(No Model.)

H. I. LEITH.

BOTTLE.

No. 489,965. Patented Jan. 17, 1893.

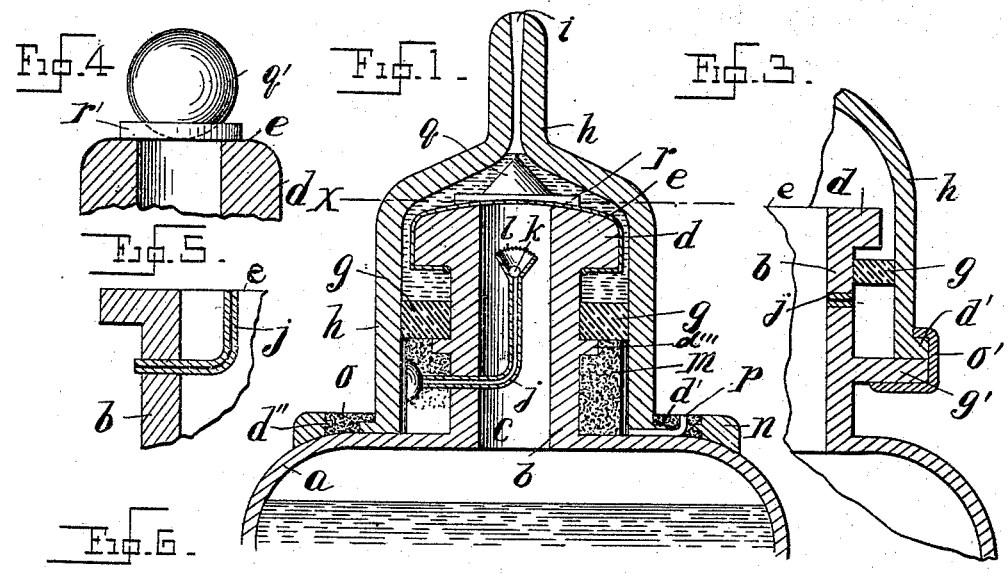

Fig. 4.

Fig. 1.

Fig. 3.

Fig. 5.

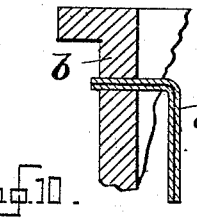

Fig. 6.

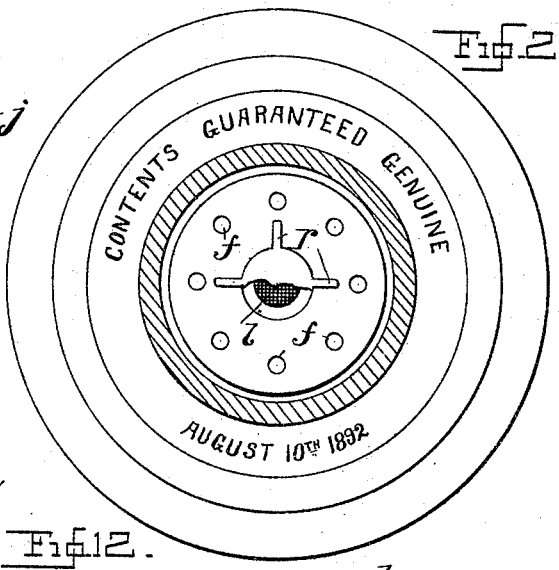

Fig. 2.

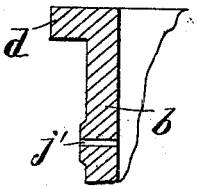

Fig. 7.

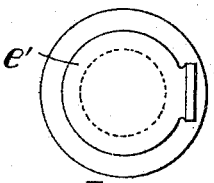

Fig. 10.

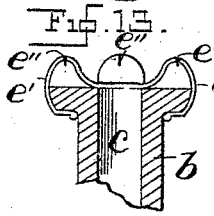

Fig. 13.

