

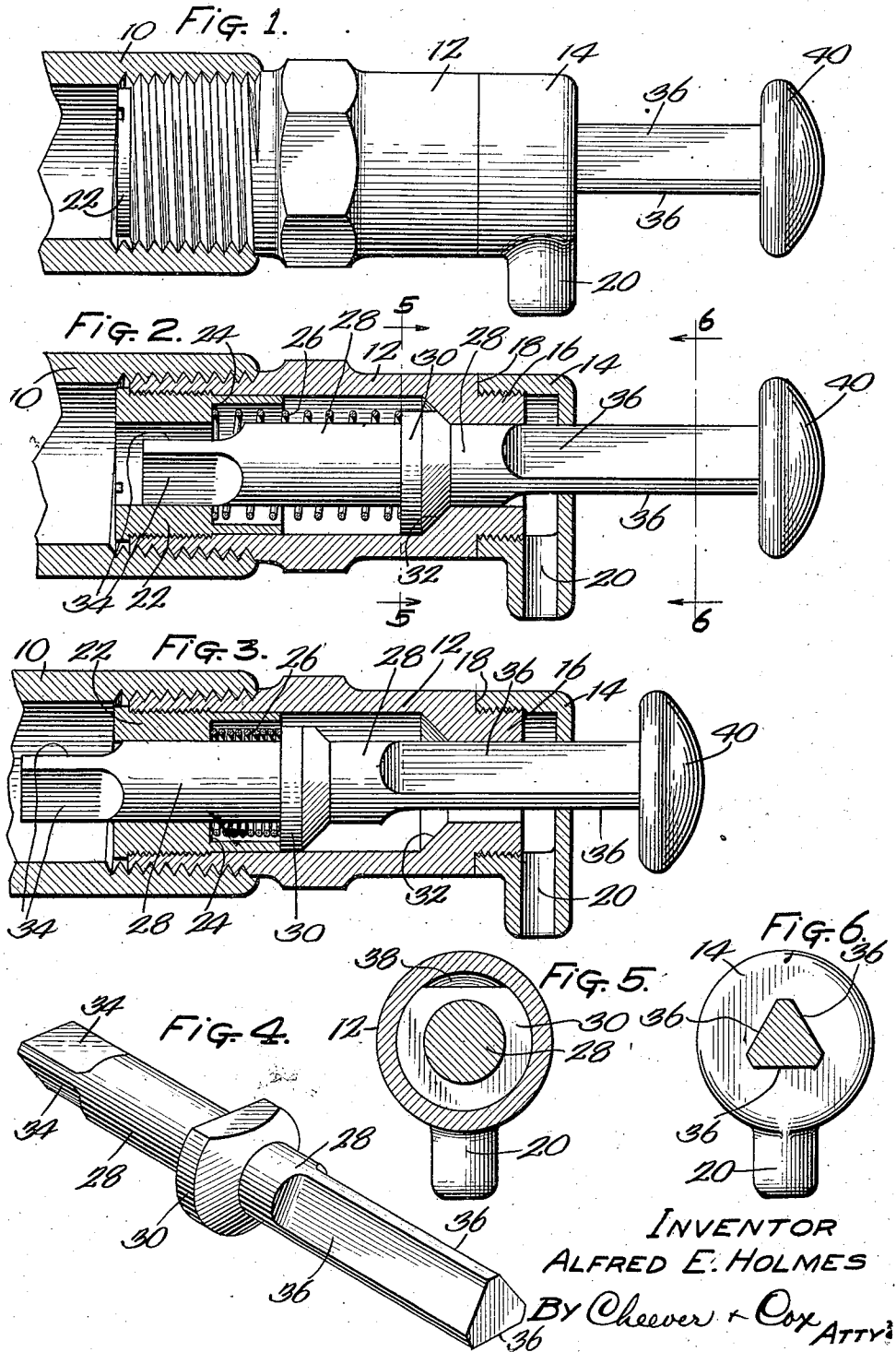
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A. E. HOLMES

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LIQUID DISPENSER

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UNITED STATES PATENT OFFICE.

ALFRED E. HOLMES, OF CHICAGO, ILLINOIS, ASSIGNOR TO WILLIAM H. PLUNKETT, OF CHICAGO, ILLINOIS.

