W. E. BYER.

LIQUID DISPENSING DEVICE.

APPLICATION FILED JUNE 7, 1910. RENEWED MAY 22, 1912.

1,049,339. Patented Jan. 7, 1913.

Fig. 1.

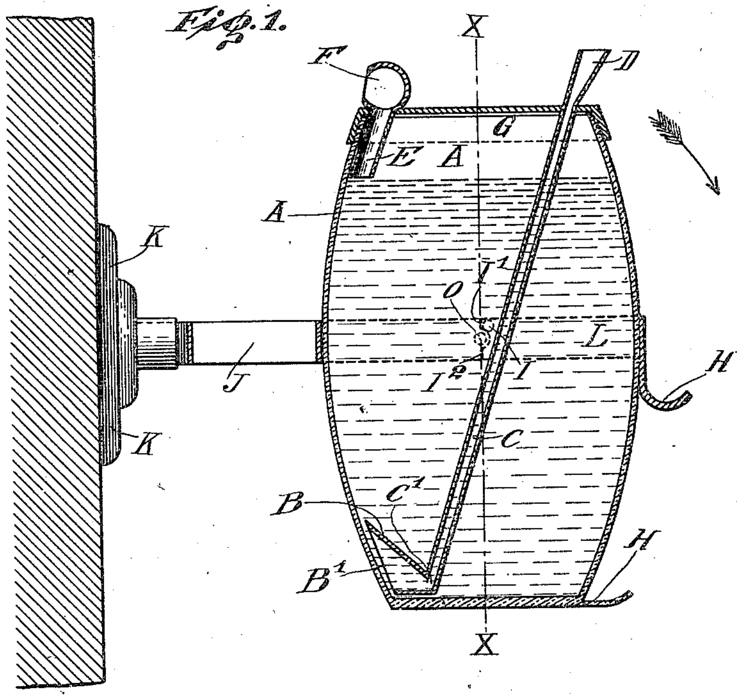
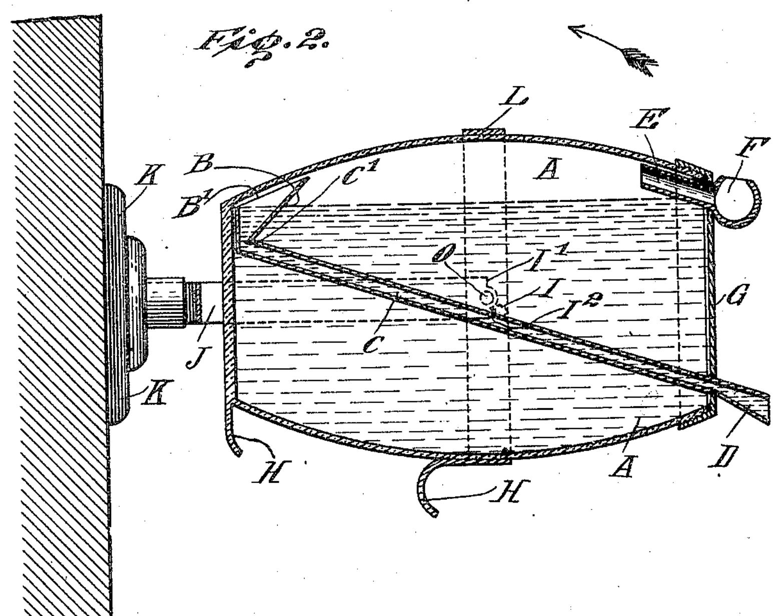


Fig. 2.



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LIQUID-DISPENSING DEVICE.

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To all whom it may concern:

Be it known that I, WILLIAM EDWIN BYER, a citizen of the United States of America, and a resident of Jersey City, New Jersey, have invented certain new and useful Improvements in Liquid-Dispensing Devices, the principles of which are set forth in the following specification and accompanying drawing, which disclose the form of the invention which I now consider to be the best of the various forms in which the principles of the invention may be embodied.

