Aug. 12, 1958 D. F. KUMPMAN 2,847,027

MIXING, DISTRIBUTING AND VOLUME CONTROLLING VALVE

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FIG. 1

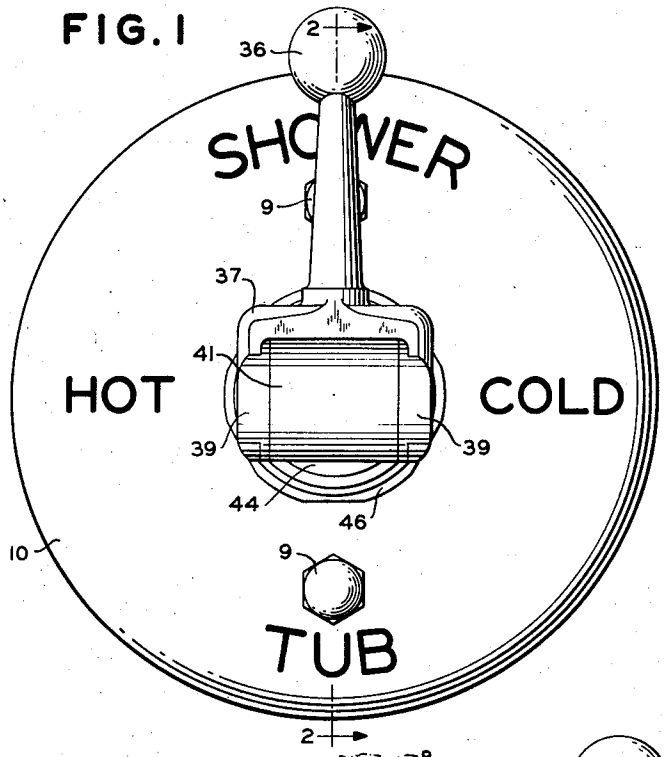
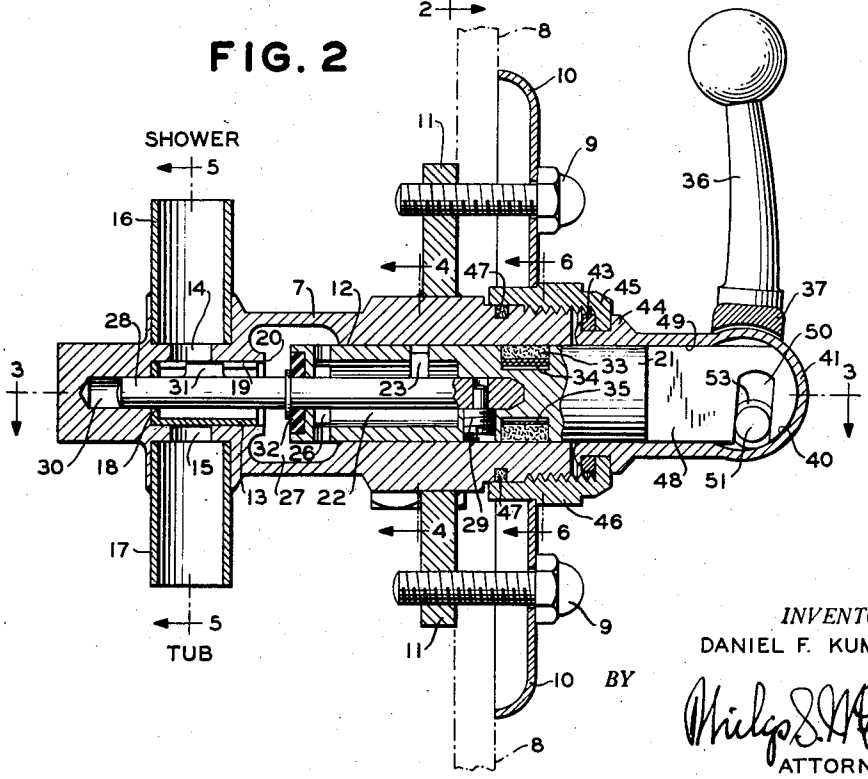


