S. COOPER.

LIQUID DISPENSING APPARATUS.

APPLICATION FILED FEB. 11, 1916. RENEWED APR. 4, 1919.

1,319,376. Patented Oct. 21, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

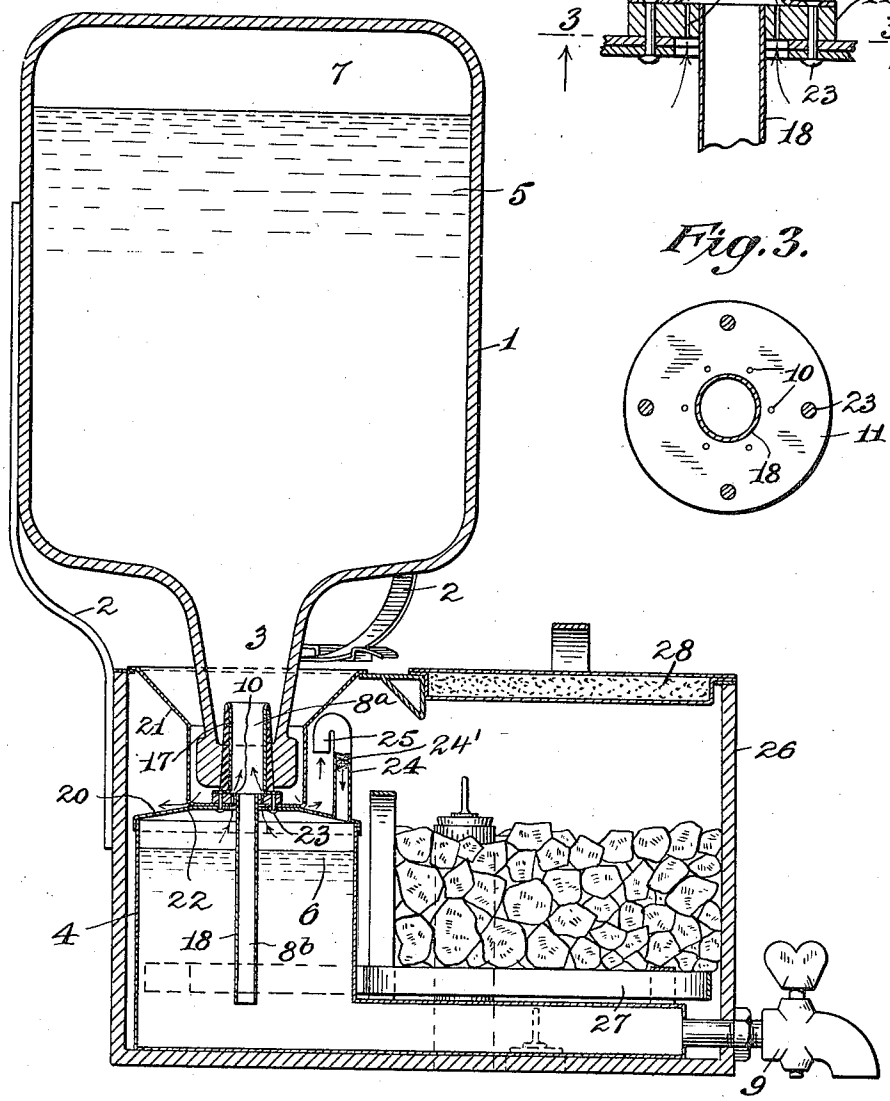


Fig. 2.

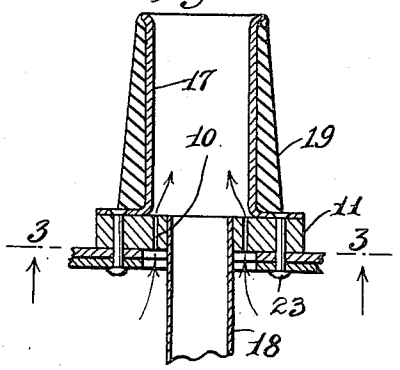


Fig. 3.