This invention relates to improvements in liquid dispensing devices of the type wherein the liquid-reservoir is tilted to cause delivery of a liquid charge of preferably uniform quantities.

The object of the invention is a device having the highest efficiency in operation and the greatest simplicity of construction, the use particularly contemplated being the dispensing of liquid soap for the toilet.

The invention consists of the essentials shown, hereinafter described in detail, and specified as to novelty in the claims.

Of the drawings, which are approximately to full scale, Figure 1 is a vertical section of the device in its normal non-operating position, and Fig. 2 is a vertical section of the device in its temporary abnormal or operating position in which it delivers the liquid from the spout D.

Referring to Fig. 1, A is the liquid reservoir; B is the measuring chamber preferably located substantially at the normal bottom of the reservoir; C is the delivery passage or pipe from the measuring chamber; and F is the vent. Reservoir A is supported by a band L encircling it and pivoted at O in a bracket-arm or two J fixed in or carried by a standard K which may be attached to the side-wall of the room. The end of arm J is cut to form stops I^1, I^2, to receive pin I mounted on band L, so that pin I will engage stop I^1 to prevent reservoir A from being moved to the left beyond its vertical position, and so that pin I will engage stop I^2 to prevent reservoir A from being moved downwardly to the right beyond its extreme delivery position shown in Fig. 2.

The operation consists in the delivery of the liquid soap from spout D into the hand of the user, the spout being enlarged toward its outer end, as shown, to permit free delivery. To perform this operation, the user tilts the reservoir toward him, from the vertical position shown in Fig. 1, in the direction of the arrow, into the position shown in Fig. 2. If spout D simply communicates with the interior of the reservoir at the upper portion thereof in the normal position of Fig. 1, (as is permissible, thereby omitting parts B and C) then the above operation will result in a continuing flow of liquid as long as the user holds the reservoir in the position of Fig 2; but in that position it is in unstable equilibrium, its pivoted support being located sufficiently high (Fig. 1) to insure the return of the reservoir to its normal position of Fig. 1, as soon as the user lets go of it, by the dropping (Fig. 2) of the heavier left-hand portion.

The vent F is so located, as shown, Fig. 1, relative to spout D, (*i. e.*, on the opposite side of the normal vertical center X—X), that during the operation of tilting and delivery, the liquid is delivered from the spout without also flowing into said vent F. This not only limits the delivery to and through spout D, but also prevents F from being obstructed by the liquid; so that if F be otherwise unobstructed, the delivery will be entirely free of vacuum resistance, owing to the continuous communication through F between the outside air and the air-space inside the reservoir above the liquid therein. Substantially all the liquid in the reservoir can be delivered through spout D in the position of the reservoir shown in Fig. 2, and this final position, determined by the stop devices I, etc., above described, insures against a rise of liquid level sufficient to cause an inflow into vent F. On account of the above construction and arrangement as to vent F, outlet D, and the stop devices, the vent F can be and preferably is entirely and permanently unobstructed, so that it is always certainly operative to provide free air access and consequent free liquid delivery from spout D. This unobstructed character of F also adapts it for use as an inlet for introducing the liquid into the reservoir, although spout D may be used for that purpose, particularly in the case where parts B and C are not used. In either case, the filling inlet, as F shown, may be and preferably is projected downwardly (Fig. 1) at E so as to coöperate with the feature of location of F relative to D, to prevent access of liquid to F during tilting and delivery. If desired, also, and to the same end, the part E of F which projects down into the interior of the reservoir (Fig. 1), may be inclined away from spout D, so that a yet higher level of liquid in the operating position of Fig. 2, would be required before the liquid could enter F. The above means chiefly relate to the maintenance of a free access for air, by the prevention of a stoppage of F by the liquid. If the device be too abruptly tilted, a little liquid might be thrown up into F, and to take care of this, the top of F and its side toward D may be and preferably are closed, and the leader F may be cup-shaped at the top, as shown, to prevent the complete exit of such small quantity of the liquid, which can afterward return into the reservoir upon the automatic return of the same to its normal position of Fig. 1. The filling in such case may be done by an ordinary funnel modified to have a bent end to extend into the filling aperture and permit the main part of the funnel to maintain a vertical position.