FIG. 2



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FIG. 3

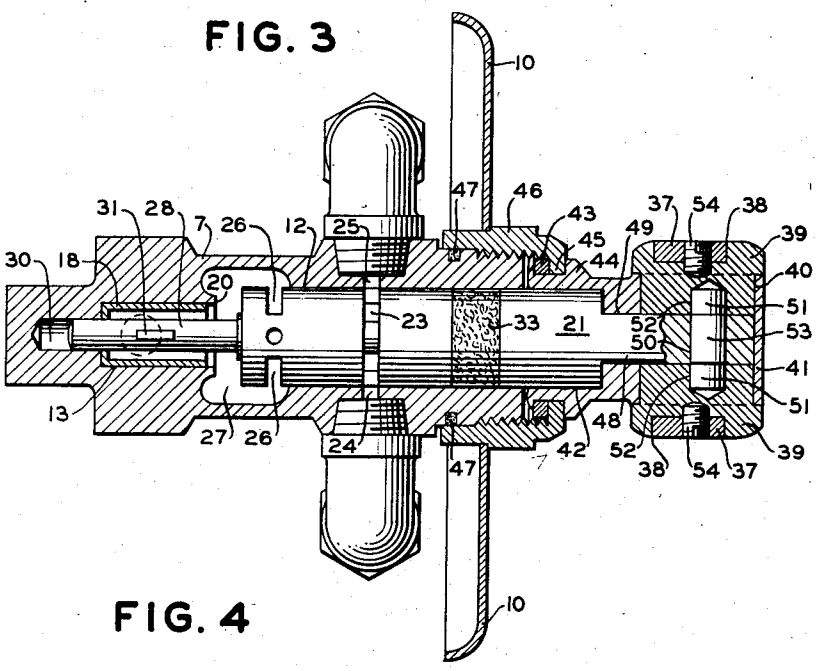


FIG. 4

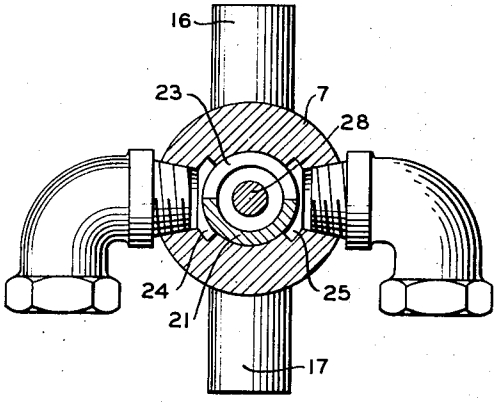


FIG. 5

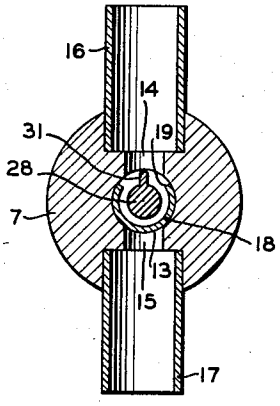
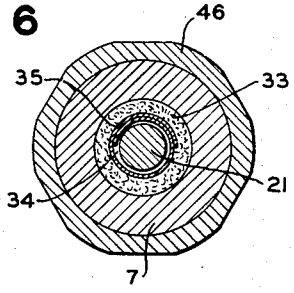


FIG. 6



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2,847,027

MIXING, DISTRIBUTING AND VOLUME CONTROLLING VALVE

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Application March 23, 1954, Serial No. 418,028

1 Claim. (Cl. 137—597)

The invention herein disclosed is a combination valve for mixing, distributing and controlling volume.

As a practical example, the invention is particularly useful in connection with overhead shower and tub, and an important feature of the invention is the accomplishment of all three functions, that is, the proportioning of hot and cold water, the directing of flow to shower or tub and the regulating of volume of flow, by a single, easily adjusted handle which will show by its position just what adjustments are in effect.