LIQUID DISPENSER.

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My invention relates to liquid dispensers and is designed primarily for the dispensing of liquid soap in lavatories. One object of the invention is to provide a dispenser in which the plunger is arranged horizontally and the delivery spout vertically so that when the operator imparts a straight-in push to the plunger and then releases it a measured quantity of the liquid will be ejected downward out of the spout. Another object is to provide a device of this class which is simple to make and reliable in its operation, and which will prevent the user from obtaining an excessive amount of liquid by rapidly pumping the plunger back and forth. One of the specific objects of the invention is to provide a dispenser having a transfer port or bypass port located at the top of the plunger and means for holding it in this position.

I accomplish my objects by the mechanism illustrated in the accompanying drawings in which—

Figure 1 is a side view of a dispensing device showing the supply duct in central vertical section.

Figures 2 and 3 are elevations taken chiefly in central vertical section and showing the plunger in changed positions.

Figure 4 is a perspective view of the plunger.

Figure 5 is a transverse sectional view on the line 5—5 Figure 2.

Figure 6 is a sectional view on the line 6—6 Figure 2.

Like numerals denote like parts throughout the several views.

In practice the liquid is supplied through a supply duct 10 which leads from a reservoir of any suitable type, usually of glass. Such reservoirs are known, being shown, for example, in my prior Patents 1,165,673 and 1,454,284, and consequently need not be here shown or described.

In the design illustrated a casing 12 screws into the outer end of the supply duct and stands in a horizontal position. At the outer end of the casing there is a spout section 14 which is internally threaded and screws upon an externally threaded portion 16 of the casing. A shoulder 18 is formed on the casing near the outer end and the spout section screws up against it so as to lock the spout section in vertical position. This serves another function in also locking

the plunger against rotation about a horizontal axis in the manner which will be hereinafter explained. The liquid is delivered through a spout 20 at the bottom of the section.

Screwing into the inner end of the casing is a nipple 22 which has an internal shoulder 24 serving as an abutment for a helical compression spring 26. This spring surrounds the stem 28 of the plunger 30 and abuts the plunger for the purpose of urging it outward to the normal position shown in Figures 1 and 2. By preference the forward portion of the plunger is conical and seats against the conical shoulder 32 formed internally near the outer end of the valve casing. The nipple 22 is cylindrically bored to slidably receive the cylindrical stem 28 and the same is true of the outer end of the valve casing.

The inner end of the stem is cut away at the side as indicated at 34 to form inlet ports to the chamber within the casing when the plunger is in the normal projected position shown in Figures 1 and 2. The forward portion of the stem is also cut away on the sides as indicated at 36 to form outlet ports at the outer end of the casing. The ports 34, 36 are so located with reference to the shoulder 24 of the nipple and the shoulder 32 in the casing that one set of ports will be closed just before the other set is open.

The top of the plunger 30 is cut away to leave a space 38 through which liquid may pass when the plunger is reciprocated. As this passage is at the top of the plunger the liquid is prevented from dribbling past the plunger. The liquid will pass only when there is sufficient liquid in the chamber to bring the level up to the upper part of the plunger. Thus the plunger in a sense constitutes a dam, and unless there is enough liquid to overflow the top of this dam there will be no flow at all.

The plunger is prevented from rotating about its axis by the outer wall of the spout section 14 which has the same cross section—in the present case approximately triangular—as the cross section of the stem at that point.

It is desirable to place a button or hand hold 40 at the outer end of the stem for convenience of operation.

In practice, the supply duct 10 will be kept full of the liquid to be dispensed, this

