**. Then when it is desired to close both valves or close either valve that is open, the off push button **174** is depressed thus depressing the plate **176** causing the ends **190** to move towards each other and the ends **192** to move towards each other thus elevating or raising the plate **180** thereby raising the depressed operating push button or any of the push buttons that may be depressed.

Accordingly, with this construction, a person may depress only the cold water push button and receive all cold water. Alternatively, a person may depress only the hot water push button and receive hot water at a predetermined temperature which can be adjusted. Normally, once the hot water temperature has been adjusted, subsequent adjustments are not necessary or are not often necessary. In lieu of depressing the hot water button, a person may depress the warm water button and have only warm water discharge from the spigot. Regardless of which button or buttons are depressed, the off push button will return any or all of the buttons **54, 94** and **102** to the elevated or off position.

The specific configuration and size of the various components may be altered in the interest of compact and economical construction with the specific structure illustrated and described herein being only for the purposes of illustration of the particular principles involved.

In the event steam discharge through the outlet is desired, a thermostatic switch **200** may be placed in line **112** for breaking the circuit when steam backs up toward the cold water supply pipe **24**. A reset button **202** is provided on the switch **200** for returning the switch **202** to a closed position after it has been opened due to contact with steam backing into line **28**. Thus, the temperature of the water or steam may be varied as desired and the controls and safety devices may be altered to satisfy various local building regulations and the like.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be restorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A combined faucet and heater construction comprising a hollow body having one end thereof provided with an adapter for connection with a cold water line and the other end provided with an adapter connected with a hot water line, said hollow body provided with means defining a water path from the hot and cold water line adapters to an outlet carried by said body member, a water heating assembly connected with the hot water line, an inlet valve located within said hollow body and associated with the cold water line, an inlet valve located within said hollow body and associated with the hot water line, push button members located within said hollow body and operatively connected to each of said inlet valves, said water heating assembly including a plurality of serially connected tubes for flow of water therethrough, a heating element in each tube, said heating elements being incorporated into an electric circuit having a first switch therein for controlling all of said heating elements, said puush button member operating the hot water inlet valve provided with means for mechanically closing the switch when the valve is opened thus heating water flowing through the hot water inlet valve, said push button members also including a warm water push button member including means for actuating the hot water inlet valve and a switch associated with at least one but less than the total number of heating elements for heating water to a warm temperature less than all of the heaters combined.

2. The structure as defined in claim **1** wherein said hollow body includes an off push button member, means interconnecting the off push button member and all of the other push button members for elevating the other push button members to an inoperative position when the off push button member is depressed.

3. The structure as defined in claim **2** wherein the push button members associated with the switches include a switch actuating rod projecting therefrom, means adjustably positioning the actuating rod on the push but-

ton member for adjusting the degree of movement of the push button member before the switch is actuated thus enabling adjustment of the flow of water through the heater for varying the output temperature of the heated water.

4. The structure as defined in claim 3 wherein said means interconnecting the push buttons and the valves includes a cam surface on each push button member, each valve including an operating stem having an inner end thereof engaged by said cam surface.

5. The structure as defined in claim 4 wherein said cam surface is disposed axially along the length of the push button member whereby inward movement of a pushbutton member to its full extent will completely open the associated valve, the adjustment of the actuating rod on the push button members associated with the switches enabling a temperature to be preset after which that temperature will always be attained when the push button is depressed when inlet water pressure and temperature remain constant.

6. The structure as defined in claim 5 wherein said push buttons are orientated in slide passageways located within said hollow body and said warm push button is engaged by an operating extension attached to the hot water inlet valve.

7. A combined faucet and heater construction comprising: a faucet control housing; a hollow body having one end thereof provided with an adapter for connection with a cold water line and the other end provided with an adapter connected with a hot water line, said hot water line including a plurality of interconnected

tubes for flow of water therethrough, a heating element in each tube, said heating elements being incorporated into an electric circuit; an inlet valve associated with said cold water line; an inlet valve associated with said hot water line; push button members operatively connected to each of said inlet valves; first switching means for electrically controlling current flow in said aforementioned circuit wherein said switching means is operatively connected to said push button members and activated upon depression of said push button members to a preselected position thereby causing said valve to open and further causing the heating of water flowing through said hot water inlet valve; a common water outlet providing exit from said cold water inlet valve and said hot water inlet valve; adjusting means associated with said push button and operatively connected to said hot water inlet for allowing the opening of said hot water inlet valve by a preselected amount before said switch is caused to close.

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