Nov. 27, 1956 W. J. DOBKIN 2,772,116

SOAP DISPENSERS

Filed June 26, 1953 2 Sheets-Sheet 1

Fig. 1.

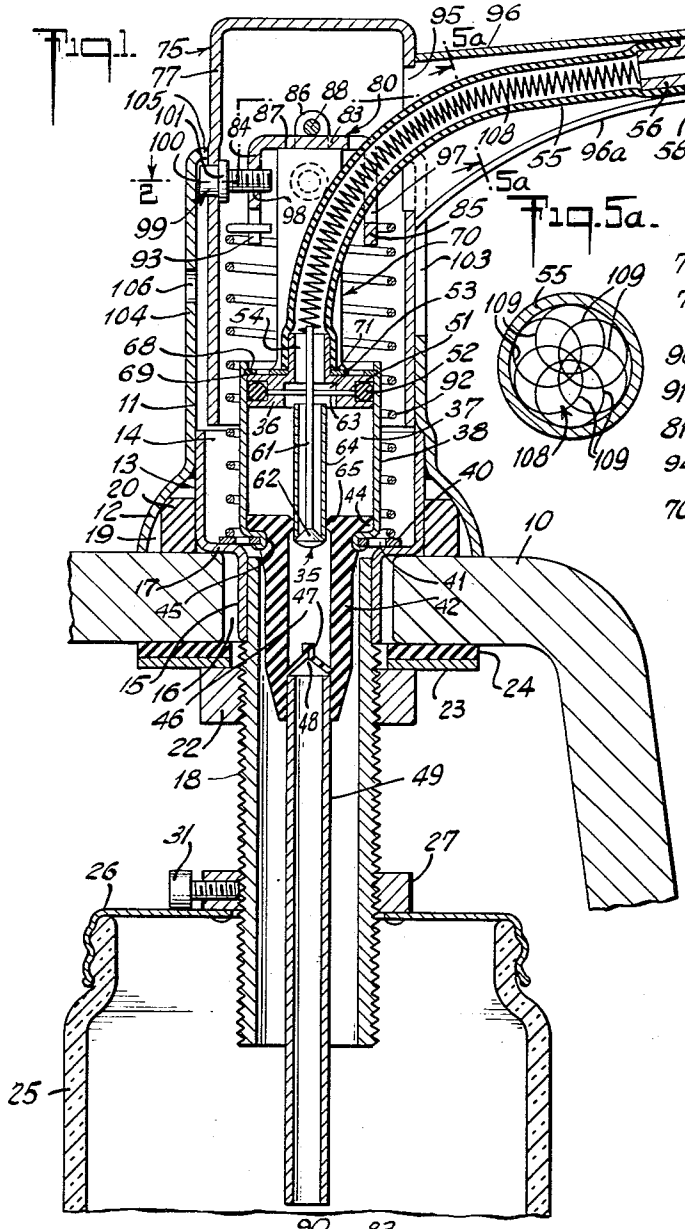


Fig. 2.

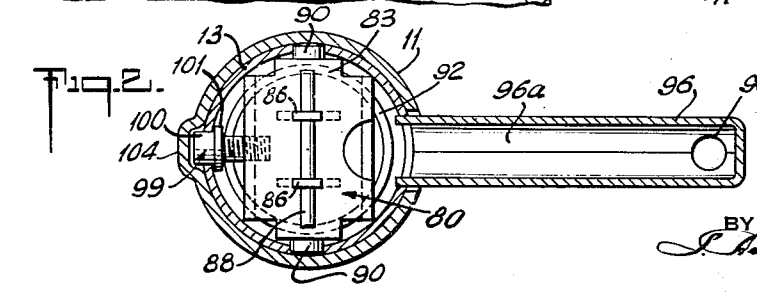


Fig. 3.

Fig. 5a.

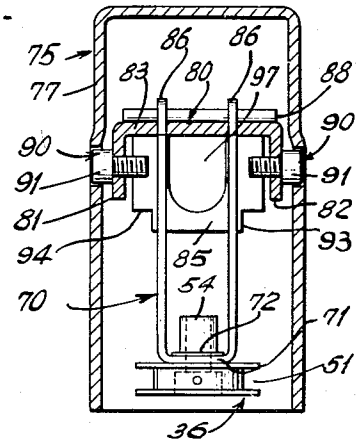
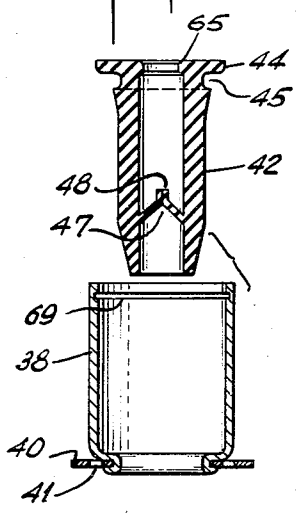


Fig. 4.



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Filed June 26, 1953 2 Sheets-Sheet 2

Fig. 6.

