United States Patent

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a part interest

[54] **MIXING FAUCET**
9 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **239/318;** 239/310; 239/434
[51] **Int. Cl.** **B05b 7/30**
[50] **Field of Search** 239/310, 318, 428.5, 433, 434; 222/193; 137/604, 636.1, 636.3, 636.4

[56] **References Cited**
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2,376,565 5/1945 Williams 239/318X
2,908,227 10/1959 McDougall 239/310X

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ABSTRACT: A hot and cold water faucet having a body and a spout having a base which is horizontally swingable within limits on the faucet body which is provided with an inlet connection to receive a conduit for supplying to a detergent conduit in the body liquid detergent from a countermounted refillable detergent container, the spout having embodied within it a detergent conduit leading from the base of the spout to a manually controllable aspirating means at the outlet end of the spout, the base of the spout and the body of the faucet having communicating detergent passages connecting the detergent conduit in the body of the faucet with the detergent conduit in the spout in all positions of the spout on the body within the limits of its horizontal movement at which discharge of detergent is desirable. The faucet is provided with the conventional diverter and connections to a hand-manipulated spray nozzle.

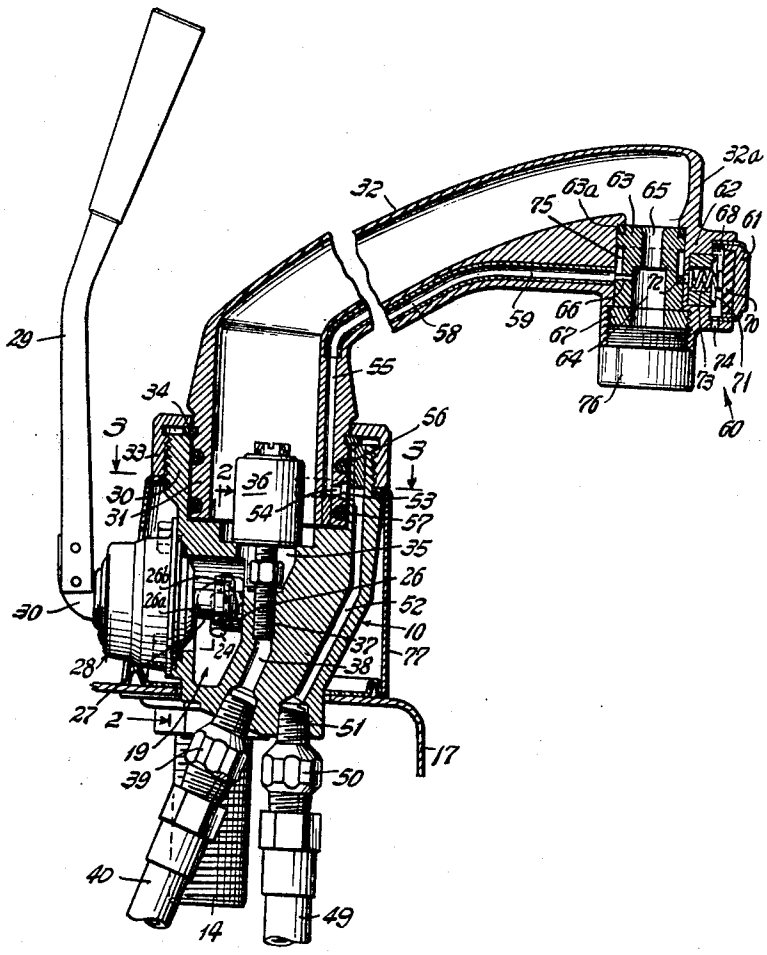


Fig. 2

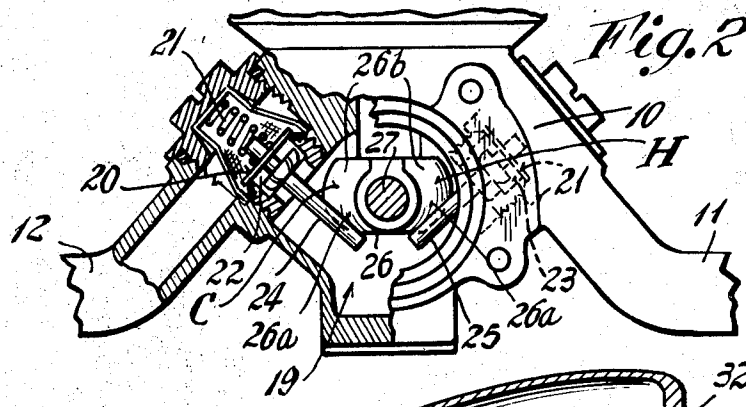


Fig. 1

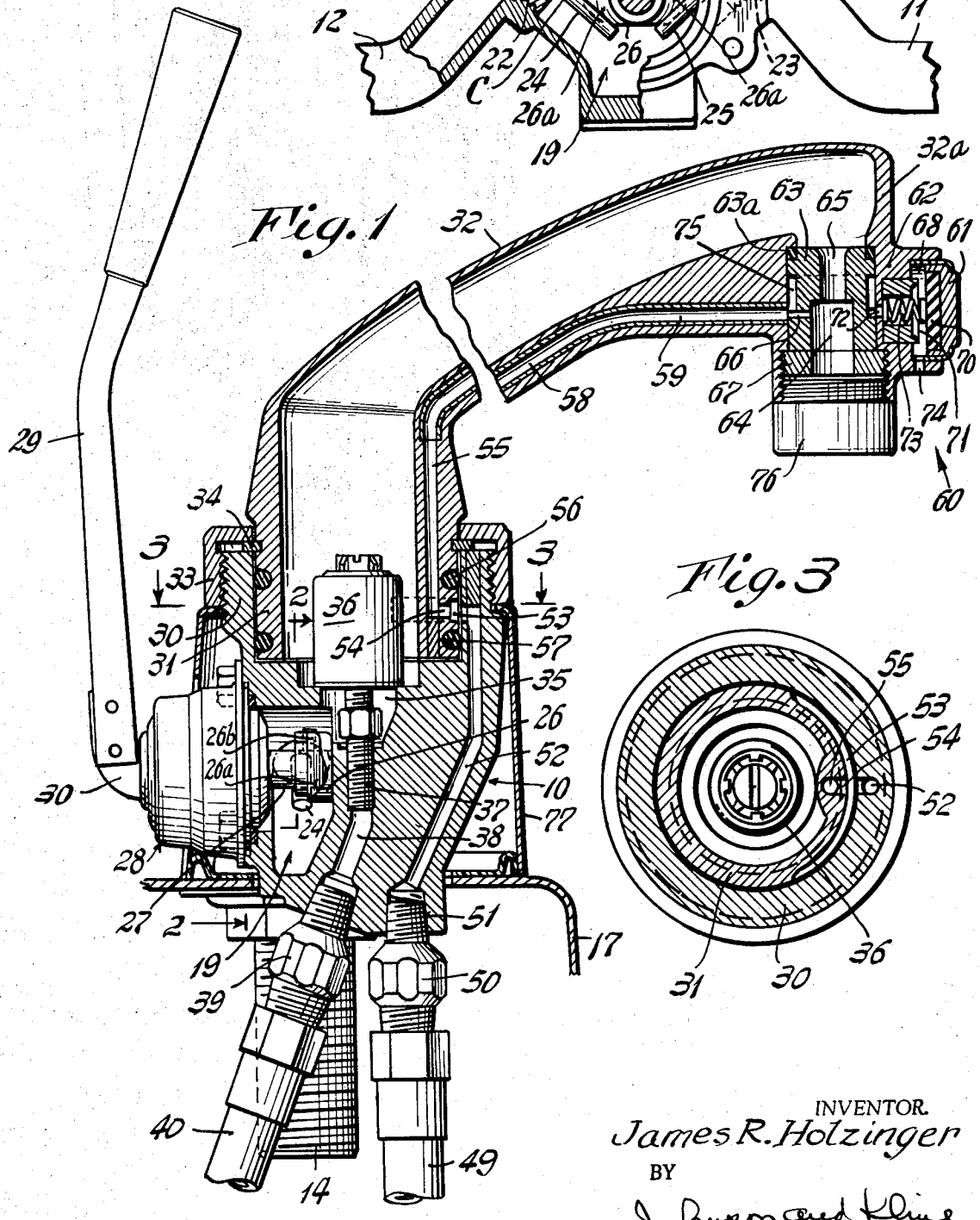


Fig. 3

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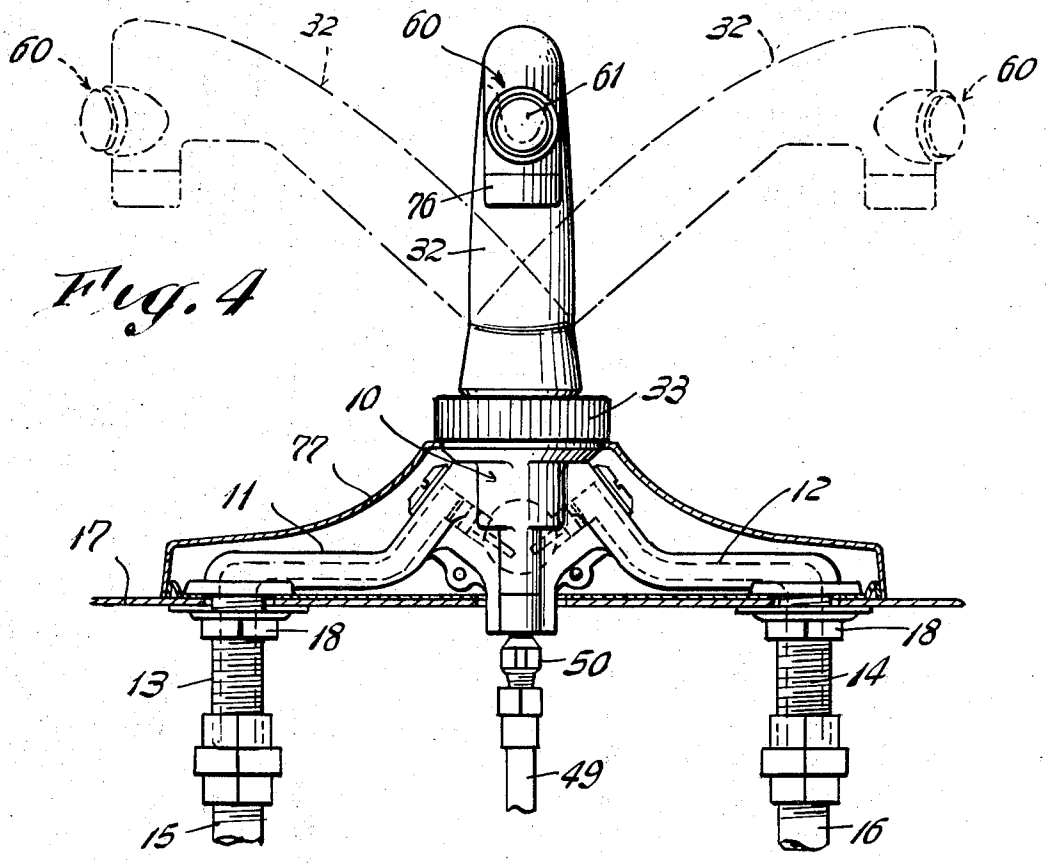


