

W. R. GROVE.
NON-REFILLABLE BOTTLE.
APPLICATION FILED FEB. 19, 1910.

985,586.

Patented Feb. 28, 1911.

2 SHEETS-SHEET 1.

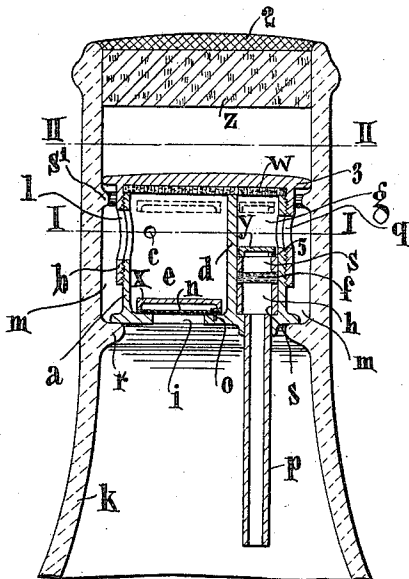


Fig. 1.

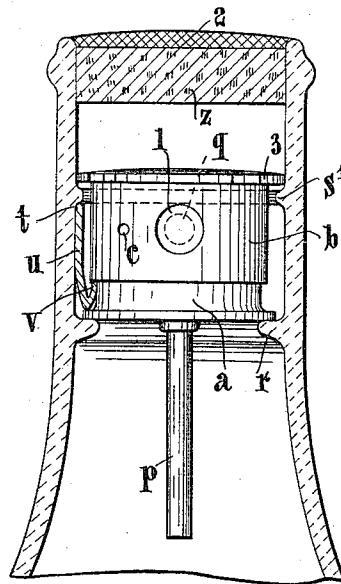


Fig. 3.

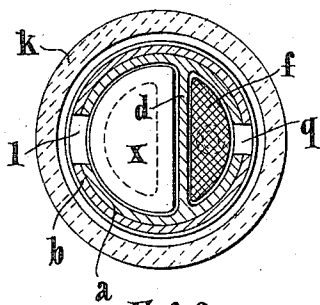


Fig. 2.

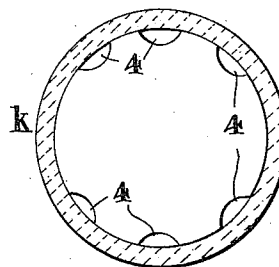


Fig. 4.

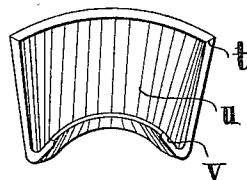


Fig. 5.

Witnesses

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2 SHEETS-SHEET 2.

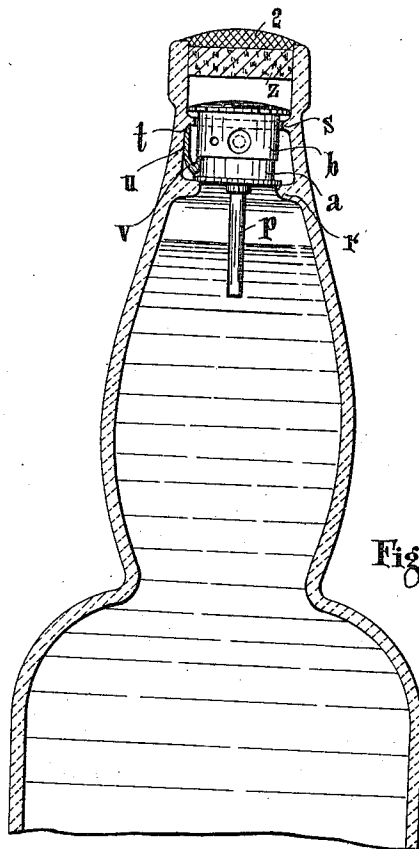


Fig. 6.