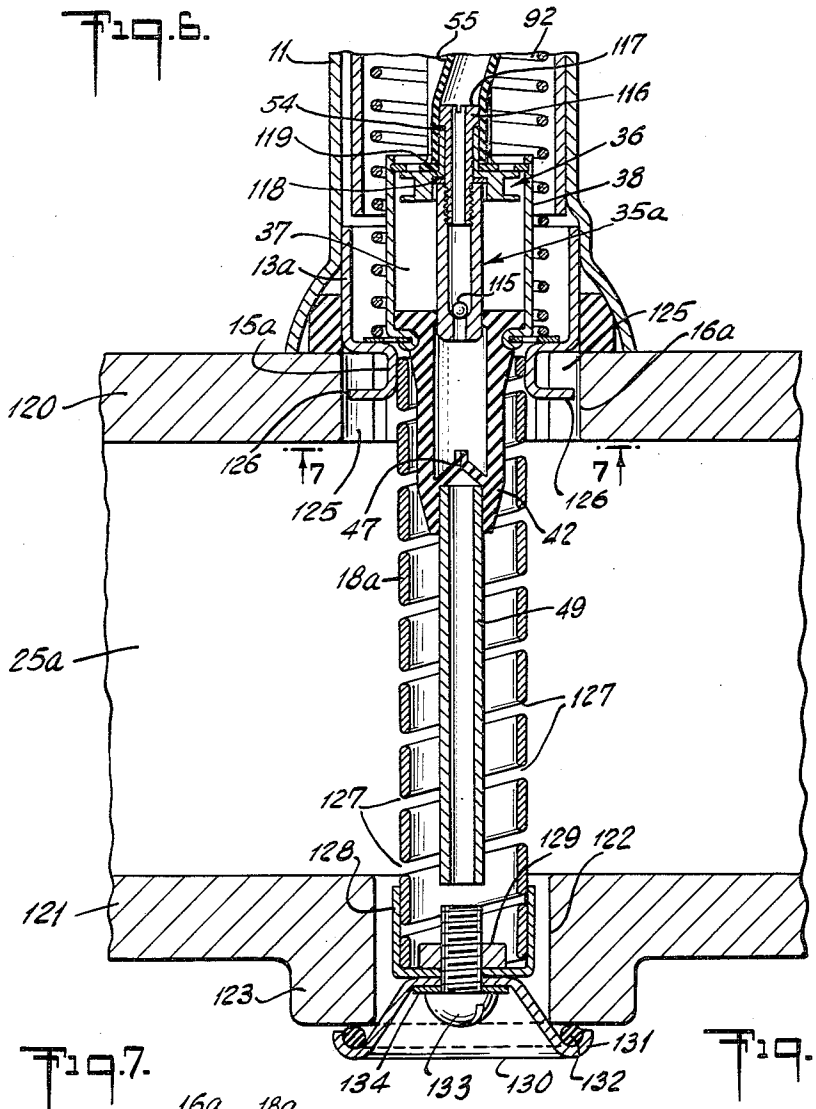


Fig. 7.

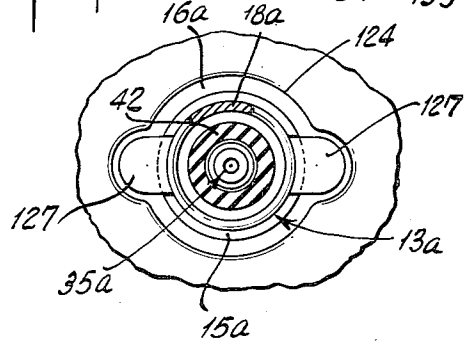
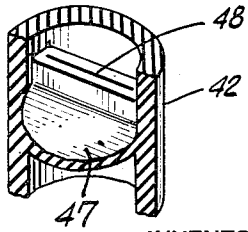


Fig. 5.



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SOAP DISPENSERS

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Application June 26, 1953, Serial No. 364,350

13 Claims. (Cl. 299—83)

The present invention relates to liquid soap dispensers of the basin type, such as are used in Pullman cars and other basin installations.

Among the objects of the present invention are to provide a new and improved dispenser of the general type described, which is comparatively inexpensive to manufacture, which is easy to maintain in efficient operation, which can be easily taken apart for cleaning and easily assembled, which is designed to prevent unauthorized tampering therewith, which when clogged by dried soap will nevertheless operate and dispense soap and will be self-cleaned by this operation, and which can be easily refilled.

Another object of the present invention is to provide a new and improved dispenser of the general type described, which can be easily converted to dispense either straight liquid or foam, as desired.

A further object is to provide a liquid soap dispenser, which is adaptable for attachment either to a basin requiring a soap reservoir separate from said basin or to a basin with a built-in soap reservoir.

Various other objects of the invention are apparent from the following particular description and from an inspection of the accompanying drawings, in which:

Fig. 1 is a vertical section of a form of soap dispenser embodying the present invention, this dispenser being shown converted to dispense foam and being shown installed in operative position on a conventional type of basin and in connection with a bottle or jar soap reservoir;

Fig. 2 is a section of the soap dispenser taken approximately along the lines 2—2 of Fig. 1 but shown without the spout tube, the spout head or the spout;

Fig. 3 is a detail section of the soap dispenser of Fig. 1 showing the plunger and piston assembly;

Fig. 4 is a detail section showing in exploded view the soap pump barrel and mixing chamber;

Fig. 5 is a perspective of a section of the soap pump barrel and of the pump value therein;

Fig. 5*a* is a section of the spout part of the dispenser taken along the lines 5*a*—5*a* of Fig. 1;

Fig. 6 shows a vertical section of the soap dispenser shown converted to dispense straight liquid soap and shown installed in a basin having a built-in soap reservoir; and

Fig. 7 is a section of the soap dispenser taken along the lines 7—7 of Fig. 6.