Fig. 4

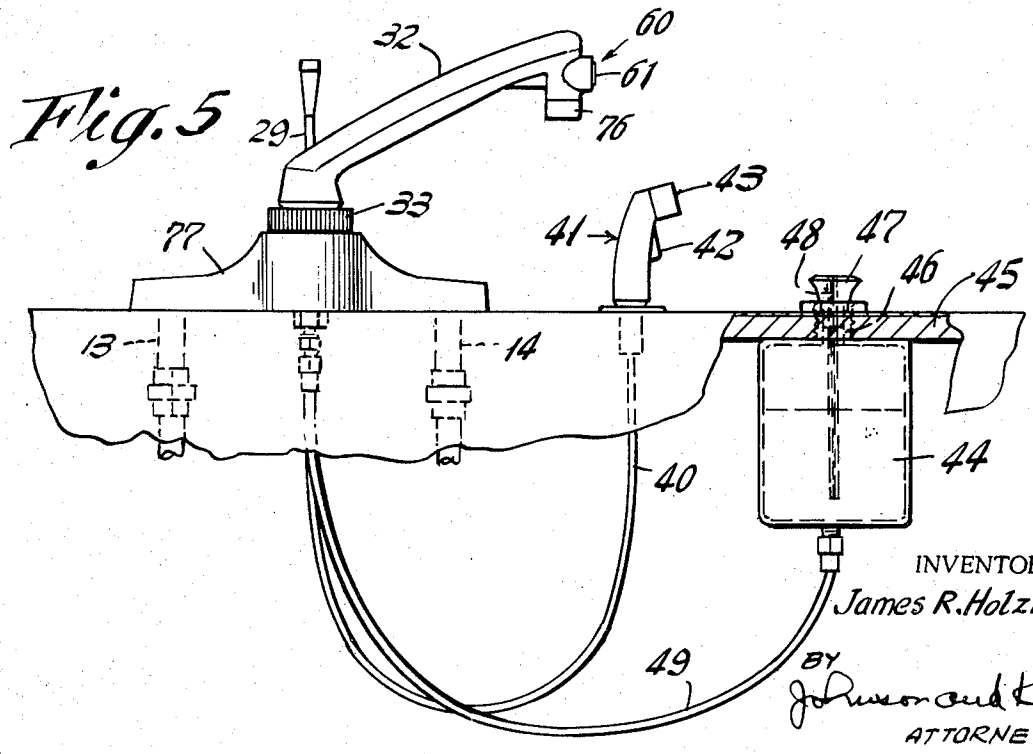


Fig. 5

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MIXING FAUCET

This invention relates to water faucets adapted to be mounted on kitchen, laboratory and other sinks, and more particularly to a hot and cold water faucet having valve means, which may comprise a single control handle, and a spout which may be swung manually horizontally over a wide angle to deliver hot and cold water, or both, to either a right-hand or a left-hand basin of a twin-basin sink.

An object of this invention is to provide such a faucet with manually controllable means for conveying through the spout a detergent liquid from a remote supply to a stream of water issuing from the spout in all horizontal positions of the spout within the limits of such movement at which discharge of detergent is desirable and regardless of whether the faucet is operating to issue hot water, cold water, or a mixture of hot and cold water.

A feature of this invention is the provision of means whereby the means for conducting the detergent to the discharge opening of the spout may be entirely contained within the spout itself as distinguished from arrangements in which the conduit means is extraneous of the spout. Such extraneous detergent-conducting means are subject to damage, and also to leakage, due to the necessity of packing the articulated joints provided for the swinging movement of the spout. Such extraneous detergent-conducting means also creates problems in installation and repairs. With the faucet of the present invention, the detergent supply means in the faucet is self-contained, and the faucet body may be installed in a sink in the same manner as a similar faucet body without detergent supply means. When this is done, it is a simple matter to connect a supply line from a remotely located detergent container to the body of the faucet.

Another feature of this invention is the provision of means in the body of the faucet for conducting detergent, received from a remote but accessible container for the detergent, through conduit means in the body of the faucet and the base of the spout, through channel means which communicates in all arcuate positions which the spout is capable of assuming.

Such channel means may include a circumferential channel in the base of the spout communicating with a port in the detergent passage in the body of the faucet. The circumferential channel is located between a pair of gaskets, such as O-rings, placed between the base of the spout and the body of the faucet to avoid detergent escaping through any clearance space between the rotatable base of the spout and the stationary body of the faucet either to the exterior of the faucet or into the mixing chamber. The circumferential channel communicates with the conduit means leading from the base of the spout to the outlet end of the spout.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

FIG. 1 is a vertical sectional view of the a faucet of the present invention with certain of the parts shown in elevation;

FIG. 2 is a fragmentary sectional view taken on the line 2–2 of FIG. 1, showing the valve mechanism of the faucet;

FIG. 3 is a horizontal sectional view taken on the line 3–3 of FIG. 1, showing the base of the spout with its circumferential channel and the body of the faucet;

FIG. 4 is a front view of the faucet of the present invention with the escutcheon plate and portions of the sink shown in cross section, the positions to which the spout may be swung being shown in broken lines; and

FIG. 5 is a front view showing the faucet of the present invention installed on the upper portion of a sink, and also showing the detergent supply means.

