

July 6, 1965

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3,192,952

PUSH BUTTON ACTIVATED MIXING FAUCET

Filed June 26, 1961

5 Sheets-Sheet 3

FIG. 4

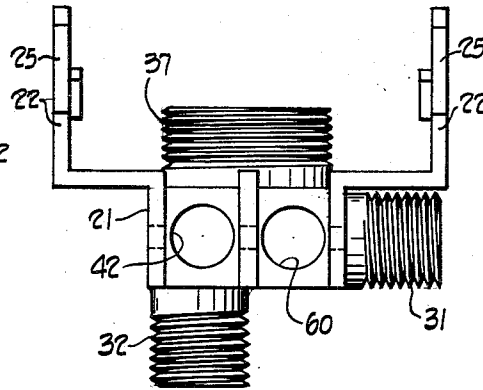
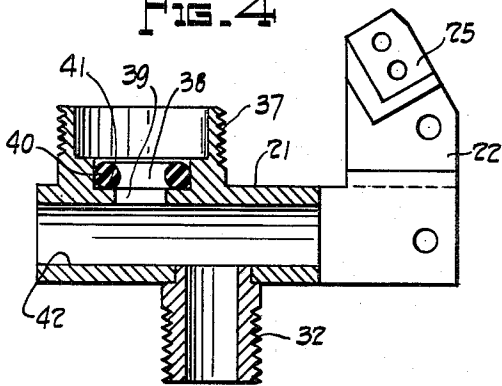


FIG. 6

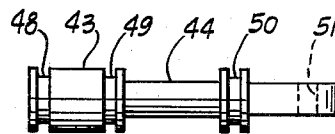


FIG. 8

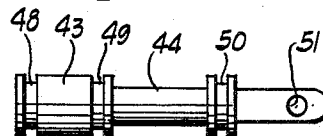


FIG. 7

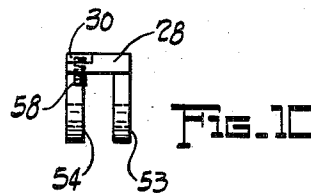


FIG. 5

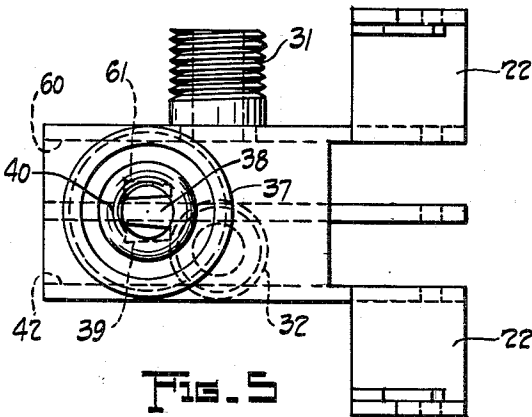


FIG. 11

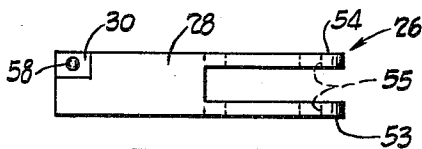
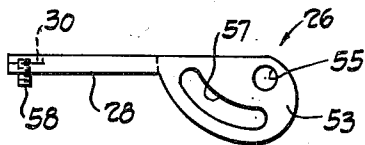


FIG. 9



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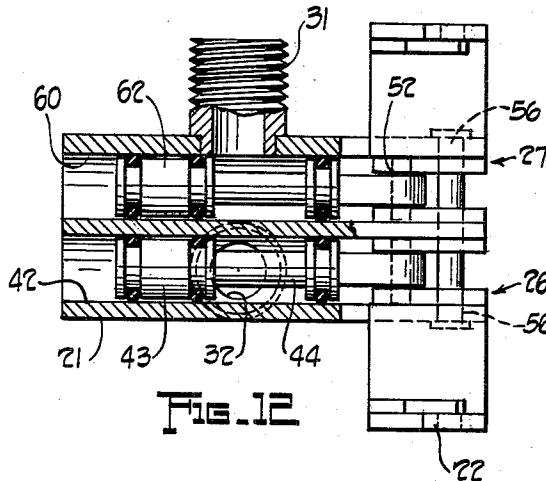