Objects of the invention are to provide a combination valve of this character which will be entirely practical and effective, which can be produced at reasonable cost, which will be of compact, rugged structure and which while easy to operate for all its functions, will be packed against leaking in any of its positions or adjustments.

Other desirable objects and the novel features through which the purposes of the invention are attained are set forth or will appear in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate a present approved form of the invention. Structure, however, may be modified and changed as regards the immediate illustration, all within the true intent and scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawings is a front elevation of a combination tub and shower form of the invention;

Fig. 2 is a broken vertical sectional view on substantially the plane of line 2—2 of Fig. 1;

Fig. 3 is a horizontal sectional view on substantially the plane of line 3—3 of Fig. 2;

Fig. 4 is a cross sectional detail on substantially the plane of line 4—4 of Fig. 2;

Figs. 5 and 6 are similar views on substantially the planes of lines 5—5 and 6—6, respectively, of Fig. 2.

In the several views the body of the valve is designated 7, this being shown as a relatively simple, straight tubular member, suitable for a single hole mounting in a supporting structure such as indicated at 8.

The valve is shown secured in this relation by two screws 9 extended through a face plate 10 at the front of the structure into lugs 11 projecting from the top and bottom of the valve body at the back of the support.

The tubular valve body has a main bore 12 opening out through the front of the same and a smaller, concentric bore 13 at the back, the latter having upwardly and downwardly opening ports 14, 15 for communication with piping 16, 17 leading to the shower head and tub, respectively.

A diverter 18 in the form of a loose cylindrical shell is rotatably disposed in the smaller bore or chamber 13, this sleeve or shell having an approximately 100° angle cut-out 19, Fig. 5, in one side to afford full flow to one of the ports 14, 15 while closing off the other.

The front end of the diverter chamber 13 is shown as faced off as an annular valve seat 20.

Slidably and rotatably fitted within the main bore or cylindrical chamber 12 is a piston-like valve stem 21 hollowed out at the inner end, at 22, Fig. 2, and having a segmental port 23 opening into this hollowed portion for cooperation with the oppositely disposed hot and cold water inlet ports 24, 25 in the sides of the valve casing.

From Fig. 4 it will be clear that rotary movements of the piston element 21 will carry the segmental port 23 therein into more or less registry with one or the other of the hot and cold water inlet ports 24, 25, and that longitudinal movements of this element, Fig. 3, will more or less open or close these ports to regulate volume.

The hollow inner end portion of the piston element is shown as having side ports 26 opening into an enlargement 27 at the inner end of the main bore to pass the mixture of liquids governed and admitted by the piston valve, to the valve seat 20 and by way of the diverter 18, either upwardly to the shower or downwardly to the tub.

The diverter is positioned by rotation of the piston element, the latter being shown in Figs. 2 and 3 as having a rearwardly projecting stem 28 fixed thereto by screw pin 29, said stem projecting longitudinally through the diverter sleeve and into a guide socket 30 at the back, and carrying in that portion disposed within the sleeve a key lug 31 extending radially into the wide angle opening 19 in the sleeve.

This construction provides a loose key connection between the sliding and rotating piston element and by means of which the diverter may be turned as far as need be to cut off tub or shower and left in that relation while the piston may be turned to vary the proportions of hot and cold water.

A valve element 32 is shown mounted on the inner end of the piston for engagement with valve seat 20 when the piston is shifted all the way in the valve body, thus to seal off any flow or leakage to the diverter and piping leading to the shower and tub.

The piston is sealed against any leakage at the front, by a ring 33 of compressible packing set in an annular groove 34 in the piston and backed up by an annular expansion spring 35.

This special packing will ride back and forth with the piston and rotate therewith without losing its sealing effect in either or both these movements.