As illustrated in the accompanying drawings, the faucet of the present invention is of the single lever type and includes a body 10 having two laterally extending hollow arms 11 and 12 connected to threaded tubes 13 and 14 adapted adapted to be coupled respectively to hot and cold water supply pipes 15 and 16. The tubes 13 an and 14 extend through holes in the sink 17 and receive nuts 18 which secure the body 10 to the sink.

The central portion of the body 10 has a cavity forming a mixing chamber 19 into which water from either or both of the tubular hollow arms 11 and 12 may flow under control of disc valves 20 and 21 interposed between the chamber 19 and outlet ports 22 and 23 in the hollow arms 11 and 12. The valves 20 and 21 are resiliently seated by means of springs 21*a* and are provided respectively with operating pins 24 and 25 extending into the chamber 19 in position to be engaged by a valve-controlling cam 26 mounted on a cam shaft 27 rotatably mounted in a housing 28 as shown in FIG. 1. The cam shaft 27 is mounted in the housing 28 for axial and rotative movements in response to the movements of the control handle 29 relative to the valve-operating pins 24 and 25. The handle and shaft may be mounted in the housing substantially as shown in U.S. Pat. No. 2,871,880.

The control handle 29 at its lower end is connected to an arm 30 pivotally mounted on the end of the cam shaft 27 for movement through an arc of about 90° from side to side and an arc of about 25° from front to back, such movements of the handle 29 resulting in rotation of the cam shaft 27 and axial movement of the cam shaft 27 respectively relative to the valve-operating pins 24 and 25.

The cam 26 is s so shaped that in the back or "off" position of the handle 29, the cam is clear of the valve pins 24 and 25 so that the valves 20 and 21 remain on their respective seats regardless of the side-to-side position of the handle.

If, however, the handle 29 is swung forwardly from its upright position, the lower sloping portions 26*a* at opposite sides of the cam 26 will engage both valve pins 24 and 25, and cause them to tilt their respective valves, allowing hot and cold water to enter the mixing chamber in substantially equal amounts. When the handle 29 is swung forwardly and partially toward one side or the other, for instance toward the left, the higher sloping portion 26*b* on the side H of the cam 26 will engage pin 24 of the hot water valve and unseat it depending on the extent of the side-to-side movement of the handle toward the left, as viewed from the front. At the same time, the lower sloping portion 16*a* of the right side of the cam 26 will engage pin 25 of the right or cold water valve and open the latter but to a lesser extent than the left hand valve.

When the handle 29 is swung to the limit of its side-to-side movement, to the left for instance, and to the limit of its movement forwardly, the high sloping portion 26*b* at the side H of the cam will engage the pin 24 and open the hot water valve to the maximum while the low portion 26*a* of the side C of the cam will be clear of the pin 25 and the cold water valve will remain shut.

The movement of the handle 29 to the right will control the cold water valve in the same manner as the hot water valve is controlled by movements of the handle to the left to control the hot water valve.

The upper end of the body 10 is provided with a hollow boss 30 which provides a bearing for the cylindrical base 31 at the inlet end of the spout 32. The exterior of the boss 30 is threaded to receive a clamping ring 33 which engages a snap ring 34 on the base 31 and holds the latter on the body 10 while permitting the spout to swing from side-to-side in a horizontal plane to position the outlet end of the spout over one or the other of the twin-basin sink.

Water from the mixing chamber 19 flows through a port 35 in the body 10 through a diverter 36 and into the spout to be discharged from the mouth of the spout. The diverter 36, which may be identical with that disclosed in U.S. Pat. Nos. 2,172,345 and 2,314,071, has a tube 37 threaded into a passage 38 in the body 10. At its other end, the passage 38 has threads to receive a fitting 39 connected to a flexible hose 40 leading to a spray nozzle 41 of conventional construction provided with a shutoff button 42. When the spray nozzle is shut off, water pressure in the mixing chamber 19 and port 32*a* applies pressure in the diverter causing the water to flow to the spout 32 and out of the discharge end 32*a*.

However, when the spray nozzle 41 is opened by operating the button 42, the water pressure in the diverter drops and the

major portion of the water passes through the diverter passage 38 and hose 40 to the nozzle 41 and is expelled from the outlet 43 of the spray nozzle.

As pointed out above, a feature of the present invention is the provision of a hot and cold water faucet having a spout which may be swung horizontally to position the outlet over one side of the sink or the other, with means for supplying liquid detergent when desired by the user through conduit means in the spout to the stream of water issuing from the spout and in all horizontal adjusted positions of the spout.