FIG. 12

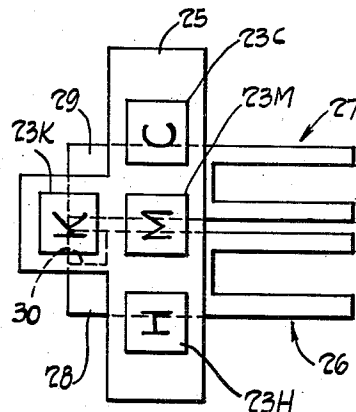


FIG. 13

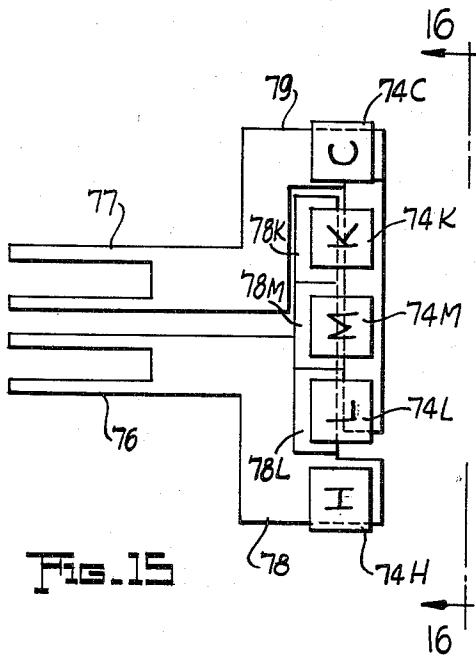


FIG. 15

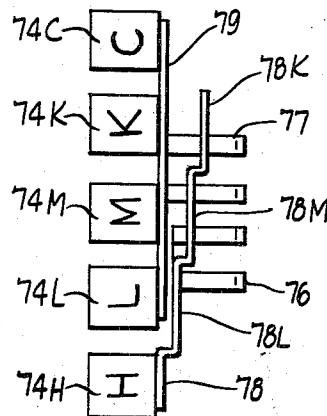


FIG. 16

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PUSH BUTTON ACTIVATED MIXING FAUCET

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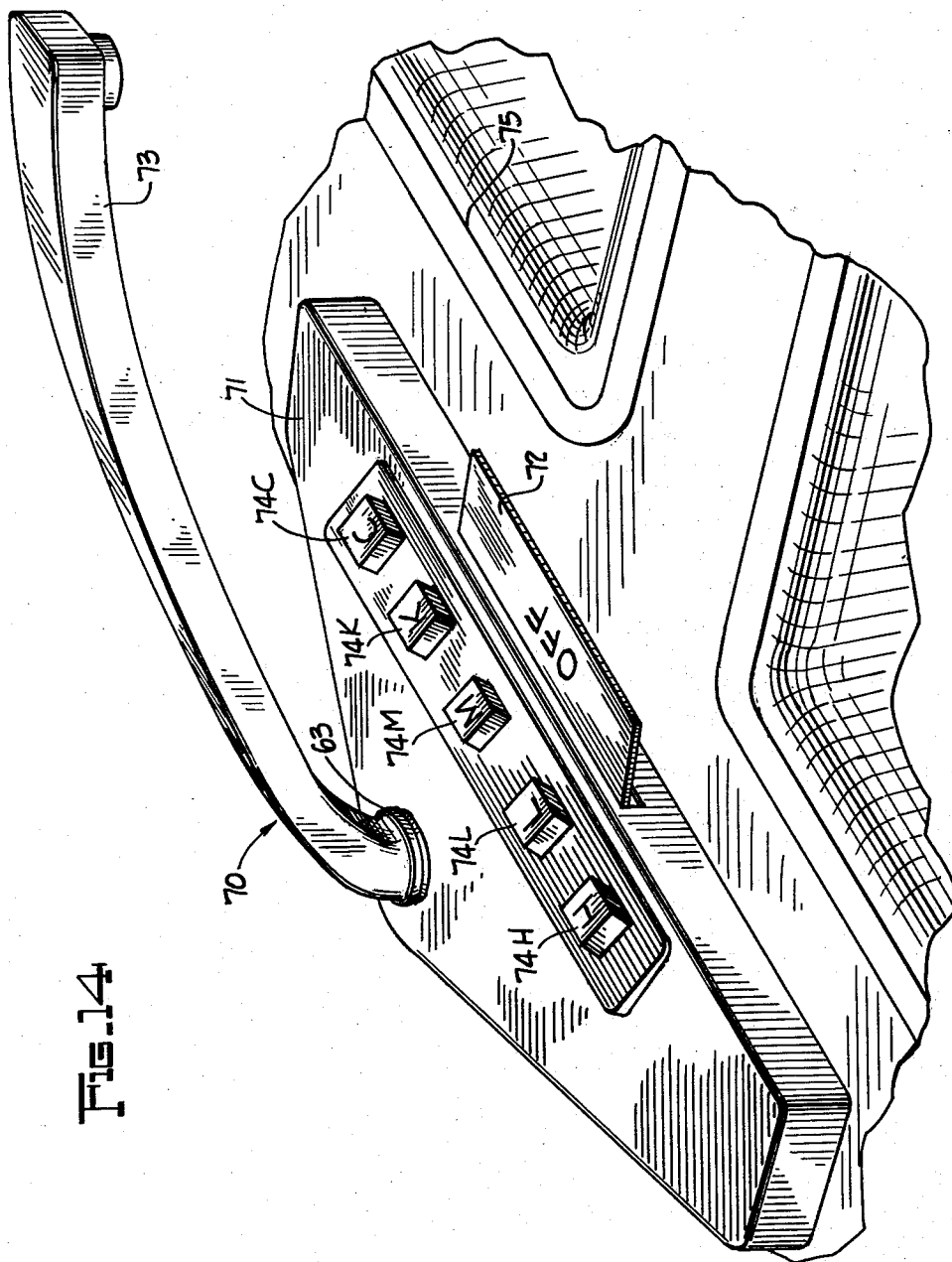