Inventor:

by Simon Cooper

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2 SHEETS—SHEET 2.

Fig. 4.

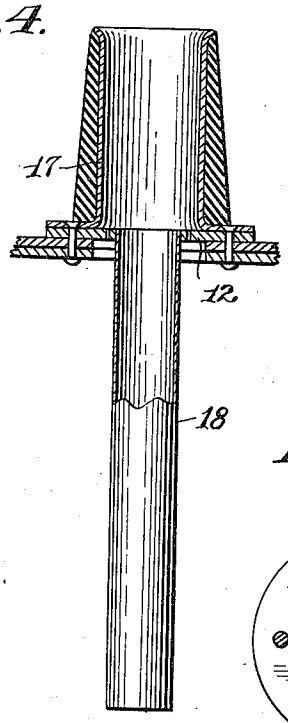


Fig. 5.

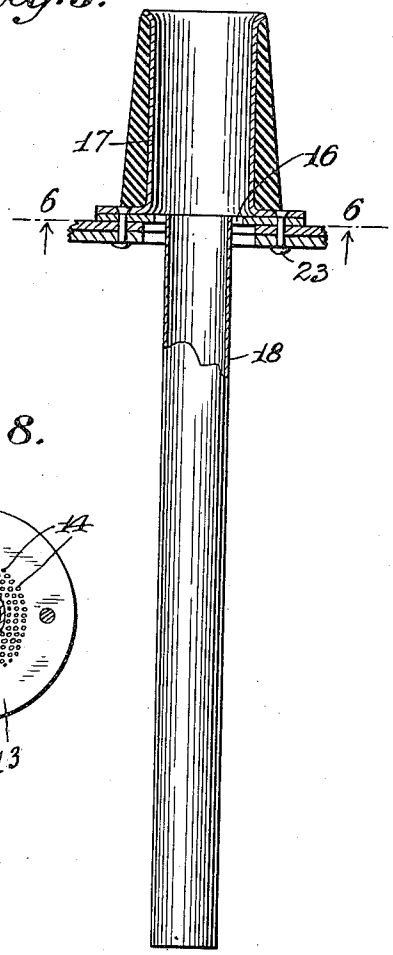


Fig. 8.

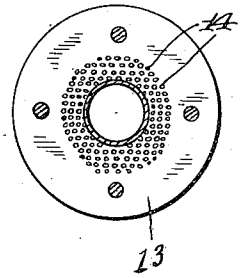


Fig. 7.

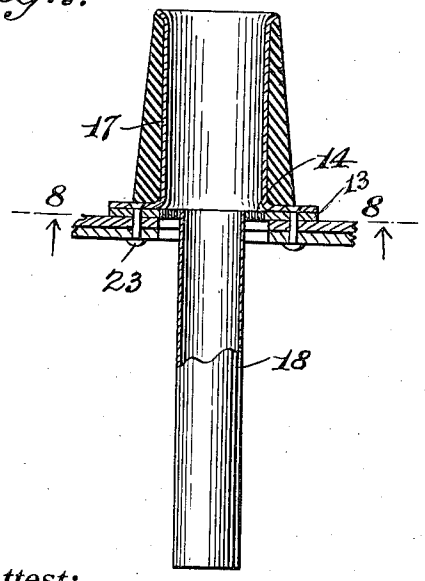
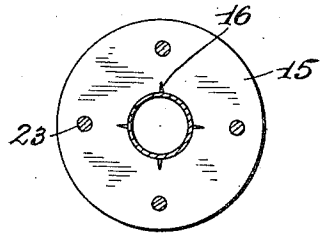


Fig. 6.



Attest:

Edgeworth Greene

Inventor:

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UNITED STATES PATENT OFFICE.