For this purpose, in the form of the invention herein illustrated, there is provided a container or receptacle 44 for holding a quantity of detergent which may be conveniently mounted in any suitable manner on a portion of a countertop 45 adjacent the sink and the faucet. The container 44 has a filling opening 46 and a stopper 47 having an aperture 48 through which air may pass to the interior of the container to maintain atmospheric pressure on the liquid therein.

The liquid detergent is conducted from the container 44 to the faucet through a hose 49 which is connected to a fitting 50 threaded into a socket 51 in the bottom of the faucet body 10 and communicating with a channel 52 extending vertically in the body 10 and terminating in the boss 30 on which the spout is mounted. The channel 52 opens laterally into a circumferential channel 53 in the cylindrical base 31 of the spout. The channel 53, as shown in FIG. 3, is connected by a passage 54 to a vertical channel 55 in the base 31 of the spout.

The arcuate length of the channel 53 is such as to remain in communication with the channel 52 in all desirable arcuate positions of the spout. The circumferential channel 53 may, if desired, extend for 360° around the base 31 of the spout. However, assuming the permissible arcuate movement of the spout around the base could carry the outlet end of the spout beyond the sink basins, where detergent is not required or desired, it is preferable, as shown in FIG. 3, to limit the arcuate length of the circumferential channel to the range of movement in which the outlet of the spout is over at least one or both of the basins of the sink. O-rings 56 and 57 confine the flow of detergent liquid to the part of the base containing the channel 53 and prevent water from escaping between the boss 30 of the body 10 and the base 31 of the spout 32. The O-rings 56 and 57 also provide sufficient friction between the boss 30 of the body and the base 31 of the spout to hold the spout in adjusted position against unintentional movements.

The channel 55 in the spout for the detergent liquid extends upwardly and has an inclined extending portion 58 which follows the general contour of the spout and a forwarding extending portion 59 which opens into the mouth 32*a* of the spout.

The flow of detergent liquid from the channel 59 is controlled by an aspirating device 60 on the discharge end 32*a* of the spout 32. The aspirating device has a manually operable button 61 which may be depressed when the user desires to have detergent liquid mixed with water issuing from the spout.

The aspirating device 60, shown by way of example in FIG. 1, is of the type illustrated and described in U.S. Pat. No. 2,908,227, except that it has a body portion 62 formed as an integral part of the discharge end 32*a* of the spout 32. The aspirator comprises a cylindrical plug 63 inserted in the body portion 62 and has a discharge passage 64 communicating with a substantially restricted intake passage 65. At approximately the junction of the discharge passage 64 and the intake passage 65, the plug 63 has a radial detergent induction passage 66 connecting the portion 59 of the detergent passage with the discharge passage 64 of the plug. The plug 63 is retained in the body portion 62 by a hollow nut 67 threaded in the bottom of the body portion 62. A washer 63*a* is inserted between the top of the plug 63 and the adjacent body portion 62.

The body portion 62 is provided with a forwardly extending socket 68 which houses the push button 61. An elastomeric valve disc 70 on the inner side of the button is adapted to engage a valve seat 71 having a valve port 72 when the button is depressed against the tension of a spring 73. The interior of the body portion 62 is open to the atmosphere through an inlet port 74. The valve port 72 communicates with an annular groove 75 in the body which also communicates with the detergent induction passage 66. In this way, the outlet of the channel 54 is normally maintained at atmospheric pressure balancing the atmospheric pressure on the surface of the liquid detergent in the container 44.

With the button 69 in undepressed position shown in FIG. 1, when the handle 29 of the faucet is operated and water passes through the restricted water passage 65 and into the larger passage 64, the venturi effect produced by the reduction of pressure in the passage 64 is defeated by atmospheric air maintaining the passage 64 adjacent the detergent induction passage 66 at atmospheric pressure. When the button 69 is depressed and atmospheric air to the channel 75 is cut off by the valve disc 71, the venturi effect of the water flowing through the passages 64 and 65 reduces the pressure in the passage 64 and atmospheric pressure on the surface of the detergent in the container 44 will force the detergent through the induction passage 66 into the stream of water issuing from the spout.