Fig. 14

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PUSH BUTTON ACTIVATED MIXING FAUCET
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Filed June 26, 1961, Ser. No. 119,426
1 Claim. (Cl. 137-607)

This invention relates to faucets and valve structures, and has reference more particularly to devices of the kind known as mixing faucets or mixing valves, and which are especially adapted for use in connection with bathtubs, sinks, laundry trays and other appliances, where hot and cold water is to be controlled through the use of faucets or valves.

The primary object of this invention is to provide a push button activated mixer faucet by means of which, for example, either hot or cold water or mixed hot and cold water can be drawn at will be merely depressing and releasing a button.

Another object is to provide a mixer faucet, of the type stated, having a separate activating button for predetermined mixtures of hot and cold water, whereby any desired mixture ranging between all cold and all hot water can be duplicated instantaneously by depressing the appropriate button.

A further object is to provide an improved mixer spout mount, whereby the spout may be swivelled or rocked simultaneously in both horizontal and vertical planes to deliver water toward any desired spot within the area of its associated basin, sink, or tub.

Other objects of the invention reside in the details of construction and combination of parts, and their mode of operation, as will hereinafter be described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

FIGURE 1 is a perspective view of the preferred form of the Push Button Activated Mixing Faucet that is the subject of this invention;

FIGURE 2 is a vertical sectional view of the same taken along the line and in the direction of the arrows 2-2 of FIGURE 1, showing the valve piston and operating cam in their closed position;

FIGURE 3 is a sectional view of a portion of the valve case showing the valve piston and associated cam in their open position;

FIGURE 4 is a side view, partly in section, of the valve case;

FIGURE 5 is a top plan view of the same;

FIGURE 6 is a front view of the case;

FIGURE 7 is a side view of one of the valve pistons and operating rods;

FIGURE 8 is a top plan view of the same;

FIGURE 9 is a side view of the hot water regulating cam;

FIGURE 10 is a left end view of the same;

FIGURE 11 is a top plan view of the same;

FIGURE 12 is a top plan view of the valve case with the spout and activating buttons removed, showing the valve pistons and cams in place;

FIGURE 13 is a schematic view showing the relation of the activating buttons to the valve cams;

FIGURE 14 is a perspective view of an alternate form of the device having the activating buttons arranged in a straight line;

FIGURE 15 is a top plan view of the activating buttons and cam fingers;

FIGURE 16 is a front view of the activating buttons and cam fingers taken along the line and in the direction of the arrows 16-16 of FIGURE 15.

Referring more particularly to the drawings, there is

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seen in FIGURE 1 the Push Button Activated Mixing Faucet that is the subject of this invention, broadly indicated by reference numeral 20.

The device comprises a valve case 21, having cold and hot water intakes 31 and 32, respectively, a discharge spout 33, and a plurality of valve activating buttons 23H, 23C, 23M and 23K, whose depression affects delivery through the spout 33 of hot, cold, medium hot, or cool water, respectively.