Referring to Figs. 1–5 of the drawings, the dispenser is shown mounted on the top wall 10 of an ordinary wash basin requiring a separate soap reservoir. This dispenser comprises a cylindrical housing 11 with a flaring or bell-bottom flange 12 seated on the top wall 10 of the wash basin. A cup 13 has an upper cylindrical section 14 fitting snugly into the cylindrical part of the housing 11 and rigidly secured thereto, as by welding, and a lower cylindrical neck section 15 of reduced diameter extending into a hole 16 in the basin wall 10 in installed position of the dispenser and defining with said upper

cup section 14 an annular shoulder 17 for seating said cup on said basin wall. This lower neck section 15 of the cup 13 embraces the upper end of an externally threaded tube 18 serving as a shank for the dispenser and is rigidly secured to said shank, as by welding. Thus the housing 11, cup 13 and shank 18 form a permanent unit.

Between the bell flange 12 of the housing 11 and the cup 13 is an annular space 19 enclosing a soft washer 20 which acts as a seal and a cushion for the top surface of the basin wall 10.

The dispenser is secured to the basin wall 10 by inserting the shank 18 through the hole 16 in said basin wall and by screwing a nut 22 onto said shank, backed up by a metal washer 23 and a soft washer 24. A suitable soap reservoir 25, shown in the form of a bottle or Mason jar and having a screw cap 26, is secured to the shank 18 below the basin wall 10 by means of a nut 27 rigidly secured to said cap, as for example, by peening and threaded to said shank. A set screw 31 is provided for locking the screw cap 26 and nut 27 to the shank 18.

The dispenser shown in Figs. 1–5 is of the foam type, requiring a mixture of air and soap to produce the desired lather. Accordingly, there is provided a small suction piston 35 for pumping a measured quantity of soap from the soap reservoir 25 and a larger piston 36 to which said small piston 35 is connected for pumping air into a mixing chamber 37, and for pumping the soap and air mixture to a discharge spout to be described.

The mixing chamber 37 is defined by a cylinder 38 extending in the housing 11 and having an external washer 40 permanently secured to the bottom thereof, as for example, by peening, and seating upon the shoulder 17 on the cup 13. This washer 40 is provided with a plurality of holes 41 permitting any residue of soap, which may seep out from the mixing chamber 37, to drain back into the soap reservoir 25.

Connected to the lower end of the cylinder 38 is the barrel 42 of a soap pump, which is molded from a suitable elastic material, such as rubber or any suitable elastomer and in which operates the soap piston 35. This pump barrel 42 has an outward flange 44 at its upper end fitting snugly in the bottom of the mixing chamber 37 for suspension therefrom and an external groove 45 into which the lower beaded end of the cylinder 38 snaps into locking engagement to prevent the pump barrel 42 from moving, after it is forced in place in the lower end of said cylinder. The pump barrel 42 has a central cylindrical passage 46 and near its lower end controlling flow through said passage, is a closure gland 47 serving as a pressure responsive pump valve. This pump valve 47 is molded integral with the pump barrel 42 and is shown having an axial cross-section in the form of an inverted Y, the stem of said valve being cut through to form a pair of facing resilient walls defining therebetween a slit 48. Thus the valve 47 acts as a diaphragm and when there is suction above the valve, the slit 48 opens up, but when there is pressure, the slit automatically closes tightly and blocks thereby flow of the soap through said valve from the passage 46 of the pump barrel 42 above said valve.

Cemented or otherwise secured to the lower end of the soap pump barrel 42 below the pump valve 47 is a flexible intake or supply tube 49, which extends downward to the bottom of the soap reservoir 25 and through which soap is delivered into the pump barrel through the suction action of the piston 35.

The piston 36 for drawing air into the mixing chamber 37 and for pumping the soap and air mixture to the discharge spout of the dispenser is located in the mixing chamber and is reciprocable therein. This piston 36

has a peripheral groove 51 receiving an O-ring 52 of rubber or similar sealing material, serving as a piston ring to seal the slide contact between the piston and the walls of the cylinder 38. A hole 53 through the piston 36 serves to define a passage for admitting air into the mixing chamber 37 from the discharge spout to be described and for discharging soap and air mixture from said mixing chamber towards said discharge spout. A tubular neck 54 extending from the upper side of the piston 36 over the passage 53 is embraced by and secured to one end of a spout tube 55, the other end of which is laterally spaced from the housing 11 and carries a spout head 56 and a spout 57, thus providing flow communication between the mixing chamber 37 and the outside of the dispenser. For effecting a removable connection between the spout head 56 and the spout 57, this spout is threaded into the spout head. To prevent unauthorized tampering with the spout 57, this spout has a fluted discharge passage 58 designed to receive a special key or wrench, such as an "Allen" wrench.

Connected to the piston 36 is the piston 35 for pumping soap from the reservoir 25 into the mixing chamber 37. This piston 35 comprises a flat piston rod 61 extending at its upper end through the central passage 53 of the piston 36 and carrying at its lower end a conical piston head 62. The piston rod 61 is attached to the piston 36 by a cross-pin 63 which passes through a hole in the piston rod and which extends at its ends into holes in the piston 36. This cross-pin 63, while loosely inserted, is retained in place by the O-ring 52. Mounted loosely on the piston rod 61 is a piston sleeve 64, which in association with the piston head 62 forms the piston 35 and which is slightly shorter than the space between the conical face of the piston head 62 and the cross-pin 63. This permits the sleeve 64 to slide up and down on the piston rod 61 between the piston head 62 and the cross-pin 63, for the purpose to be described.