SIMON COOPER, OF BROOKLYN, NEW YORK, ASSIGNOR TO PINE HILL CRYSTAL SPRING WATER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

LIQUID-DISPENSING APPARATUS.

1,319,376. Specification of Letters Patent. Patented Oct. 21, 1919.

Application filed February 11, 1916, Serial No. 77,551. Renewed April 4, 1919. Serial No. 287,632.

To all whom it may concern:

Be it known that I, SIMON COOPER, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Liquid-Dispensing Apparatus, of which the following is a specification.

This invention relates to dispensing apparatus for liquids, and the invention is particularly applicable for dispensing beverages from large inverted containers. Such apparatus in operation produces a hydrostatic balance between the column of liquid within the receptacle and the column outside. The liquid is dispensed from the outer column and this disturbs the equilibrium of the columns and tends to produce a flow from the inner column to the outer one. In order to facilitate this flow it is necessary to admit air to the partial vacuum chamber within the container above the column of liquid within it.

Applicant's prior Patent 1,236,912 deals with this general proposition, but in a somewhat different manner than that contemplated in the present case. The specific construction of the air inlet means is different in both cases, in his former case the inverted container and the delivery chamber have independent or separate air inlets and in order to prevent the liquid from flowing out from the container, also for normally preventing air from leaking into the same, there is provided a hydrostatic seal, whereas in the present case he provides an air passageway between the two liquid columns, and has a constantly open vent associated only with the delivery chamber leading to the atmosphere.

One of the objects of this invention is to provide very simple and efficient means for effecting this admission of air but with the parts so organized as to prevent any flow of water through the air inlet means. Among the other objects of the invention is to provide means for enabling the admitted air to be purified if desired.

Further objects of the invention will appear hereinafter.

The invention consists in the general combination of parts, and features described in the following specification while the broad scope of the invention is set forth in the claims.

In the drawing, Figure 1 is a vertical section through apparatus embodying my invention; Fig. 2 is a vertical section upon a large scale showing in detail one embodiment of the air inlet means; Fig. 3 is a horizontal cross section on the line 3—3 of Fig. 2; Fig. 4 is a view similar to Fig. 2 but showing a modification; Fig. 5 is a similar view showing another modification; Fig. 6 is a horizontal section on the line 6—6 of Fig. 5; Fig. 7 is another vertical section showing another modification; and Fig. 8 is a cross section on the line 8—8 of Fig. 7.

The container 1 is, for example, in the form of a large bottle received in an inverted position in a bottle holder 2. At its lower side or neck 3 it communicates with a delivery chamber or cup 4 and when the container is in position there is developed a hydrostatic balance or state of equilibrium between the liquid column 5 within the container, and the column 6 in the delivery cup or chamber 4, the effect being to produce a partial vacuum in the chamber 7 above the liquid column 5. Equilibrium is established when the atmospheric pressure and the column 6 equal the water column 5 and the attenuated pressure in the vacuum chamber 7. The communication between the water columns is best effected by means of a duct preferably having an enlarged upper portion 8^a and a reduced lower portion 8^b, the latter extending down into the delivery chamber 4 and below the level of the liquid column 6.

Means such as the stop-cock 9 is provided for drawing off liquid from time to time from the column 6. When this is done the level of the water column 6 descends and this disturbs the equilibrium and produces a flow of liquid from the column 5 to the column 6. When this occurs air should be admitted to the partial vacuum chamber 7, and this means should operate without permitting any outward passage of the liquid. I construct it entirely without valves and in the simplest manner possible. For this purpose, preferably adjacent the junction point of the two portions 8^a and 8^b of the duct I prefer to provide air-inlet means comprising preferably a plurality of small vents 10 which may be formed in a collar 11 located at this point. When the liquid flows down in the duct there is developed a relatively high central velocity in the duct which

tends to produce a reduction in pressure near the wall of the upper portion of the duct. At all events an inflow of air occurs at the inlets and this air passes up through the liquid column 5 to the space 7. On account of the small size of these vents and their relatively large number, their combined effect is to give a relatively steady or regular inflow of air, which tends to produce a steady flowing stream at the stopcock 9 characterized by the absence of violence and splashing. In Fig. 3 by way of example I have illustrated six of these air inlets, but there may be more or less of them as desired. In Fig. 2 the collar is relatively thick giving relatively long vents and giving relatively sluggish flow through the duct 8^a, 8^b.