The case 21 has two parallel valve cylinder bores 60 and 42, open at both ends and intersected through their side walls by the cold and hot water intakes 31 and 32, respectively, as is seen most clearly in FIGURES 4, 5 and 6.

A mixing chamber 38, formed by O-ring gasket 40 seated on shoulder 41 within collar 37, straddles the bores 60 and 42 and has intake ports 61 and 39, respectively, leading therefrom, as seen in FIGURE 5.

Reciprocating piston rods 44 and 62 are mounted in the cylinder bores 60 and 42, respectively.

Both piston rod assemblies have the same construction, therefore, the structural details of only the hot water piston rod 44 will be described.

The rod 44 has a cross bore 51 at one end in which a cam link-pin 52 is seated, for a purpose to be described hereinafter. Reference numeral 48 indicates a piston head located at the opposite end of the rod 44. A second piston head 49 and a third piston head 50 are positioned in spaced relation inwardly of the head 48, as is seen most clearly in FIGURES 7 and 8. O-ring gaskets 45, 46 and 47 are seated in the peripheral edges of piston heads 48, 49 and 50, respectively. The spacing of the piston head 50 is such that the O-ring 47 will be in sealing contact with the wall of the cylinder 42 in all possible working positions of the piston rod 44 to prevent escape of fluid from the open end of the cylinder 42, as seen in FIGURES 2 and 3.

Hot and cold water valve piston activating cams, broadly indicated by reference numerals 26 and 27, respectively, are pivotally mounted on a pivot pin 56 extending crosswise of the ends of the piston rods and between the end wall 22 of the button housing 25, as seen most clearly in FIGURES 1 and 12.

As seen in FIGURES 9, 10 and 11, hot water control cam 26 has two spaced and parallel mounting ears 53 and 54 and an upwardly extending activating finger 28. The ears 53 and 54 have aligned pivot bores 55 through which the pivot pin 56 extends.

Reference numeral 57 indicates an arcuate cam slot cut in each ear 53 and 54 into which are fitted the ends of the piston rod cam link pin 52, described hereinabove. The relation of the cam slot 57 to the pivot pin bores 55 is such that when the cam finger 28 is moved from its upright position, as seen in FIGURE 2, to its fully tilted position, as seen in FIGURE 3, the piston 43 linked thereto will be moved away from the cam 26 to its fully open position.

Reference numeral 30 indicates a metering socket cut in the right upper edge of the finger 28 of cam 26, of a size to receive the lower left hand end of the activating button 23K, therein, as explained hereinafter.

A metering screw 58 is located in the center of the socket 30, with its head movable toward or away from the base of the socket 30, to vary the effective depth thereof. The cold water cam 27 is of identical construction, except it does not have a metering socket in its activating finger 29.

The cam activating buttons 23H, 23C, 23M and 23K are slidably mounted in a housing 25 and normally held in their inoperative raised positions by a spring 63, as seen in FIGURE 2. When a button, such as for example, button 23H, as seen in FIGURE 3, is depressed it compresses the spring and rocks the cam finger 28 downward to move

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the valve piston 43 to its open position. When pressure on the button is released, the spring 63 expands to move the button 23H back to its original position, as seen in FIGURE 2, at the same time leaving the cam finger 28 in its tilted position, against the cross bar 65 of the shut-off plate 24, with the valve piston 43 remaining in its open position as seen in FIGURE 3.

As seen in FIGURE 13, button 23H contacts the left half of finger 28 of hot water cam 26. Button 23C contacts the right half of finger 29 of cold water cam 27. Button 23M is positioned between fingers 28 and 29 and contacts the right and left halves, respectively, of said fingers.

Button 23K is positioned above button 23M in alignment with the socket 30 of the hot water cam finger 28 and the left edge of finger 29 of cold water cam 27.

The discharge nozzle, or spout 33 is mounted in collar 37 by means of a ball 34 which has a bore 66 therethrough leading to the spout mouth 35. The spout ball 34 is pressed into sealed engagement with an O-ring gasket 49, seated on shoulder 41, by means of a clamp nut 36, as is seen most clearly in FIGURE 2. It will be noted, from FIGURES 2, 3 and 5, that O-ring 40 defines a mixing chamber 38 encircling the outlet ports 39 and 61, in which fluid from ports 39 and 61 is mixed before entering the common discharge bore 66 of swivel ball 34.