The piston rod 61 is flat as described and its cross-sectional dimensions are such, that the rod across its width extends from wall to wall in the sleeve 64 and in the piston neck 54, thus locating the rod and the sleeve concentrically with respect to the piston 36 and restricting any wobbling to a minimum during assembly or operation. The narrow dimension of the piston rod 61 across its thickness on the other hand, provides an opening in the piston 36 for the passage of soap and air therethrough.

The upper end of the pump barrel 42 has an inwardly extending lip 65 forming a restricted opening or throat into which the sleeve 64 extends with a friction sealing fit, so that said sleeve is constantly under the restraining influence of said lip. Therefore, during the downward stroke of the piston rod 61, the sleeve 64 frictionally held by the lip 65 of the pump barrel 42 remains stationary, causing the piston head 62 to move below said sleeve to form an opening between the lower end of said sleeve and said piston head. This separating movement between the sleeve 64 and the piston head 62 continues until the cross-pin 63 carried by the piston 36 comes in contact with the upper end of said sleeve, whereupon the piston rod 61, piston head 62 and sleeve 64 move downwardly together as a unit. This downward movement of the piston head 62 and sleeve 64 together while separated, as described, causes the soap to be pumped from above a valve 47, through the sleeve 64, over the upper rim of said sleeve and into the mixing chamber 37.

On the upward stroke of the piston rod 61, the piston sleeve 64 frictionally held by the lip 65 of the pump barrel 42 remains stationary, until the piston head 62 reaches the bottom of the sleeve and seals said sleeve, whereupon both the sleeve and the piston head move upward in unison. During this action, the combined piston head 62 and sleeve 64 form a suction piston for pumping additional soap from the soap reservoir 25, through the valve 47 and into the section of the pump barrel 42 above said valve.

The piston 36 is limited in its downward movement in the cylinder 38 by the top of the pump barrel 42 and is limited in its upward movement in said cylinder by a snap ring 68 fitting in an internal peripheral groove 69 near the upper end of said cylinder.

For moving the piston 36 in the cylinder 38, there is provided a U-shaped link 70 having a base cross-piece 71 with a hole fitted over the tubular neck 54 of said position. The link 70 and the piston 36 are assembled and are permanently secured together as a unit by welding, or by peening, as for example at 72.

For operating the link 70 to move thereby the piston 36 in the mixing chamber 37, there is provided a hollow hand plunger 75 in the form of an inverted cup, slidably assembled telescopically in the fixed housing 11 and projecting thereabove. The portion 77 of the plunger 75 projecting above the housing 11 is reduced slightly in diameter to prevent this exposed plunger portion from rubbing against the walls of the housing and to prevent thereby the finish on said exposed plunger portion from being marred by the operation of the plunger.

For connecting the U-shaped link 70 and the hand plunger 75 for operation together, there is provided a keeper 80 in the form of a saddle having two opposed sides 81 and 82 depending from a flat top plate 83 and two opposed sides 84 and 85 quadrantly arranged with respect to said sides 81 and 82 and also depending from said top plate. This saddle 80 straddles the upper end of the link 70. The upper ends of the arms of the link 70 are reduced and shaped to form semi-circular tabs 86 passing through the top plate 83 of the saddle and to form shoulders 87 on which this saddle top plate seats. A pin 88 above the saddle 80 fits through the tabs 86 to lock the saddle 80 and the link 70 together.

The saddle 80 is secured to the hand plunger 75 for operation therewith. To that end, the two depending opposed sides 81 and 82 of the saddle 80 have threaded therein screws 90 respectively, the heads 91 of which extend through holes in the plunger 75. These screw heads 91 have special fluted keyways, requiring them to be turned with a special key or wrench to prevent unauthorized tampering therewith. These keyways are preferably of the same design as that of the spout 57, to permit the screws 90 to be turned by the same special key or wrench, such as the "Allen" wrench, employed to turn said spout in or out of position.

To urge the plunger 75 upwardly, there is provided a recoil spring 92, encircling the cylinder 38 and having its lower end seated on the washer 40 secured to the bottom of the cylinder 38. The two depending opposed sides 84 and 85 of the saddle 80 have lower tab sections 93 of reduced width extending into the upper end of the spring 92 to form guides for the upper section of the spring and define shoulders 94 against which the spring bears. The cylinder 38 forms a guide for the lower section of the spring 92.

One side of the plunger 75 has an opening 95 and secured to this side of the plunger and against this opening, as for example, by welding, is a spout housing 96. The depending side 85 of the saddle 80 has an oblong or elongated hole 97 through which the spout tube 55 extends freely. This tube 55 also extends through the plunger opening 95 and into the spout housing 96. This spout housing 96 is closed on all sides and has a bottom wall 96*a* with a juncture therealong as a result of making said housing from a single metal sheet stamped or bent to bring the opposite edges of said sheet together. This bottom spout housing wall 96*a* has a hole 96*b* through which the spout 57 extends. The spout tube 55 is thereby retained in extended position along the spout housing 96.

To prevent the unauthorized separation of the plunger 75 from the housing 11 after assembly, the saddle side 84 is provided with a threaded hole 98 to receive a screw

99. This screw 99 has a head 100 passing snugly through a hole in the plunger 75 and a shoulder 101 at the base of said screw head to limit inward and outward movement of said screw. When the screw 99 is all the way in and shoulder 101 bears against the saddle side 84, the head of the screw 99 clears the wall of the plunger, thereby permitting the saddle 80 to be freely inserted in or removed from within the plunger 75. When the saddle 80 is in place in the plunger 75, and the screw 99 is moved out until its shoulder 101 bears against the wall of the plunger, the head 100 of said screw protrudes through the side of said plunger and forms a lock stud on the outside of said plunger. A fluted keyway similar to those in the heads 91 of the screws 90 is provided in the screw head 100, requiring the same special turning key, such as the "Allen" wrench, as is employed for said screws 90 and the spout 57. Unauthorized tampering with the screw 99 is thereby prevented.