By altering the features of construction of the inlet vents the action of the stream flowing through the duct may be varied as desired, for example, by employing a relatively thin collar (see Fig. 4) or by providing such a collar 13 (see Fig. 8) with a relatively great number of vents 14.

The vents may be formed in any manner desired, for example, by drilling the collars or forming the collars of fine gauze, or if desired the vents may be formed by forming them in the inner edge of the collar 15 (see Fig. 6) in which case they may be in the form of small slits 16.

The communicating duct is preferably formed in a plug comprising an upper metal tube 17, the bore of which forms the duct 8^a, and a smaller tube 18 connected by the collar 11, the upper tube having a tapered gasket or bushing 19 of cork, rubber or similar material adapted to form an effective stopper for the bottle neck.

In order to prevent any spilled liquid from finding its way into the delivery chamber I prefer to provide the same with a tight cover 20 surmounted by a funnel-mouthed cup 21 which assists in guiding the bottle neck into place, and provided with drain openings 22. If desired fastening devices such as rivets 23 through the collar may secure these parts all together.

Communication of the chamber 4 with the atmosphere may be maintained by means of a tube 24 which may be provided with a goose-neck 25 which may be provided if desired with a porous disinfectant such as medicated gauze as illustrated at 24'.

As is usual with such apparatus the delivery chamber 4 and contiguous parts of the apparatus are held in a case 26 which may be provided with a removable ice holder 27, access being had to the interior by means of a removable cover 28.

The character of the vents has considerable influence on the variations of level that will occur in the liquid column 6 but in every case the duct 8^b should be long enough to insure that its lower end will never be uncovered (see Figs. 4, 5 and 7). If that should occur it would break the hydrostatic seal which is formed at this point and the apparatus would then not operate in its normal way. It is desirable that the vents should be small, that is, of a capillary nature, because then the surface tension of the liquid standing in the vents is high and operates so that the surface pressure on the outer side of each vent prevents the liquid from flowing out through it.

It is understood that the embodiment of the invention set forth herein is only one of the many embodiments the invention may take, and I do not wish to be limited in the practice of my invention nor in my claims to the particular embodiment set forth.

I claim:

1. In a liquid dispensing apparatus, the combination of an inverted container for holding a column of the liquid with a partial vacuum chamber above the liquid column, a delivery chamber to contain a second column of the liquid in communication with said first column so that said liquid columns normally hydrostatically balance each other, means for drawing off the liquid from said second column and thereby causing a flow of liquid from said first column to said second column, and constantly open air inlet means comprising a plurality of small vents exposed to the atmosphere on the outer side and communicating with the interior of said container on the inner side for admitting air to the said partial vacuum chamber when said flow of liquid between the said liquid columns occurs, the vents in said air inlet means operating as capillary tubes to prevent the liquid from flowing therethrough.

2. In a liquid dispensing apparatus, the combination of an inverted container for holding a column of the liquid with a partial vacuum chamber above the liquid column, a delivery chamber to contain a second column of the liquid in communication with said first column so that said liquid columns normally hydrostatically balance each other, means for drawing off the liquid from said second column and thereby causing a flow of liquid from said first column to said second column, and a plug in the lower side of said container having a communicating duct for said liquid columns and having constantly open air-inlet means arranged below said plug communicating on its upper side with the interior of said container and exposed on its under side to the atmospheric pressure whereby the atmospheric pressure prevents the liquid from passing downwardly therethrough.