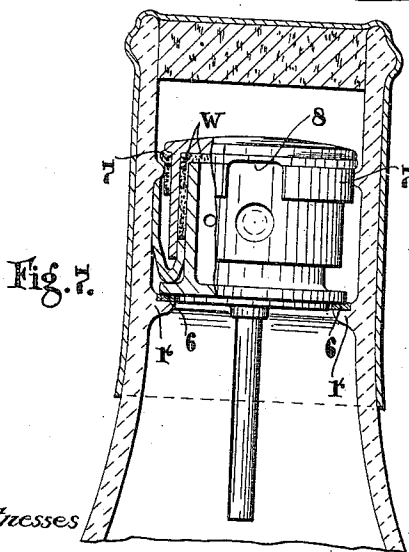


Fig. 7.

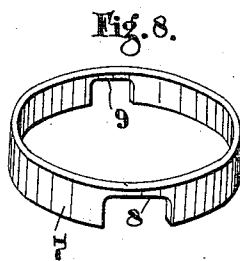


Fig. 8.

Witnesses

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UNITED STATES PATENT OFFICE.

WALTER RICHARD GROVE, OF TWICKENHAM, ENGLAND.

NON-REFILLABLE BOTTLE.

985,586.

Specification of Letters Patent. Patented Feb. 28, 1911.

Application filed February 19, 1910. Serial No. 544,824.

To all whom it may concern:

Be it known that I, WALTER RICHARD GROVE, a subject of the King of Great Britain and Ireland, residing at 33 Colne road, Twickenham, in the county of Middlesex, England, have invented certain new and useful Improvements in Non-Refillable Bottles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to non-refillable bottles of the type in which a chambered stopper is inserted in the neck of the bottle, the said stopper being provided with orifices or passages permitting the outflow of liquid and the inflow of air, but controlled by means which prevent the inflow of liquid and outflow of air.

The object of the present invention is to dispense with the valves usually employed for controlling the air inlet passage and to provide a device for this purpose which is not dependent upon gravity for its operation and is of such a nature as to prevent the inflow of liquid even if suction is applied to the bottle.

Other objects are to provide a stopper which can be very easily inserted in the bottle neck and locked therein so that it cannot be removed therefrom without necessitating fracture of the bottle neck, but which when removed from a fractured bottle can be used again in another bottle.

The invention consists in providing within the air passage a diaphragm of material which will permit the passage of air, but is impervious to liquid.

The invention also consists in so arranging the aforesaid diaphragm in the air passage that an air lock is formed on one side of it and a liquid seal on the other side, if any attempt is made to insert liquid into the bottle.

The invention further comprises various details in combination forming the improved stopper hereinafter particularly referred to.

Figure 1 is a sectional elevation of part of a bottle fitted with one form of stopper according to the invention. Fig. 2 is a cross section on the line I, I, Fig. 1. Fig.

3 is a sectional elevation, showing the stopper in elevation as viewed from a direction perpendicular to the plane of section of Fig. 1. Fig. 4 is a cross section on the line II, II, Fig. 1. Fig. 5 is a perspective view of a locking device. Fig. 6 is a similar view to Fig. 3 but illustrating the application of the stopper to a bottle of different form. Figs. 7 and 8 are detail views illustrating packing rings which may be used.

In carrying out the invention according to one form, as illustrated by way of example in Figs. 1 to 3, the stopper comprises two portions *a*, *b*, made of porcelain or other material not likely to contaminate the contents of the bottle. The portions *a*, *b*, are screwed or otherwise firmly secured together and are prevented from moving relatively, by a pin *c*. The lower portion *a*, is divided by a partition *d*, so as to form a liquid outflow passage *e*, and an air inlet passage which is subdivided by a diaphragm *f*, into two chambers *g*, *h*. The liquid outflow passage *e*, communicates by a lower orifice *i*, with the interior of the bottle *k*, and by a lateral orifice *l*, with an annular space *m*, between the neck of the bottle *k*, and the stopper. The lower orifice *i*, is controlled by a check valve *n*, which preferably consists of a thin disk of mica held at one side by a pin *o*.