The housing 11 is provided with a slot 103 on one side to receive the spout housing 96 during its reciprocation up and down with the plunger 75 and on the diametrical opposite side is formed with a channel 104 closed at the top with an inward closure flange 105 serving as a stop for the head 100 of the screw 99 secured to the plunger 75, to prevent the withdrawal of said plunger from said housing. About midway of the channel 104, the outer wall thereof has a hole 106 permitting access to the head 100 of the screw 99, when the plunger 75 has been depressed to the bottom of its downward stroke. In this fully depressed position of the plunger 75, the head 100 of the screw 99 will be opposite the hole 106.

Normally, the plunger 75 is raised in the housing 11 by the action of the spring 92 to the elevated position shown in Fig. 1. In this position of the plunger 75, the spout housing 96 will extend partway in the housing slot 103 and the head 100 of the screw 99 will be inaccessibly concealed in the upper end of the housing channel 104. The housing slot 103 and the housing channel 104 act as guideways for the plunger 75, serving thereby to maintain said plunger against rotation with respect to the housing 11.

To withdraw the plunger 75 from the housing 11 for disassembly, the plunger is depressed to its full stroke to bring the head 100 of the screw 99 opposite the hole 106 in the outer wall of the housing channel 104. In this fully depressed position of the plunger 75, the special key or wrench may be inserted through the channel hole 106 and into the keyway of the screw head 100 and turned until said screw head clears the closure or stop flange 105 in the upper end of the channel 104. With the screw 99 so set into inoperative position, the plunger 75 may be withdrawn from the housing 11.

In a soap dispenser of the foam type, in addition to forming a mixture of air and liquid soap, it is necessary, in order to form a dense lather, to break up the larger bubbles. To accomplish this, a screen 108 is provided inside the spout tube 55 consisting of a plurality of fine coil springs 109 arranged alongside of each other. These coil springs 109 are of such outside diameter with respect to the inside diameter of the spout tube 55 and the number of these springs is such, that they overlap and intermesh in the inside of said spout tube, as shown in Fig. 5*a*, thereby breaking up the inside cross-sectional area of said tube into small openings, and causing the larger soap bubbles to break up into smaller ones, as they pass through said openings. In the form shown in Fig. 5*a*, the outside diameter of each coil spring 109 is larger than the inside radius of the spout tube 55 and about six of these coil springs are provided equally spaced around the longitudinal center line of the spout tube.

The assembling of the coil springs 109 as a screen unit 108 into the spout tube 55 is easily accomplished. To that end, the coil springs 109 are arranged side by side in a circle, and at one end they are pressed towards the center to overlap and intermesh these springs at this end and to make the spring unit at this end small enough, in cross-sectional dimensions, to permit its entry into the spout tube 55. These springs 109 at this end of the unit may be held together into reduced overlapping intermeshing relationship by a clamp, collar or clip. The spring unit at this reduced end is then inserted into the end of the spout tube 55 and the unit pushed endwise into said spout tube. As the spring unit is pushed into the spout tube 55, the coil springs 109 are forced laterally progressively towards the center of the unit into overlapping, intermeshing relationship by the confining walls of said spout tube, until the spring unit is entirely in said spout tube and has formed the screen 108. This screen 108 interferes with the free passage of the air-soap mixture from the mixing chamber 37 to the spout 57 and breaks up the larger bubbles, thus forming a lather of the desired consistency.

In liquid soap dispensers, especially of the foam type, there is a tendency for the soap to dry up in the passage to the spout, when the dispenser is not used for an extended period of time. The dried soap clogs up the passage to the spout, thus rendering the dispenser useless. In accordance with the present invention, in order to prevent such flow blockage in the spout tube 55, this tube is made from resilient material, such as rubber or neoprene (chloroprene) which can be stretched and enlarged under pressure. Hence, if the screen 108 should become clogged, the pumping pressure will force the spout tube 55 to expand, permitting fresh soap mixture to reach the discharge spout 57. This fresh soap mixture in its passage through the spout tube 55 will dissolve the soap which has dried and caked in said tube, thus making the dispenser self-cleaning.

In assembling the dispenser, the cylinder 38, the pump barrel 42 and the soap supply or intake tube 49 are put together as a subassembly. Also, to the unit consisting of the piston 36 and the link 70, are connected the piston sleeve 64, the piston rod 61, the piston ring 52, the spout tube 55, the screen 108 and the spout head 56, to form another subassembly. The two subassemblies are then connected together by inserting the piston 36 into the cylinder 38 and securing them together by means of the snap ring 68. After placing the spring 92 over the cylinder 38 from the top, and seating said spring on the washer 40, the spout tube 55 with the spout head 56 are inserted through the oblong hole 97 in the side 85 of the saddle 80. The saddle 80 is then seated on top of the spring 92 and this spring is compressed until the tabs 86 of the arms of the link 70 pass through openings in the top plate 83 of the saddle 80 and protrude from said plate. At this point, the pin 88 is inserted through the protruding tabs 86 to lock the saddle 80 and the link together. In this position, the spring 92 is maintained under semi-compression between the saddle 80 and the washer 40 with the piston 36 bearing against the snap ring 68 under the action of said spring.