The spout is free to rotate 360° with ball 34 in a horizontal plane and is also tiltable in a vertical plane within limits set by a flange 63 at the base of the spout which contacts the edge of the clamp nut 36 when it is tilted upward to an angle just short of that which would direct the water stream beyond the edge of the basin on which it is mounted, and at a downwardly tilted angle whereat the spout mouth 35 would dip below the level of water held in the basin, to prevent back-flow into supply lines, as provided against by most building codes.

A shut-off plate 24 is pivotally mounted on shaft 59 between the side brackets 22 of housing 25, below the button bank. The plate 24 is normally spring biased into a substantially horizontal plane, and is cut beyond the shaft 59 to provide a rear cross bar 65 that lies across the rear of cam fingers 28 and 29. The bar 65 acts to contact and raise the cam fingers to their closed positions when the front edge of the plate is tilted downward on the pivot shaft 59. The action of the mixer valve is as follows: First, it should be understood that the action of the cold water valving elements is the same as that of the hot water valving elements whose action will now be described in detail.

Referring to FIGURE 2, the valve elements of the hot water delivery sides are shown in their normal closed position. It will be seen that the outlet port 39 is enclosed between the gaskets 45 and 46 of the first and second piston heads 48 and 49, respectively, which seal it off from the inlet port 32. At the same time the O-ring gasket 47 of piston head 50 seals the open end of the cylinder 42 against the escape of water. Since the facing surfaces of piston heads 49 and 50 have the same area, the pressure of the water in the cylinder 42 will react equally against both piston head faces so that the piston rod 44 will remain stationary in its closed position. At the same time the cam finger 28 is in its raised position with the piston rod link-pin 52 located at the lower end of arcuate cam slot 57. FIGURE 3 shows the same valve elements in their open position. The button 23H has been pressed inward against the spring 63. The cam finger has been tilted downward by the button 23H against the back bar 65 of shut-off plate 24. The cam slot 57 has been tilted downward causing the link-pin 52 to move the piston rod 44 and first and second piston heads 48 and 49 to the left, thereby uncovering the inlet port 39 between the mixing chamber 38 and the cylinder bore 42. Hot water is now free to flow around piston rod 44, which is of substantially smaller diameter than the cylinder 42, into the mixing chamber 38 and out through the spout 33. It will be noted that the cylinder 42, to the left of piston head 48 is open

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to the atmosphere so that no pressure can be built up to oppose easy movement of the head 48, while at the same time gasket 45 acts to seal the cylinder end against leakage of water. As soon as pressure on the button 23H is released, it moves back to its normal, raised, position, while the cam finger 28 remains in its depressed position, so that hot water continues to flow. It will be noted as the piston rod travels to its second position, illustrated in FIGURE 3, the water can flow on both sides of piston head 49 while only against on face of piston head 50, thereby destroying the stabilizing effect of the pressure against the two heads 49 and 50. If it were not for the presence of the first piston head 48 the piston rod would not remain stationary when released. However due to the fact that the water pressure is now exerted against the end faces of heads 48 and 50, the piston rod will not be moved by the water pressure, but remain wherever set by the cam fingers. To shut off the flow of water, the shut-off plate 24 is depressed which causes the bar 65 to tilt upward to raise and return the cam finger to its first position, thereby pulling piston rod 44 back to its first position illustrated in FIGURE 2.

It will be evident that the same cycle of events occurs when the cold water button 23C is depressed.

Furthermore, when button 23M is depressed, both cam fingers 28 and 29 are depressed equally and simultaneously with the result that both valve piston rods 44 and 62 are moved to their second, fully open positions, to deliver equal amounts of hot and cold water, or so-called medium-hot water.

When button 23K is depressed, it immediately contacts cold water finger 29 but does not contact the metering screw 58 of socket 30 of cam finger 28 until some time later so that the proportion of cold water entering the mixing chamber 38 is always greater at a pre-determined percentage, thereby providing so-called cool water that is not as warm as that provided by depressing button 23M. The percentage ratio of hot water delivered by button 23K can be varied by adjustment, up or down, of the screw 58, which provides a variable depth for the socket 30 of cam finger 28. It will be evident that this novel construction provides a compact and attractive push-button control console for the automatic selection of water of four different temperatures.

Another form of the device, having a five-in-line button console, broadly identified by reference numeral 70, is illustrated in FIGURES 14, 15 and 16.