being accomplished by the supply reservoir, not shown. Normally the plunger will occupy the projected position shown in Figures 1 and 2. Under this condition the liquid will pass by the inlet ports 34 into the chamber within the casing. At the same time the plunger 30 which is seated against the shoulder 32 will retain the liquid within the chamber. If, now, the operator wishes to obtain liquid he presses inward upon the button 40 and moves the plunger towards the position shown in Figure 3. This has the effect of first closing the inlet ports 34 and then opening the outlet ports 36. Practically speaking, the amount of liquid delivered will be the amount displaced by the plunger after the inlet ports 34 have been closed. The amount displaced will flow over the top of the plunger to a position in front of it and when the plunger is released it will move outward and eject the quantity of liquid that has thus flowed over it. As the entire sides and bottom portion of the plunger make contact with the inner walls of the casing there will be no back flow, practically speaking, for only such liquid can flow back as would be above the level of the cut portion of the plunger. Under ordinary circumstances where the user operates the device reasonably slowly this would be negligible. As soon as the stem 28 moves outward far enough to cover the ports 36 the forward flow is checked. Soon thereafter the ports 34 are uncovered whereupon a fresh charge of liquid will be drawn in. However, if the user becomes impatient and starts to pump the plunger back and forth rapidly, he will not obtain much more liquid than he would by a more deliberate operation because the spaces around the forward stem at the ports 36 are more or less constricted and the resistance to flow at this point would cause a portion of the liquid to flow back over the top of the plunger. The quick motion back and forth would not permit the space in front of the plunger to refill to any great extent, and the result would be that the liquid would swash back and forth past the plunger and not deliver a full measure of liquid on each forward reciprocation. Therefore the device automatically puts a premium on deliberate and normal operation and if the device is operated in this way the user will obtain the allotted amount of liquid and he will not obtain much more than this if he misuses the device by attempting rapidly to pump the liquid from it.

From the foregoing it will be seen that the construction is simple and that the device is effective in operation. As the spout section 14 locks against the shoulder 18 it holds the spout in a truly vertical position, and the locking of the spout section also

locks the stem against rotation about its axis, thus always holding the dam or cut portion of the plunger uppermost and horizontal.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A liquid dispenser having a casing arranged horizontally, a plunger slidable within the casing, and a stem extending inwardly and one extending outwardly from the plunger for operating it, said stems having ports in the side so located that the ports on one side of the piston will close before the ones on the other side open the port area about the inwardly extending end of the plunger being smaller than the effective area of the plunger, the plunger being cut away at the upper portion only whereby no liquid will be passed except that which flows over the said upper portion of the plunger.

2. A liquid dispenser having a casing arranged horizontally and provided with a chamber having a center bore at each end, a plunger fitting slidably within the chamber and cut away at the top only for passing the liquid, the plunger having stems of reduced diameter extending into the bores, the stems having ports at the sides alternately covered and uncovered as the plunger is reciprocated, and means for preventing the plunger from rotating about its axis whereby the cut-away portion always remains uppermost and the plunger fits the walls of the chamber at all other portions.

3. A liquid dispenser having a casing arranged horizontally with center bores at the front and rear, the inner walls of the casing being cylindrical, a plunger slidable within the casing in a horizontal direction, stems at the front and rear of the plunger, making a sliding fit with the center bores, said stems having ports in their side, the port area of the forward stem being less than the effective area of the plunger, one set of ports being covered before the other set is uncovered, the plunger fitting the inner walls of the casing and being cut away at the top only to form a passage for the liquid, and means for preventing the rotation of the plunger about its axis.

4. A liquid dispenser having a casing arranged horizontally with center bores at the front and rear, the inner walls of the casing being cylindrical, a plunger slidable within the casing in a horizontal direction, stems at the front and rear of the plunger making a sliding fit with the center bores, said stems having ports in their side, the port area of the forward stem being less than the effective area of the plunger, one set of ports being covered before the other set is uncovered, the plunger fitting the inner walls of the casing and being cut away at the top only to form a passage for the

liquid, a portion of the forward stem being polyangular in cross section, and means secured to the forward end of the casing and making a sliding fit with the polyangular portion of the stem for preventing the latter and the plunger from rotating about their axis.

5. A liquid dispenser having a casing with cylindrical inner walls and center bores of reduced diameter at the front and back end, a plunger sliding within the cylindrical portion of the casing and having a segment cut away at the top only to form a passage for the liquid, stems integral with the plunger and extending forward and backward to fit slidingly within the center bores, the stems having ports in the side, the port area of the forward stem being smaller than the effective area of the plunger, one set of ports being covered before the other set is uncovered when the piston is reciprocated, a spout section screwing onto the forward end of the casing, means for locking the spout section in such position that the spout extends vertically downward, the forward portion of the spout section having the same cross section as the forward portion of the forward stem for preventing the latter and the plunger from rotating about their axes.

In witness whereof, I have hereunto subscribed my name.

ALFRED E. HOLMES.