When the assembly operation so far described has been accomplished, the spout tube 55, due to the location of the oblong hole 97 in the side 85 of the saddle 80, becomes deflected to one side. This assists the spout tube 55 in finding its way into the spout housing 96, when the assembly is inserted from the bottom into the plunger 75. When the assembly described is placed within the plunger 75, it is secured therein by the screws 90. The spout head 56 at this stage of assembly will align with the hole 96*b* near the outer end of the spout housing 96, permitting thereby the spout 57 to be screwed into said housing to complete the assembly of the working parts of the dispenser.

The housing 11 with the cup 13 and shank tube 18 permanently connected thereto to form a unit are first secured to the basin wall 19 by means of the nut 22 threaded on to the shank tube 18. The unit made up of the working parts of the dispenser including the plunger 75, cylinder 38 and supply tube 49 assembled as described,

is then fitted within the housing 11. The plunger 75 is depressed to its full stroke, until the head 100 of the screw 99, which at this stage is threaded all the way into the saddle 80 is opposite the hole 106 in the wall of the housing channel 104. The screw head 100 is turned by means of the special key or wrench, until the shoulder 101 on said head abuts the wall of the plunger 75. The screw 99 in this position locks the plunger 75 against separation from the housing 11.

To fill or refill the soap reservoir 25, the plunger assembly is removed from the housing 11, by depressing the plunger 75 fully, so that the screw 99 is aligned with the hole 106 in the wall of the housing channel 104, turning the screw with the special key or wrench inserted through said hole, until said screw clears the stop flange 105 on the housing 11, to unlock the plunger assembly from said housing and lifting said plunger assembly from said housing. This removal of the plunger assembly leaves a wide soap passage through the housing 11 and through the shank tube 18 to the soap reservoir 25. After the soap reservoir 25 has been filled, the plunger assembly is inserted into the housing 11 and locked thereto by means of the screw 99, following an operation reversed from that described in preparation for the filling of the soap reservoir 25.

Since the spout 57 has a fluted hole, the same special key or wrench which is used for turning the screws 90 and 99 is also used for inserting the spout in position into the spout head 56 and for removing said spout from said head.

The operation of the dispenser is as follows:

Normally, the dispenser remains as shown in Fig. 1 and is operated by manually depressing the plunger 75 against the action of the spring 92. Upon release of the plunger 75, it returns by the action of the spring 92 into the normal position shown.

On the initial downward stroke of the plunger 75, the valve 47 in the pump barrel 42 is closed and the air is expelled from the mixing chamber 37 and from the pump barrel above said valve and is ejected from the discharge spout 57 by the action of the pistons 36 and 35. On the next upward stroke of the plunger 75, the piston 35 moving upward in the pump barrel 42 creates a suction therein, causing the valve 47 in said barrel to open and soap to be drawn upward from the reservoir 25 through the intake tube 49 and through the valve 47 into the pump barrel 42 above said valve. At the same time, air is drawn into the mixing chamber 37 through the spout 57.

On the succeeding downward stroke, soap, from the pump barrel 42 above the valve 47 is injected into the mixing chamber 37 through the open sleeve 64 of the piston 35, as a result of the downward action of said piston in said pump barrel. The mixture of soap and air in the mixing chamber 37 is forced by the continued downward stroke of the plunger 75 through the screened spout tube 55 and through the spout 57, from which the mixture is discharged as a foam.

On the next upward stroke of the plunger 75, air is drawn through the spout 57, through the spout head 56, through the spout tube 55 and into the mixing chamber 37, thus clearing the passage through said spout members after each discharge. At the same time, a measured amount of soap is sucked into the pump barrel 42 above the valve 47 therein.

On the next downward stroke of the plunger 75, the action of the next previous downward stroke is repeated.

Figs. 6 and 7 show the dispenser of Figs. 1–5 converted to form a dispenser of the type in which liquid soap instead of soap foam is dispensed. In this modified form of dispenser, the piston rod 61, the cross-pin 63, the sleeve 64, the piston ring 52 and the screen 108 of Figs. 1–5 are left out. Instead of the piston 35, there is provided a hollow piston 35*a* with a check valve 115. This piston 35*a* is secured to the piston 36 by a hollow screw 116 threaded into said piston and having a head 117 bearing against the upper end of the piston neck 54, a soft washer 118 being provided between the upper end of the piston and a shoulder 119 on the piston 36 to make the connection air-tight. Without the piston ring 52 of Figs. 1–5, no compression or suction can take place in the mixing chamber 37, so that said chamber remains idle.

On the downward strokes of the piston 35*a*, resulting from the downward manipulation of the plunger 75, the soap which has been sucked into the pump barrel 42 above the valve 47 from the previous upward stroke of the plunger 35*a*, is forced through the check valve 115, through the hollow of said piston 35*a*, through the hollow screw 116, the spout tube 55 and in liquid form out through the discharge spout.

The modified dispenser of Figs. 6 and 7 is shown attached to a form of wash basin having a built-in sealed soap reservoir 25*a*. This basin is shown with a top slab 120 and a bottom slab 121, with the soap reservoir 25*a* formed between said slabs. In one corner of the basin, the top basin slab 120 has a hole 16*a* leading into the reservoir 25*a* and the bottom basin slab 121 has a hole 122 located directly below said hole 16*a* and surrounded by a boss 123 for reinforcement.