The chamber *h*, communicates with the interior of the bottle by an air tube *p*; while the chamber *g*, communicates with the annular space *m*, by a lateral orifice *q*. The diaphragm *f*, may be held between frames *s*, *s*, of wood, vulcanite or similar material. It is of such a nature that it will permit the passage of air, but will resist the passage of liquid. For example, it may be of fabric preferably rendered waterproof, but not air-proof, as is well-known in the art of clothing manufacture. It may be of fine gauze or a finely perforated plate similarly treated; or it may consist of a very porous earthenware porcelain or like disk.

The lower part *a*, of the stopper rests on a ledge *r*, formed in the neck of the bottle. Another ledge *s'*, prevents the insertion of a wire for the purpose of tampering with the valve *n*, and it also forms an abutment for one part *t*, of an elastic locking device *u*, the other part *v*, of which abuts against the ledge formed by the lower edge of the portion *b*, of the stopper, as indicated in Fig. 3. The locking device *u*, does not in-

terfere with the insertion of the stopper, but when the latter is arrested by the ledge *v*, the part *t*, of the device *v*, springs out and engages with the ledge *s'*.

5 A cork lining *w*, or other packing is preferably provided between the two portions *a*, and *b*, of the stopper and a packing ring 6, Fig. 7 may be provided between the lower portion *a*, of the stopper and the ledge *r*.

10 A cork ring 7, Figs. 7 and 8 may be provided around the stopper, openings 8 and 9 being cut in it to correspond with the orifices *l* and *q* in the stopper.

In order to avoid the injury to the valve *n*, and to the diaphragm *f*, should a force pump be applied to the bottle, safety disks *x*, and *y*, are provided. They are loosely fitted in their chambers so as not to interfere with the normal operation of the valve *n*, and diaphragm, but merely to act as guards therefor against sudden and abnormal pressure from outside. The guard *y*, may have a bleed hole *z* for air.

The bottle neck may be closed by an outer 25 cork *z*, and a seal 2 of wax or other material.

The upper rim 3 of the stopper may fit the neck of the bottle so as to prevent lateral movement, holes 4, Fig. 4, being formed 30 to permit outflow of liquid and inflow of air.

When it is desired to pour out liquid from the bottle, the seal 2 and cork *z*, are removed, and the bottle is tilted. Air enters 35 through the orifice *q*, chambers *g*, and *h*, and tube *p*; and liquid flows out through the orifice *i*, chamber *E* and orifice *l*.

Any attempt to insert liquid simply results in flooding of the chamber *g*, which 40 thereby acts as a liquid seal, while the chamber *h*, and tube *p*, act as an air lock. As the diaphragm *f*, will not permit the passage of liquid, any attempt to draw in liquid via the air passage, by suction applied to the 45 liquid passage is frustrated.

Having thus described my invention what I desire to secure by Letters Patent is:—

1. In combination a bottle, a stopper arranged within the neck of the bottle so as 50 to leave an annular space between the stopper and the bottle neck, the aforesaid stopper having a liquid outflow passage and an air inlet passage, each passage communicating with the aforesaid annular space and the interior of the bottle by lateral and lower 55 orifices respectively, a check valve for the lower orifice of the liquid passage and a diaphragm for subdividing the air passage, said diaphragm being of a material impervious to liquid but not to air, substantially as and for the purpose hereinbefore set forth.

2. In combination a bottle, a stopper arranged within the neck of the bottle so as to 65 leave an annular space between the stopper

and the bottle neck, the aforesaid stopper having a liquid outflow passage and an air inlet passage, each passage communicating with the aforesaid annular space and the interior of the bottle by lateral and lower 70 orifices respectively, a check valve for the lower orifice of the liquid passage, an air tube connected with the lower orifice of the air passage and a diaphragm subdividing the air passage and consisting of a material impervious to liquid but not to air, substantially as and for the purpose hereinbefore set forth.