The sliding and turning movements of the control piston are effected in the illustration by means of a handle 36 having a yoke 37 embracing and engaged in grooves 38 in cylindrical crank discs 39 rotatably seated in bearings 40 in opposite sides of a head or cover 41 disposed over the outer end of the piston.

This head 41 is shown as chambered at 42 to slidingly receive the outer end of the piston and as rotatably supported but held against longitudinal movement by having spaced flanges 43, 44 at the inner end engaged by an intermediate flange 45 on a supporting collar 46 screwed over the outer end of the valve body and held normally against rotation by friction ring or other such means 47.

The front end of the piston element is shown is flattened and reduced at 48 and as extending through a correspondingly shaped opening 49 in the bearing member 41, into transversely cylindrical bearing 40, where it is provided with an inclined, parallel sided cam slot 50.

The crank connection between this slotted outer end of the piston and the crank discs 39 is provided in the illustration by a short pin having rounded ends 51 engaged in crank sockets 52 in the inner faces of the discs, and a flattened intermediate portion 53 slidably engaged in the slot 50.

The side arms of the yoke **37** are shown secured to the crank discs by screws **54**.

It will be apparent from Figs. 2 and 3 that rocking the handle **36** outwardly on the crank discs **39** will, through the sliding crank pin connection with the piston, slide the piston inwardly to throttle the hot and cold water inlet ports **24**, **25**, and after closing these ports, to close valve element **32** at the inner end of the piston against the outlet valve seat **20**. Motion of the handle in the opposite direction will have the effect of drawing the piston outwardly to open outlet valve seat **20** and open up the hot and cold water inlets **24**, **25**.

The mounting and connection of the operating handle directly over the end of the sliding and rotating piston provides a particularly compact, attractive and easy to operate control. The requisite motions of the handle are simple and more or less instinctive. As viewed in Fig. 1, the handle is rotated upwardly or downwardly for shower or tub, this placing the diverter **18** in position for directing the water up through piping **16** or downward through piping **17**. Proportions of hot to cold water may be varied by turning the handle more or less to left or right, and volume may be determined by rocking the handle inwardly to open the valve ports, as in Fig. 2, or by rocking the handle outwardly to partly or completely close the valve ports and inner valve seat by inward movement of the piston element, Fig. 3.

The spring tensioned packing **33** provides complete seal of the piston element in all its rotating and sliding movements and positions, and the crank and sliding cam connection between the handle and piston provides smooth, easy action between these parts and the retaining of them in their various positions of adjustment.

The construction consists of relatively few parts, and these all of simple, rugged structure. The structure is such that it can be produced and installed at reasonably low cost.

What is claimed is:

A proportioning and volume controlling valve comprising the combination of a valve body having a longitudinally extending cylindrical bore provided with inlet ports in opposite sides and a piston rotatably and longitudinally slidably adjustable in said bore and ported circumferentially in line with said inlet ports for cooperation with said inlet ports in the rotary and longitudinal adjustments of said piston, a cap mounted in freely rotatable longitudinally fixed relation over the outer end of said valve body, said piston having an angular cross section outer end portion projecting into said cap and provided with a cam slot, a handle having crank discs fulcrumed in the outer end of said cap at opposite sides of the angular end extension of the piston on an axis transverse to the longitudinal axis of the piston and in rotary sliding engagement with opposite sides of said angular end extension for effecting rotary adjustments of said piston by turning movements of said handle about the axis of said cylindrical bore and a crank pin carried by said crank discs and engaged in said cam slot for effecting longitudinal sliding movements of said piston by rotary movements of said handle about the fulcrum axis of said crank discs, said valve body having a reduced cylindrical chamber at the inner end of the cylindrical bore, provided with outlet ports at opposite sides, a tubular diverter rotatably adjustable in said chamber having a wide slot therein registrable with said outlet ports and a stem projecting from the inner end of said piston through said diverter and having a transverse key projecting into said slot in the diverter and providing lost motion connection between the piston and diverter.

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