Due to the fragile nature of the basin, it is extremely difficult to install the dispenser sufficiently tight to prevent leakage through the bottom basin hole 122, without cracking the basin. Since the dispenser cannot be sufficiently tight in this type of basin to prevent turning, the basin hole 16*a* is formed with a round center 124 having a pair of diametrically opposed wing or lobe extensions 125 serving as keyways. The cup 13*a* corresponding to the cup 13 in the construction of Figs. 1–5, has its neck section 15*a* with outward side lugs or tongues 126 fitting into the hole extensions 125 respectively, to prevent the dispenser from being turned by hand from the top and to prevent thereby, the dispenser from being unscrewed from the basin.

The dispenser of Figs. 6 and 7 may have a shank corresponding to the shank 18 in the construction of Figs. 1–5 inserted through the basin holes 16*a* and 122 and secured to the basin by a cap-nut threaded to said shank. Suitable openings would be provided in the shank to allow for the passage of the soap therethrough from the shank to the soap reservoir 25*a* and vice versa.

In the actual construction shown in Figs. 6 and 7, a spiral shank 18*a* is provided made from flat spring wire and affording suitable openings 127 between the successive coils or convolutions to permit the passage therethrough of the liquid soap. The upper end of this spiral shank 18*a* is welded to the neck section 15*a* of the cup 13*a*, while the lower end is welded to a cup 128 having a nut 129 welded thereto. Before welding the upper end of the shank 18*a* to the neck section 15*a* of the cup 13*a*, the opposite parts of said neck section are sheared and bent outwardly to form the lugs or tongues 126, which fit into the lobe keyway sections 125 of the top basin hole 16*a*.

To secure the dispenser of Figs. 6 and 7 to the basin, a bell-shaped or inverted dished metal washer 130 is provided, having a skirt with its outer edge section curved upwardly to form an annular channel 131, in which a soft O ring 132 is received for the purpose of sealing the bottom hole 122 of the basin. The shank 18*a* is made of such length as to afford a gap between the bottom of said shank and the washer 130, while the shank is unstressed and before the dispenser is attached to the basin. A screw 133 carrying a soft washer 134 and threaded into the nut 129 is employed to stretch the spiral shank 18*a* until the washer 130 is tight against the bottom opening boss 123 of the bottom basin slab 121.

The design of the spiral shank 18*a* as described, serves to secure the dispenser with the desired pressure between the upper basin slab 120 and the bottom basin slab 121 without requiring any particular care or skill on the part of the person installing the dispenser. The spring

tension of the shank 18*a* maintains constant pressure on the seal 132, even though this seal may shrink or the basin may warp slightly due to ageing.

The means of attaching the dispenser to the basin of the type shown in Figs. 6 and 7, may be applied to the dispenser of the foam type shown in Figs. 1–5.

Except as indicated, the dispenser of Figs. 6 and 7 is the same as the dispenser of Figs. 1–5.

While the invention has been described with particular reference to specific embodiments, it is to be understood that it is not to be limited thereto but is to be construed broadly and restricted solely by the scope of the appended claims.

What is claimed is:

1. In a liquid soap dispenser, the combination comprising a soap pump having a barrel of resilient material, a piston reciprocable in said barrel for pumping, said barrel having an inturned edge at one end sealably embracing said piston with a friction fit, and a valve in said barrel integral therewith and having relatively movable resilient parts defining a valve passage therebetween and relatively movable into passage closing and opening positions by the pressure effect produced thereon by the movement of said piston in said barrel, and conduit means on the inlet side of said valve adapted to feed liquid soap from a soap reservoir to said valve.

2. In a liquid soap dispenser of the foam type, the combination comprising an air and soap mixing chamber, a piston in said chamber for pumping air into said chamber and for pumping soap and air admixture from said mixing chamber, a pump for pumping soap from a soap reservoir into said mixing chamber and comprising a pump barrel connected to one end of said mixing chamber and communicating therewith, a soap pumping piston connected to said air pumping piston for reciprocable movement therewith and extending into said pump barrel, and a valve for controlling flow of soap from said soap reservoir into said pump barrel, operable into open position when said soap pumping piston moves in one direction and operable into closed position when said soap pumping piston moves in the opposite direction, said soap pumping piston comprising a piston rod connected to said air pumping piston and extending into said pump barrel, a piston head at one end of said piston rod extending into said pump barrel and a sleeve around said piston rod between said air pumping piston and said piston head defining a passage along said piston rod between said pump barrel and said mixing chamber and short enough to have axial play along said piston rod, said piston head affording a seat for said sleeve, friction means yieldably restraining said sleeve against axial movement, said piston rod being moved along said sleeve, while said sleeve is frictionally held at the beginning of the stroke of said air pumping piston towards said pump barrel, whereby an opening is formed between said sleeve and said piston head, said sleeve for the remaining of said stroke being engaged by said air pumping piston and being moved thereby in unison with said piston rod to close said valve and to cause the soap trapped in said pump barrel to flow through said opening, through said sleeve and into said mixing chamber, said piston rod upon the return stroke of said air pumping piston, being moved with respect to the frictionally held sleeve, until said piston head seats against said sleeve, whereupon said piston head and said sleeve move together in unison to open said valve and to operate as a suction piston, whereby soap is drawn into said pump barrel from said soap reservoir.

3. In a liquid soap dispenser of the foam type, the combination as described in claim 2, wherein said piston rod is flat and extends from opposite sides of the wall of said sleeve to center said rod in said sleeve and to prevent thereby lateral play of said sleeve in relation to said piston rod while affording a passage in said sleeve along said rod, and wherein said piston rod is connected to said air pumping piston by a cross-pin extending through the latter piston, and wherein there is provided a piston ring embracing said air pumping piston and arranged in sealing contact with the wall of said mixing chamber, said piston ring forming a stop for the ends of said cross-pin.