3. In combination a bottle having two ridges in its neck, a stopper supported on 80 one ridge and leaving an annular space between the stopper and the bottle neck, means adapted to permit insertion of the stopper but to co-act with the other of the aforesaid ridges so as to lock the stopper in the neck, 85 said stopper having a liquid outflow passage and an air inlet passage, each passage communicating with the aforesaid annular space and the interior of the bottle by lateral and lower orifices respectively, a check valve for 90 the lower orifice of the liquid passage and a diaphragm for subdividing the air passage, said diaphragm being of a material impervious to liquid but not to air, substantially as and for the purpose hereinbefore set 95 forth.

4. In combination, a bottle having ridges *r*, *s'*, in its neck, a stopper supported on one ridge *r*, and leaving an annular space *m*, between the said stopper and the bottle neck, 100 said stopper comprising two cylindrical portions *a*, and *b*, screwed together and having a liquid outflow passage *e*, communicating with the aforesaid annular space by a lateral orifice *l*, and with the interior of the bottle 105 by a lower orifice *i*, a check valve *n*, for the latter orifice, an air inlet passage in said stopper divided into an air lock chamber *h*, and a liquid sealing chamber *g*, by a diaphragm *f*, of material impervious to liquid 110 but not to air, the chamber *g*, communicating with the aforesaid annular space *m*, by a lateral orifice *q*, and the chamber *h*, communicating with the interior of the bottle by an air tube *p*; means for guarding the 115 aforesaid check valve *n*, and diaphragm *f*, against outwardly applied pressure, and means for automatically locking the stopper within the bottle neck, substantially as hereinbefore described.

5. In combination, a bottle formed with an interior flange, a hollow stopper supported on the flange and spaced from the walls of the bottle, said stopper comprising two sections, one section having a vertical 125 partition to form a liquid passage and an air inlet passage, there being openings in the wall of said section and there being an opening in the bottom of the liquid overflow passage and the air inlet passage, the 130

other section of the stopper having a flange which fits over the first mentioned section and provided with a flange which overhangs the space formed between the stopper and the bottle, there being openings in the said flange for the inlet of air and outlet of liquid, a flat diaphragm in the air inlet passage, and a valve located over the opening in the liquid overflow passage.

6. In combination, a bottle, a hollow stopper mounted in the neck of the bottle, said hollow stopper having a partition to form a liquid overflow passage and an air inlet passage, there being openings in the bottom and sides of the two passages, a diaphragm in the air inlet passage, a movable protector operative above the diaphragm, a valve in the bottom of the liquid overflow passage, and a movable protector above the said valve.

7. In combination, a bottle provided with a flange, a stopper supported on the flange and having its side walls spaced from the neck of the bottle, said stopper comprising two sections one of which is provided with a partition to form an air inlet compartment and a liquid escape compartment, there being openings in the walls of the stopper to afford communication between the said two compartments and the space between the stopper and the neck of the bottle, a diaphragm in the air inlet compartment located below the opening therein, there being an opening in the bottom of the stopper to com-

municate with the interior of the bottle, a valve in the liquid escape compartment over an opening formed in the bottom of the compartment and means for holding the stopper in the neck of the bottle.

8. In combination, a bottle formed with an interior flange, a hollow two part stopper supported on said flange and provided with a vertical partition to form a liquid passage and an air inlet passage, the stopper having openings which communicate with the liquid passage, the air inlet passage and a space formed between the stopper and the bottle, the stopper having a flange above the plane of the openings and projecting over the space between the said stopper and the bottle, said flange being formed with openings for passage of liquid from the liquid space and the admission of air to said space, a diaphragm in the air inlet passage below the plane of the opening therein, said diaphragm being impervious to liquid but adapted to admit air, a tube extending from the air passage below the diaphragm into the bottle, and a valve in the liquid overflow passage to control an opening formed in the bottom of the latter.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER RICHARD GROVE.

Witnesses:

A. W. MATHYS,
H. TREBLE.