3. In a liquid dispensing apparatus, the combination of an inverted container for holding a column of the liquid with a partial

vacuum chamber above the liquid column, a delivery chamber to contain a second column of the liquid in communication with said first column so that said liquid columns normally hydrostatically balance each other, means for drawing off the liquid from said second column and thereby causing a flow of liquid from said first column to said second column, and a plug in the lower side of said container having a communicating duct for said liquid columns and having a plurality of constantly open air vents communicating on their upper sides with the interior of said container and on their lower sides with the atmosphere whereby the atmospheric pressure prevents flow of the liquid therethrough.

4. In a liquid dispensing apparatus, the combination of an inverted container for holding a column of the liquid with a partial vacuum chamber above the liquid column, a delivery chamber to contain a second column of the liquid in communication with said first column so that said columns normally hydrostatically balance each other, means for drawing off the liquid from said second columns and thereby causing a flow of liquid from said first column to said second column, and a plug in the lower side of said container having a communicating duct for said liquid columns, said duct having a lower portion of reduced diameter, and having a plurality of air inlet vents communicating on their upper sides with the interior of said container and on their under sides with the atmosphere whereby the atmospheric pressure prevents the liquid from passing therethrough.

5. In a liquid dispensing apparatus, the combination of an inverted container for holding a liquid column with a partial vacuum chamber above said column, a plug in the lower side of said container having a duct with an enlarged upper portion and a reduced lower portion, a delivery chamber receiving said reduced portion and for holding a second liquid column so that said liquid columns hydrostatically balance each other, means for drawing off the liquid from said second liquid column, and thereby producing a flow of liquid from said first column to said second column, said plug having a collar at the junction point of said enlarged portion and said reduced portion, said collar having a plurality of air inlet vents for admitting air up through the enlarged portion of said duct, said vents being sufficiently small to enable the atmospheric pressure to prevent the flow of liquid therethrough.

6. In a liquid dispensing apparatus, the combination of an inverted container for holding a liquid column with a partial vacuum chamber above said column, a plug in the lower side of said container, having a duct with an enlarged upper portion and a reduced lower portion, a delivery chamber receiving said reduced portion and for holding a second liquid column so that said liquid columns hydrostatically balance each other, means for drawing off the liquid from the said delivery chamber and thereby producing a flow of liquid from said first column to said second column, said plug having a plurality of open inlet air vents adjacent the junction of the enlarged and reduced portions of said duct, said air vents being sufficiently small to enable the atmospheric pressure on the under side of said vents to prevent the flow of liquid therethrough.

7. In a liquid dispensing apparatus, the combination of an inverted container for holding a liquid column with a partial vacuum chamber above said column, a plug in the lower side of said container, having a duct with an enlarged upper portion and a reduced lower portion, a closed delivery chamber receiving said reduced portion and for holding a second liquid column so that said liquid columns hydrostatically balance each other, means for drawing off the liquid from the said delivery chamber and thereby producing a flow of liquid from said first column to second column, said plug having a plurality of open inlet air vents adjacent the junction of the enlarged and reduced portions of said duct, said air vents being sufficiently small to enable the atmospheric pressure on the under side of said vents to prevent the flow of liquid therethrough, and an air inlet means for said delivery chamber constructed to receive a disinfectant.

8. In a liquid dispensing apparatus, the combination of a container for holding a column of the liquid with a partial vacuum chamber above the liquid column, a delivery chamber to contain a second column of the liquid in communication with said first column so that said liquid columns normally hydrostatically balance each other, means for drawing off the liquid from said second column and thereby causing a flow of liquid from said first column to said second column, and constantly open air-inlet means comprising a plurality of small vents arranged between said container and delivery chamber exposed to the atmosphere on the lower side and communicating with the interior of said container on the upper side for admitting air to the said partial vacuum chamber when said flow of liquid between the said liquid columns occurs, the surface pressure on the under side of said vents operating to prevent the liquid from passing therethrough.