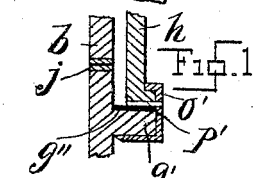

Fig. 14.

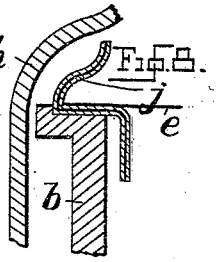

Fig. 8.

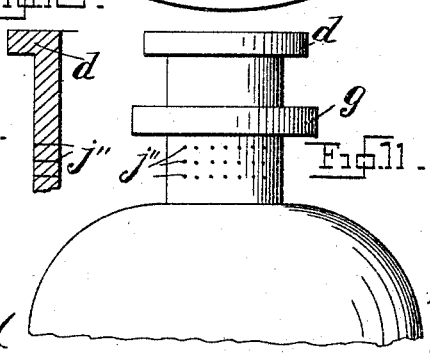

Fig. 12.

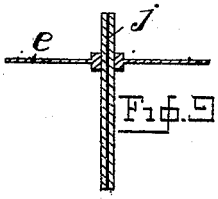

Fig. 9.

Fig. 11.

Witnesses
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Harvey I. Leith
BY HIS ATTORNEY
Edward P. Thompson

UNITED STATES PATENT OFFICE.

HARVEY I. LEITH, OF PROVIDENCE, RHODE ISLAND.

BOTTLE.

SPECIFICATION forming part of Letters Patent No. 489,965, dated January 17, 1893.

Application filed March 16, 1892. Serial No. 425,098. (No model.)

To all whom it may concern:

Be it known that I, HARVEY I. LEITH, a citizen of the United States, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Bottles, of which the following is a specification.

The object of my invention is to provide a bottle or similar receptacle, as for example, an oil can, from the interior of which a liquid may be obtained by the mere inversion of the vessel, but into which a liquid cannot be introduced without breaking a seal.

My invention herein described, relates to important improvements over the construction set forth in former patents granted to me, and having the following data;—No. 360,102, of March 29, 1887, filed September 28, 1886; and No. 368,345, of August 16, 1887, filed May 11, 1887.

In the accompanying drawings, Figure 1, is a sectional elevation of the device, with a portion of the bottle broken away, as an unnecessary part of the invention. Fig. 2, is a cross sectional plan of the device, the section being taken at the line X, in Fig. 1. One or two of the details are in part, broken away so as to show as much as possible in the single view. Fig. 3, is a modification of the means for sealing the stopper. It is a vertical section and only enough is shown to illustrate the difference over the construction seen in Fig. 1. Fig. 4, is a modification, in section, in part, of a valve construction which may be substituted for that seen in Fig. 1, without departing from the nature of the invention. Figs. 5, 6, 7, 8, 9, 11, and 12, are modifications, partly in section of the means for admitting air into the bottle. Fig. 12, is a section of a part of that shown in Fig. 11. Fig. 10, is a plan of a modified valve which may be used in my device. Fig. 13, is a section of a modified valve construction. Fig. 14, is a sectional view of a modification of the construction shown in Fig. 3. A piece of rubber is between the base of the cap and the flange g', and a hole p' formed above it.