In the form of aspirating device shown in FIG. 1, the pressure differential, i.e., the difference between the pressure immediately below the restricted orifice 65 and the atmospheric pressure on the other side of the button 66 retains the button in valve-closed position against the tension of the spring 73.

When a sufficient supply of detergent has issued from the spout, the flow of detergent through the passage 66 may be stopped by restoring the faucet handle 29 to valve-closing position and hence stopping the flow of water through the passages 64 and 65. When this occurs, the pressure immediately below the passage 65 is raised to atmospheric pressure and the button 61 is urged outwardly by the spring 73 to open the port 67 and the annular groove 65 to atmospheric pressure.

The outlet end 32*a* of the spout 32 may be provided with a suitable aerating device 76 shown in FIG. 1.

The base of the faucet may be enclosed and concealed by an escutcheon 77.

It will be seen from the above that, in the faucet of the present invention, means for conveying the detergent from the detergent inlet to the detergent outlet at the end 32*a* of the spout is entirely concealed and protected from damage within the faucet and the spout. Moreover, even though the spout is capable of horizontal swinging movement, there is but one joint at which leaking could possibly occur, i.e., the connection between the base of the spout and the faucet body, and at that joint leakage is adequately prevented by the O-rings 56 at each side of the circumferential channel 53.

I claim:

1. In a mixing faucet, a body having cold water inlet means and separate hot water inlet means, and a single outlet means including a spout having a discharge opening at one end and a spout mounting base at the other end for pivotally mounting the spout on said body for angular movement in a horizontal plane, valve means in said body including manual means for controlling the flow of water selectively to said spout from either said hot water inlet means or said cold water inlet means or simultaneously from both inlet means to said spout, a detergent container, a pipe connecting said container to said faucet body, said body having detergent conduit means for receiving detergent liquid from said pipe, detergent conduit means embodied in said spout and having detergent outlet means located adjacent the discharge opening of the spout, manually operable means at the discharge end of said spout which when operated cause the flow of detergent from said detergent outlet means concurrently with the discharge of water through the spout, and means for connecting said detergent conduit means in the body of the faucet to said detergent conduit means in the spout in all positions of said angular movement of said spout in said horizontal plane.

2. The mixing faucet as defined in claim 1, in which the means for connecting said detergent conduit means in the body of the faucet to the detergent conduit means in the base of the spout comprises an aperture in one of said detergent conduit means, and a communicating circumferential channel in the other of said conduit means.

3. The mixing faucet as defined in claim 2, in which said aperture is in the body of the faucet and the circumferential channel is in the base of the spout-mounting means.

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4. The mixing faucet as defined in claim 1, in which there are aspirating means in the discharge opening of the spout having a detergent passage communicating with said detergent passage in the spout.

5. The mixing faucet as defined in claim 1, in which there are manually controllable aspirating means in the outlet end of the spout which cause reduction of air pressure at the outlet end of the detergent conduit means when water is issuing from the spout to cause liquid detergent to flow from said detergent container and through the said detergent conduit means by atmospheric pressure on the surface of the detergent in said container.

6. A mixing faucet having a body; hot and cold water inlet means in said body; a mixing chamber in said body; valve means between said water inlet means and said mixing chamber to control the flow of water thereto; a spout; means for mounting the spout on said body for angular horizontal movement; an outlet port connecting said spout with the mixing chamber; detergent inlet means in said body; detergent conduit means in said body isolated from said mixing chamber and said outlet port; detergent conduit means in said spout; and means connecting said detergent conduit means in the spout with the detergent conduit means in the body in various angular positions which the spout may assume on the body of the faucet.

7. A mixing faucet as defined in claim 6, in which the means connecting said detergent conduit means in the spout with the detergent conduit means in the body comprises a circumferential channel in one of said detergent conduit means and a communicating port in the other of said detergent conduit means.

8. A mixing faucet as defined in claim 6, in which the means connecting said detergent conduit means in the spout with the detergent conduit means in the body comprises a circumferential groove in the spout and a communicating port in the body.

9. A mixing faucet as defined in claim 7, in which the circumferential channel is of predetermined arcuate length whereby communication between said port in the other detergent conduit means exists only when the spout is in a position within said predetermined arcuate length.