With the above construction, omitting parts B and C, the delivery would be continuous through D as long as the user held A in an operating position, as against the stop I^2 as shown in Fig. 2. It is preferable, however, for general public use, that the delivery be limited to a substantially uniform quantity of liquid for each operation of tilting. It is by no means new to provide a measuring chamber and a delivery passage for that pupose in a tilting reservoir; but I have invented certain improvements which I believe will for the first time permit a practicable device of this general character. In order that the constructor may make the device in such way as to embody my invention, an explanation additional to the drawing is desirable.

Of first importance is the disposition of passage C and its inlet C^1, and chamber B and its inlet B^1, relative to spout D, and to air-inlet F, the latter being the inlet for liquid as well as air, whenever passage C is used, and C being preferably of very small internal diameter, in order to leave most of the measuring function to chamber B. It is desirable to make F of as large internal diameter as the rest of the device permits, in order to provide as free as possible an inlet for air and liquid. As a result of the construction and disposition of parts B and C herein, F is permitted to be of ample size for these purposes, and to be permanently unobstructed by any devices such as valves, etc. Passage C is preferably in fixed relation to reservoir A, and as shown, the lower end of C communicates at C^1 with measuring chamber B, and the latter is located (Fig. 1) preferably exclusively on the same side of the vertical center X—X as is inlet F, and on the side opposite to outlet D; the results being that C^1 is also so located and that passage C has considerable angle with the vertical center X—X, and away from, or, as to tilting, in advance of, inlet F. The location of B^1 (being the communication between reservoir A and measuring chamber B), is important, (being on the same side of the vertical as is F, and on the side opposite to D, or at least much nearer the vertical through F than the vertical through D), because that location of B^1 causes B, when A is tilted, to take the measured quantity of liquid for delivery, the tilting of A causing the main body of liquid in A to fall away, in effect, from said communication B^1 between A and B; *i. e.*, if B^1 were not much nearer to F than to D, B would have no substantially useful function as a measuring chamber, except at times when A had a low liquid level, because at other times the liquid would be delivered continuously as long as A were held in Fig. 2 position. But a feature of this invention which is important, in addition to the feature just described, is the normal inclination of passage C to the vertical and away from the inlet F, which is obtained by connecting C at C^1 directly to B, the connection C^1 being located sufficiently to the side toward F, of the vertical through D, to permit the desired inclination of C which will cause delivery through D before the liquid level rises to F. The greater this inclination away from inlet F, the greater will be the certainty of emptying chamber B before the liquid reaches F. The inclined passage C also provides the shortest and most direct route for the delivery of the complete charge, which is made forthwith upon the tilting of A.

Another important feature is the fact that the inlet B^1 to B does not extend far from the wall of the reservoir on the same side as inlet F, and this is obtained, preferably, by the use of a measuring chamber in the form of the dipper or bucket B shown, the mouth of which is arranged closely adjacent to said wall. The result is that upon tilting, the air-space at the top of A reaches B^1, (*i. e.*, the liquid is withdrawn therefrom) much more quickly than if inlet B^1 had a considerable extent horizontally away from the vertical wall of A, *i. e.*, than if B^1 were a vertical inlet; and that result is desirable here on account of the early delivery through C caused by the sharp inclination of C away from F and toward the direction of tilting. It is of course desirable for the air-space to uncover B^1 before the commencement of discharge through D, in order that the charge may be of a given amount; and the delivery of a given amount when the device is first operated after filling, is due to the short horizontal distance between B and the wall of A, (*i. e.*, permitted by the fact that

B^1 is a horizontal inlet), as well as to the initial top air space caused by the vertical dependence of F at E down into A. The early withdrawal of liquid from the mouth B^1 of B, which is permitted by the horizontally-short passage between B^1 and the wall of A, (said passage being permissibly short by virtue of the fact that B^1 is a horizontal inlet), is also important in that it permits economy or reservoir space by permitting a larger amount of liquid in A prior to the commencement of the delivery of definite charges.