The device embodying the invention consists of the combination of a bottle a, provided as usual with a neck b, having a mouth c; a circular flange d, at the end of the mouth; the face of the flange forming a valve seat; a valve, consisting of a rubber cap e which contains perforations arranged around the center and located so that the holes are upon the upper surface of the flange d; the holes being lettered f; a rubber ring g, surrounding the neck b, and located below the said flange d; a perforated cap h, applied over the neck and the valve, and held by pressure and friction on the ring g, and whose lower edge rests upon the upper part of the bottle just below the neck thereof, the perforation or outlet i, being just above the valve; a capillary tube j, passing through the bottle below the valve, *i. e.* at a point which is between the bottom of the bottle and the said valve; the tube being bent upward and having an enlarged end in which lies a ball valve k; a gauze l, over the enlarged end and inclosing the ball valve to serve as means for retaining the valve within proper limits; a porous substance such for example as blotting paper m, inserted between the cap h, and the neck b, and having a concave portion cut away at the mouth of the tube j, the porous substance fitting in the space named completely, and in such a manner that on becoming wet, it expands to such an extent as to be practically air tight under slight or substantially no pressure; a ring n, surrounding the foot of the cap h which is provided with a flange d', the space between the cap h, and ring n, being filled with wax, plaster soft metal or similar impressionable substance which may be called the sealing material o; a tube p, communicating from the outside atmosphere with the porous substance m; and located, preferably on the opposite side of the neck from the tube j; and a deflector q, on the upper surface of the rubber valve e, and attached thereto, and provided with legs r, which rest upon the flange d, but are not fastened thereto.

Upon the sealing material o, is stamped as shown the words "Contents Guaranteed Genuine," and a date, but it is evident that any suitable words may be stamped thereon, when as afterwards described that the object of the stamping is a signal in the future as to whether the seal has been tampered with.

In Fig. 4, the rubber sheet valve e, is cemented to the rubber ring r' upon which mov-

ably rests the deflector q', which in this case is a ball with hard and smooth surface, while in Fig. 1, the deflector q, is a conical mass, with the apex, just below the aperture i.

In Fig. 3, the flange d' rests upon a projecting ring extending from the neck of the bottle. The ring just named is lettered g'.

o' is a piece or ring of soft metal which is applied to the device, and its edge which is seen under the flange g' is bent by force so as to make a clamp between the cap h, and flange g' of the neck b. Upon the soft metal, may be stamped a name date &c. as if it were wax, except that more pressure would be needed. The tube j, heretofore alluded to, may be passed through the glass so that it is behind the cap and inaccessible. Although the metallic seal o' is clamped as tightly as possible, yet it is evident to those who are versed with the difficulty of making an air tight joint between glass and metal, that enough air can pass through the imperfect joint thus made to feed the tube j, with approximately as much rapidity as if the tube opened into the out side atmosphere.

In Fig. 5, the tube j, is bent upward as it enters the bottle and is extended to such an extent that it just presses upon the rubber sheet valve e. In Fig. 6, the same tube or at least a corresponding tube j, is bent downward, but this is by no means the preferable disposition.

In Fig. 7, the equivalent of the tube j, is formed directly in the glass, being simply a capillary hole extending from the exterior to the interior of the bottle.

In Fig. 8, the tube extends from the interior of the bottle below the valve e, to above said valve to an appreciable extent. It is seen to pass along a groove in the top of the flange d. In Fig. 9, the same result is obtained by passing the tube j, through the valve e, itself; the valve being thickened there for the purpose of increased strength. This thickened portion may be replaced by or may represent the ball q' or cone q.

In Figs. 11, 12, the conduit j' of Fig. 7, is replaced by very fine and practically invisible perforations j'' which are made through the material of the bottle in any convenient manner as for example by the electric spark. Fig. 11, may be considered as a part of Fig. 1, the perforations being below the ring g.

In Fig. 10, the valve e' is a sheet of rubber cemented at one of its edges to the top of the glass-flange d.

Referring again to Fig. 1, it may be stated that the tube j, passes through the absorbent material m, and just escapes the surface of the cap h. At the mouth of this tube is a concave space, to prevent the easy stopping up of the tube. The blotting paper fits snugly at the top and bottom surfaces thereof, but is left loose between its outer surface and the inner surface of the cap h. The air, therefore can pass not only through the pores of the absorbent material but more easily in and through the space thus formed around the said material.

d''' represents a flange formed upon the neck of the bottle, so that the ring g, may rest thereon in a fixed position.