This version has a housing 71 in which are mounted 5 control buttons identified as 74H, 74L, 74M, 74K and 74C, together with a shut-off plate 72. A swivel spout 73 can be swung between the sections of divided sink 75.

The construction of the valves and operating cams is the same as that described in connection with preferred form 20. The only difference is in the shape and arrangement of the fingers 78 and 79 of the hot and cold water cams 76 and 77, respectively, as seen in FIGURES 15 and 16.

Finger 79 of the cold water cam 77 is positioned cross-wise of the console and is in a single, horizontal plane along its entire length. Finger 79 is also aligned with buttons 74L, 74M, 74K and 74C. Finger 78 of hot water cam 76 is also positioned cross-wise of the console and parallel to and spaced from finger 79. In their normal, or off positions, the left end of finger 78 is in the plane of finger 79, but is offset downward in three progressively deeper steps or sockets 78L, 78M and 78K, as it passes back off finger 79 and below buttons 74L, 74M and 74K, respectively, as seen most clearly in FIGURE 16.

Button 74H is aligned with finger 78 only.

Button 74L is aligned with finger 79 and socket 78L of cam 76.

Button 74M is aligned with socket 78M of cam 76 and finger 79.

Button 74K is aligned with finger 79 and socket 78K of cam 76.

Button 74C is aligned only with finger 79 of cold water cam 77.

A study of FIGURE 16 will show that buttons 74L, 74M, 74K and 74C will all contact cold water cam finger 79 from the moment they are started to be depressed. However, the moment of contact between hot water cam finger 78 and the buttons will be progressively later, depending upon the depth of the steps 78L, 78M and 78K of the finger 78.

Thus buttons 74H and 74C will deliver only hot or cold water, respectively.

When button 74L is fully depressed, it will open the hot water valve 75% while opening the cold water valve 100% to deliver a warm mixture.

When button 74M is fully depressed, it will open the hot water valve 50% while opening the cold water valve 100% to deliver a lukewarm mixture.

When button 74K is fully depressed, it will open the hot water valve only 25% while opening the cold water valve 100% to deliver a cool mixture.

It will thus be evident that by varying the depth of the several hot water cam finger sockets 78L, 78M, and 78K, any desired percentage of hot water to cold water ratio can be established. Thereafter, any particular ratio can be automatically duplicated by merely depressing the proper button. No trial and error method of opening the individual hot and cold water valves is necessary.

It will be evident that any number of hot and cold combinations can be provided by lengthening the cam fingers 78 and 79, to make room for more buttons.

The actuation of a particular button will not only provide the selected hot-cold ratio, but the depth of depression of the button will determine the rate of flow.

While the device has been described as a button actuated mixing valve for hot and cold water, it is to be understood that any two liquids or gasses could be mixed by this device.

It will now be clear that there is provided a device which accomplishes the objectives heretofore set forth.

While the invention has been disclosed in a preferred and alternate form, it is to be understood that the specific embodiments thereof as described and illustrated herein are not to be considered in a limited sense as there may be other forms or modifications of the invention which should also be construed to come within the scope of the appended claims.

I claim:

In a hot and cold water mixing device of the type having a slidable piston valve for each of the hot and cold

water lines, mounted side-by-side in a case, with their respective operating piston rods in parallel relation and movable in a straight-line between open and closed positions, selective piston rod moving means, comprising in combination, a housing mounted on the case, covering the free ends of the valve piston rods; a cam member pivotally mounted in the housing in alignment with each piston rod end; each cam having two spaced and parallel mounting ears, with its respective valve piston rod end centered therebetween, the cam ears also having opposed arcuate cam tracks operatively connected to their respective valve piston rod through a cam follower mounted through the rod end and slidably engaged in said track; the respective hot and cold water control cams having elongated actuating fingers extending laterally thereof, and disposed edge-to-edge and parallel to one another, the cams being pivotable by their respective fingers between a first position, wherein the piston valves are in their closed positions, and a second position, wherein the piston valves are in their open positions; the hot water control cam finger having a plurality of steps of progressively greater depth; and, a plurality of actuating buttons mounted for reciprocating movement in the housing, above the hot and cold water control cam fingers; the first and last of said buttons being engageable only with the hot or cold water control cam fingers, respectively, the intermediate buttons all being engageable with the cold water control cam fingers, each of the intermediate buttons also being engageable with one of the hot water control cam finger steps, whereby a plurality of predetermined hot or cold, or hot and cold water mixtures may be automatically secured by depressing a single actuating button.

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