In the case shown, the inlet B^1 may approximately be five-eighths of an inch at the mouth of the dipper B, and the dipper may approximately be a half-inch deep. Although the dipper form of measuring chamber is not the only form which can be arranged to have a horizontal inlet and therefore a horizontally-short passage between A and B^1, yet this form is preferred on account of the simplicity thereby permitted in the construction of reservoir A. The same is true as to passage C, yet this is preferably in the form of a pipe to obviate any special and difficult construction of reservoir A. Dipper B and pipe C combined, constitute a very simple device which can be readily combined with any very simple ordinary reservoir. Also the location of C entirely within the limits of the reservoir, preferably, obviates any necessity for outwardly projecting inclined parts additional to the simple enlarged spout D, which might be otherwise desirable, in order to cause delivery through D before the liquid level reached F.

In the case shown, the construction and arrangement is such that the successive openings through inlet F may be as great as three-eighths of an inch, in internal diameter, thus assuring ample relief to permit prompt liquid delivery from D, and also providing a very ready means for refilling reservoir A. Also the use of the measuring chamber in the form of a dipper connected to passage C and arranged to have its mouth or inlet presented horizontally in the normal position of Fig. 1, permits inlet B^1 to be so large as to promptly fill B upon the return of A to its vertical position of Fig. 1, so that the device is ready almost instantly for another operation; and this wide mouth B^1 of B does not prevent the horizontally-short passage between B^1 and the wall of A which is so important in permitting the quick withdrawal of liquid from B^1 before the commencement of delivery from D, which latter takes place so soon after tilting when the inclined passage C is used. The constructor will understand that the quick filling of B is due to the fact that the liquid can enter it from all sides at once, (as distinguished from a vertical opening to a measuring chamber), and that any construction of a measuring chamber which shall permit that result, will be the equivalent in that respect of the dipper which is shown in the particular example disclosed as a part separate from the reservoir. It is not necessary that the liquid enter B from all sides at once, but only that it can enter B more rapidly by such horizontal inlet as compared with and distinguished from a vertical inlet, so as to permit increased inclination of passage C toward the direction of tilting; but it is desirable that the inflow may be so fast, as by entering from all sides of B at once, that the distance between the inlet B^1 and the wall may be so short as to permit a higher initial level in A without impairing the initial action of B as a measuring chamber. So far as this horizontal-inlet feature is concerned, the construction and arrangement of passage C, and the consequent horizontal extent (Fig. 1) of chamber B are immaterial. Similarly, when C is inclined substantially as shown, the construction and arrangement of chamber B are immaterial, except that any extent of B to the right (Fig. 1) beyond the inlet C^1 to C would be ineffective relative to C inclined, simply because the liquid located in a part of B extended beyond C^1, could not pass out through C.

The aim of permitting the functioning of the measuring chamber with the initial level of liquid in the reservoir is further effected by the downward projection of F at E hereinbefore described, and also by the special shape of the reservoir illustrated. The downward projection E serves to limit the amount of liquid which can be supplied, without forcing, in filling the reservoir, and it therefore serves to cause the formation of an initial top air space which causes the more rapid withdrawal of the reservoir liquid, upon tilting, from the inlet B^1 to the measuring chamber. But the shape of the reservoir itself positively permits a higher initial liquid level in the reservoir, *i. e.*, the same result which is obtained by the horizontal inlet B^1 to the measuring chamber. The reservoir is substantially cylindrical, as shown, and this permits the reservoir liquid, upon tilting, to more quickly withdraw from the inlet to the measuring chamber; this is simply because the cylindrical curvature of the reservoir is such that its capacity is very small at its top portion in the Fig. 2 position; and this permits the much quicker passage of the top air space, upon tilting, down to the measuring chamber. The result is that a higher initial level, of liquid may be used in the reservoir, and that pipe E therefore need not project so far down into the reservoir. The specific barrel shape of the reservoir also permits the pipe E to be inclined away from outlet D, in order to necessitate a yet higher liquid level in the Fig. 2 position before reaching the lower open end of E.