As to the construction shown in Fig. 9, it may be stated that when the liquid is passing, or at about the same time, around the tube j, and through the holes f, the air is passing in the opposite direction through the said tube. The enlarged central portion of the valve e, serves to hold the tube with certainty, and without interfering with the motion of the valve.

By my invention, I so construct the bottle that no liquid can be placed in the bottle after it becomes empty, nor before, unless the seal is first broken, and yet the liquid may be removed in small quantities at a time as well as in the ordinary bottles heretofore widely in use.

After the liquid is once introduced, the valve e, is stretched upon the mouth of the bottle, and the cap is applied and sealed fast, and the same stamped before hardening. The strength with which the cap is held to the neck is due to the yielding collar g, which is of such a diameter as to be squeezed by the application of the cap. The ring n, is either first fastened to the glass or metal bottle or it may be a part thereof, *i. e.* if of a glass material, the ring may be cast therewith. The said ring has a projection d'' which together with the flange d' serves to prevent the sealing wax from being taken out as a whole or the cap h, from being removed and replaced without breaking the seal.

Having explained the manner in which the liquid is introduced, the operation by which it is extracted and the science thereof may now be entered into.

When it is desired to get the liquid out, the bottle is inverted and shaken, when small quantities will proceed from the opening in the cap h, while at the same time, air will take the place of the liquid by entering the tube j; but it is found in practice that no liquid will issue through the tube j. The liquid passes out through the valve's holes f, because its weight presses the sheet of rubber away from the flange which is preferably very even or flat so that normally the rubber sheet e, will lie flat thereon. The complete path of the air is through the tube p, then through the pores of and around the filling m, then through the tube j, then around the valve k, which is moved from the hole at the end of the tube by the pressure of the air on entering to take the place of the ejected liquid. When the bottle is again set right side up, the valve e, is again and immediately adjusted to its proper place and tension on the flange d, but it should be noticed that some of the liquid will be caught above the valve, which however is an advantage as it tends to maintain the said valve closed. It is important to notice, also that the valve k, may be

dispensed with because, if the tube *j*, is a very fine capillary tube no liquid will issue whatever. The advantage of using the valve *k*, is that then the bore of the tube need not be capillary. This function is necessary or at least desirable, often, in the cases where the liquid is to be taken out by the wine glass full. The liquid will run out as from an ordinary bottle so that a wine glass could be filled in a few seconds. It may be mentioned here as well as else where, that the aggregate area of the holes in the valve *e*, should equal the total area, at least, of the hole *i* in the cap.

If a liquid is forced or an attempt made to force liquid into the bottle by applying a nozzle to the tube *p*, the result will be a failure for the following reason. The liquid, which will in the first place only enter very slowly, will immediately be absorbed by the blotting material or paper *m*, or what ever absorbing substance is used. The liquid will fill the pores of the substance. The secondary result will be a swelling of the substance, so that it will be impossible for the liquid to flow. The passage way, in other words, will be stopped up. Again, the discovery of liquid in this inner chamber will be a tell tale upon those or some one who may have tampered with the device with the probable object to defraud the public.

From another point of attack of those who might try to enter liquid, it may be stated that they might attempt to push in the valve *e*, but in the case a wire is injected into the hole *i*, it will be deflected by the ball *q'* or cone *q*, while, at the same time, the legs *r*, will prevent the rubber sheet valve *e*, from being burst or torn. In practice, the hole *i*, would be as small as consistent with the purpose for which the bottle is intended.

It may be stated also that the tube *p*, is cut off flush with the sealing material, that no connection could be very easily made in any event, so that pressure could be applied. It is admitted that some of the solution of the chemical might cover the mouth of the tube and by the process of evaporation, leave a salt which would retard the air, but on the directions on the bottle it could be remarked that this hole should be kept free at its mouth of salts &c. But it still remains true that no liquid would actually enter the hole *p* on account of the pressure of the liquid remaining above the valve *e;* unless the pressure is very great, which is obviously impracticable.