4. In a liquid soap dispenser, a discharge spout, a spring-pressed hand plunger, and means responsive to the operation of said plunger for delivering measured amounts of liquid soap from a soap reservoir to said spout, and including a chamber through which the pumped soap passes on its way to said spout, a piston in said chamber, a U-shaped link connected at its base to said piston, a saddle straddling the legs of said link and connected to said link, said saddle having depending sides connected to said plunger and a depending side with a hole therein, and a spout tube connected at one end to said chamber, passing through said saddle hole and connected at its other end to said discharge spout.

5. In a liquid dispenser, the combination as defined in claim 4, wherein the ends of said link arms are reduced to form tabs respectively passing through a top plate in said saddle and to form shoulders on which said saddle seats and wherein a pin above said saddle fits through said tabs to lock the saddle and link together.

6. In a liquid soap dispenser, a discharge spout, a hand plunger, and means responsive to the operation of said plunger for delivering measured amounts of soap from a soap reservoir to said discharge spout, and including a cylinder defining a chamber through which the pumped soap passes on its way to said discharge spout, a piston in said chamber, a link connected at its lower end to said piston, a saddle straddling the upper end of said link, means removably connecting said saddle to said link, means removably connecting said saddle to said hand plunger, a seat secured to said cylinder on the outside thereof, and a coil spring encircling said cylinder and bearing at its lower end against said seat, said saddle having depending sides extending into the upper section of said spring and serving thereby as a guide for said upper spring section.

7. In a liquid soap dispenser, the combination comprising a housing, a spring-pressed plunger in the form of an inverted cup telescoped into said housing, a discharge spout, means responsive to the operation of said plunger for delivering measured amounts of soap from a soap reservoir to said discharge spout, and including a chamber in said housing through which the pumped soap passes on its way to said discharge spout, a piston in said chamber, and means including a keeper removably connecting said plunger to said piston, and means removably locking said plunger to said housing to prevent said plunger from being withdrawn from said housing while allowing said plunger to move in operation with respect to said housing and comprising a screw-threaded into said keeper and having its head passing through the wall of said plunger, the wall of said housing along the course of said screw-head being spaced from the wall of said plunger to provide a clearance for the screw head, said screw head projecting into said clearance, the upper end of said housing wall in line with said clearance forming a stop for said projecting screw head, said housing wall having a hole in registry with the head of said screw in substantially completely depressed position of said plunger, to permit access of a turning tool to said screw-head through said hole and to permit thereby said screw-head to be turned inwardly in position to clear said stop, whereby said plunger can be withdrawn from said housing, said screw-head being designed to receive a turning tool aside from a conventional screw drive, whereby chances of unauthorized tampering with said screw is reduced.

8. In a liquid soap dispenser, the combination as described in claim 7, wherein said plunger fits into said housing with a snug slide fit, but said housing along the

course of said screw-head is formed with a channel defining said clearance for the screw-head, and wherein the top of said channel is closed with an inward closure flange serving as the stop for said screw head.

9. In a liquid soap dispenser, the combination comprising a housing, a chamber in said housing, a spring-pressed hand plunger in said housing in the form of an inverted cup telescoped into said housing, a discharge spout on one side of said housing, a resilient spout tube connected to said chamber and extending laterally to said discharge spout, a spout housing secured to one side of said plunger to form a hollow unit therewith and extending around said tube and means responsive to the operation of said plunger for pumping the soap from a soap reservoir through said chamber, through said spout tube and to said discharge spout.

10. In a liquid soap dispenser, the combination comprising a housing, a chamber in said housing, a spout housing, a discharge spout, a spout tube in said spout housing extending from said chamber to said spout, and means including a plunger connected to said spout housing for pumping soap from a soap reservoir through said housing, through said spout tube and to said discharge spout, said spout tube being of resilient material whereby said spout tube is capable of expanding to permit the passage of soap through said tube, when said tube becomes clogged and is capable of bending laterally of said chamber for assembly into said spout housing.

11. In a soap dispenser of the foam type, the combination comprising an air and soap mixing chamber, a discharge spout, a resilient tube from said mixing chamber to said spout, a screen in said tube, and plunger means for pumping soap from a soap reservoir and air to said chamber and for pumping the mixture through said tube to said spout, said tube being of resilient material so as to be capable of expanding to permit the passage of soap through said tube when said screen is clogged.

12. In a liquid soap dispenser, a chamber, a resilient spout housing, a spout tube partially in said housing connected at one end to said chamber, a spout head in said housing having a tubular neck section extending into the other end of said tube and secured thereto, said spout head having a soap passage communicating with the passage defined by said spout tube, said spout head having a threaded hole in communication with its soap passage, a discharge spout threaded into said hole and projecting to the outside of said housing through a hole in a wall thereof, whereby said spout tube is maintained extended in and along said spout housing, and plunger means for pumping soap from a soap reservoir through said chamber, through said spout tube and to said discharge spout.

13. In a soap dispenser of the lather type, the combination comprising a spout tube, means for producing mixtures of soap and air and pumping them through said spout tube, and a screen in said spout tube for breaking up the larger soap bubbles as they pass through said tube for discharge and comprising a plurality of coil springs in said spout tube with their longitudinal center axes spaced radially from the longitudinal center line of the spout tube and spaced from each other circumferentially around said center line, said coil springs being arranged side by side with the convolutions of said springs overlapping and intermeshing.

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