The outwardly projecting part of inlet F, or even the spout D itself, may be used as a finger-piece for tilting, or special projections H may be provided for that purpose.

The device with parts constructed and arranged as shown, has the following operation: First, it is filled with liquid through F, up to the level of the bottom of the lower projection of E into A, the lower end of E determining the level, in the lack of forcing in the liquid, and causing the maintenance of an air space above that level. Upon tilting, the air in the top space travels quickly down to B, and, before delivery commences through D, the reservoir liquid is completely withdrawn from the mouth B^1 of B, so that a definite charge of liquid is left in B. Upon the complete withdrawal from the mouth of B, of the liquid remaining in A, the measured charge is quickly delivered through inclined pipe C and out of spout D. This delivery is completed before or by the time tilting is stopped at I, etc., and that stoppage is effected before the liquid can escape from inlet F. Finally as soon as the device is released, it automatically resumes its position of stable equilibrium, as in Fig. 1; this causes the liquid to rise up around and flow into B, which is quickly filled with the definite charge in readiness for a second operation. It is not claimed that the liquid charge in B is identical for all liquid levels in A, but it is so nearly constant as to be substantially so for all practical purposes.

All the parts may be of metal, except that it may be desirable to make reservoir A of glass, to permit inspection of liquid level. The top G of A may be of sheet metal, stamped, washered and threaded to screw over A. Pipe C may have dipper B soldered to its lower end, and its upper end may be screwed into top G to hold C and B in their locations shown; spout D being soldered to or screwed into the top G. Inlet F may likewise be of sheet metal and screwed or soldered into top G.

The constructor will understand that other embodiments may be made of the open-topped dipper B and discharge pipe C, and that any suitable means, other than the tilting of the reservoir A, may be employed for tilting the dipper and pipe for the purpose of delivering by gravity the charge of liquid in the dipper; although the tilting of the reservoir itself for that purpose is the preferred construction, the dipper (measuring chamber) and pipe (passage) being then fixed relative to the reservoir, so that the return of the reservoir to normal position causes the liquid to rise up around the dipper and quickly fill it. That is preferred because the quickest filling of the measuring chamber is obtained by tilting the heavier member, and it is of course most convenient to have the reservoir heavier than the measuring chamber. It will also be understood that although the combination of the reservoir with the tilting means is preferable, yet the latter may be dispensed with and the tilting effected entirely by hand, the reservoir being lifted and supported by the hand.

I claim:

1. In a liquid dispensing device of the tilting type, the combination with a liquid reservoir having a small open air inlet but otherwise closed, of a delivery device located inside the reservoir and fixed relative thereto, and constructed in a single piece but comprising a flaring delivery end to prevent splashing, a measuring chamber located substantially at the bottom of the reservoir, and a small tube connecting the measuring chamber and flaring delivery end; said composite delivery device being so fixedly positioned, by being inclined, in tilting, substantially away from the air inlet of the reservoir, that delivery of the liquid is made without passing through said air inlet.

2. In a liquid dispensing device, the combination with a liquid reservoir having a small open air inlet but otherwise closed, of a measuring chamber located substantially at the bottom of the reservoir; a small tube inclosed within the reservoir, communicating with the measuring chamber, and fixed relative to said chamber and to the reservoir, and a discharge member projecting outside the reservoir and communicating with said tube; said tube being so constructed and located and said discharge member being so located, that in tilting for delivery, the liquid is discharged through said tube along a path which is so inclined as to prevent the liquid from entering or discharging through the air inlet.

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