In regard to the construction shown in Fig. 5, the tube *j*, becomes closed after the bottle has been set upright, by means of the valve *e*, which settles upon the upper end of said tube. When the bottle is inverted, the valve is pressed away by the liquid so that the tube serves as an air vent. The operation of the apparatus when equipped with the constructions as shown in Figs. 6, 7, 11, and 12, is the same as in the case of Fig. 1, *i. e.* the air enters the tube *j*, and perforations *j'* when the liquid is ejected. As to the construction shown in Fig. 8, the air may travel from the chamber above the valve, *i. e.* the valve chamber to the interior of the bottle by passage through the tube *j*, and yet no water can be introduced from the outside of the bottle because no connection can be made with the said tube.

I do not mean to say that it is absolutely impossible to introduce liquid into the bottle in the case of any of the constructions shown without breaking the seal; but it is impossible to do so without breaking either the seal or the device. For example, the top of the cap *h*, above the line X, may be broken off and the valve *e*, removed, and the liquid easily introduced; but the fracture, would subsequently show even if mended and would amount to a signal that the bottle had been tampered with in the same manner as if the seal had been broken instead of the cap. Even if some device could hereafter be invented by others whereby the bottle could be entered by liquid, after once empty without breaking either the device or seal, yet it is evident that retail dealers would not care to deceive to such an extent as to own such an opener.

In Fig. 13, is shown a peculiar valve especially adapted to carry out my invention. It is made in the form of a sheet which is, as it were, bulged out over the rim of the neck just above the flange *d*, and in the same are slits so that they may be called teats, of which there are several. The slits are lettered *e''* and the rubber or valve itself is lettered *e'*. Normally the rubber sheet covers the opening *c*, but when the bottle is inverted, the liquid rushes into the teats and through the slits, which however close when the pressure is in the opposite direction.

In Fig. 14, a piece of rubber or leather or similar soft or yielding washer *g''* is applied between the cap *h*, and the ring *g'* whereby the joint between the two is practically hermetical, while a hole *p'* is made to allow air to enter into the space between the cap and neck *b*.

An important point to be noticed is that relating to the valve or cone *q*, which in reality forms a part of the valve. It serves as a valve whose seat is the inner surface of the cap *h*, and the hole it is adapted to close is the aperture *i*. But the proportions are such that this closure will occur only when the pressure is much greater than that due to the weight of the contained liquid. If one attempts to force liquid into the bottle through the tube *j*, the pressure if great would close the outlet *i*, while if slight, the liquid left in the chamber above the valve *e*, would prevent. However, a shaking of the bottle when inverted will cause the liquid to issue in small quantities at each shake. Even with the greatest skill it is practically impossible to introduce liquid through the tube *j*.

I claim as my invention:—

1. The combination of a bottle, a valve upon

and closing the mouth thereof, an apertured cap over the mouth and valve and fastened to the exterior of the bottle, and an air duct connecting the interior of the bottle with the outside atmosphere.

2. The combination of a bottle, a valve upon and closing the mouth thereof, an apertured cap over the mouth and valve, sealing material, as for example wax, connecting the cap to the bottle, and an air duct connecting the interior of the bottle with the outside atmosphere.

3. The combination of a bottle, a valve upon and closing the mouth thereof, an apertured cap over the mouth and valve and sealed to the bottle, and a capillary tube connecting the interior of the bottle with the outside atmosphere.

4. The combination with the neck of a bottle, of a cap fitting over the mouth thereof and provided with an outlet; a valve for the mouth and opening into the cap; and a capillary tube connecting the interior of the bottle with the interior of the cap.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 11th day of March, 1892.

HARVEY I. LEITH.

Witnesses:
EDWARD P. THOMPSON,
E. W. L. BLATZ.