9. In a liquid dispensing apparatus, the combination of an inverted container for holding a column of the liquid with a partial vacuum chamber above the liquid column, a

stationary delivery chamber to contain a second column of the liquid in communication with said first column so that said liquid columns normally hydrostatically balance each other, means for drawing off the liquid from said second column and thereby causing a flow of liquid from said first column to said second column, and constantly open air inlet means arranged between said container and delivery chamber exposed to the atmosphere and communicating with the interior of said container for admitting air to the said partial vacuum chamber when said flow of liquid between the said columns occurs.

10. In a liquid dispensing apparatus, the combination of an inverted container for holding a column of the liquid with a partial vacuum chamber above the liquid column, a delivery chamber to contain a second column of the liquid in communication with said first column so that said liquid columns normally hydrostatically balance each other, means for drawing off the liquid from said second column and thereby causing a flow of liquid from said first column to said second column, and constantly open air inlet means carried by the delivery chamber exposed to the atmosphere and communicating with the interior of said container for admitting air to the said partial vacuum chamber when said flow of liquid between the said liquid columns occurs.

11. In a liquid dispensing apparatus, the combination of an inverted container for holding a column of the liquid with a partial vacuum chamber above the liquid column, a stationary delivery chamber to contain a second column of the liquid in communication with said first column so that said liquid columns normally hydrostatically balance each other, means for drawing off the liquid from said second column and thereby causing a flow of liquid from said first column to said second column, a plug in the container and constantly open air inlet means secured to the plug and arranged between the container and delivery chamber exposed to the atmosphere and communicating with the interior of the container for admitting air to the said partial vacuum chamber when said flow of liquid between the said liquid columns occurs.

12. In a liquid dispensing apparatus, the combination of an inverted container for holding a column of liquid with a partial vacuum chamber above the liquid column, a delivery chamber to contain a second column of the liquid having a tube connection in communication with said first column so that said liquid columns normally hydrostatically balance each other, means for drawing off the liquid from the said second column thereby causing a flow of liquid from said first column to said second column and constantly open air inlet means secured to and arranged about said tube connection exposed to the atmosphere and communicating with the interior of said container for admitting air to the said partial vacuum chamber when said flow of liquid between the said liquid columns occurs.

13. In a liquid dispensing apparatus, the combination of an inverted container for holding a column of liquid with a partial vacuum above the liquid column, a delivery chamber to contain a second column in communication with said first column so that said liquid columns normally hydrostatically balance each other, and a communicating air duct between the container and the delivery chamber exposed to atmospheric pressure within said chamber for reestablishing this balance when a portion of the liquid is drawn from the delivery chamber.

14. In a liquid dispensing apparatus, the combination of a reservoir for holding a column of liquid, a delivery chamber to contain a second column in communication with the reservoir so that said liquid columns hydrostatically balance each other and a communicating air duct between the container and the delivery chamber exposed to atmospheric pressure within said chamber for reëstablishing this balance when a portion of the liquid is drawn from the delivery chamber.

15. In a liquid dispensing apparatus the combination of a reservoir for holding a column of liquid, a delivery chamber open to the atmosphere to contain a second column, said chamber in communication with the reservoir so that the liquid columns hydrostatically balance each other and a communicating air duct between the container and the delivery chamber exposed to atmospheric pressure within said chamber for reëstablishing this balance when a portion of the liquid is drawn from the delivery chamber.

16. In a liquid dispensing apparatus, the combination of a reservoir for holding a column of liquid, a delivery chamber to contain a second column in communication with the reservoir so that said liquid columns hydrostatically balance each other, and a constantly open inlet duct common to both columns for reëstablishing this balance when a portion of the liquid is drawn from the delivery chamber.

In testimony whereof I affix my signature.

SIMON COOPER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."