

(No Model.)

F. T. ROBINSON.
BOTTLE STOPPER.

No. 535,556.

Patented Mar. 12, 1895.

FIG. 1.

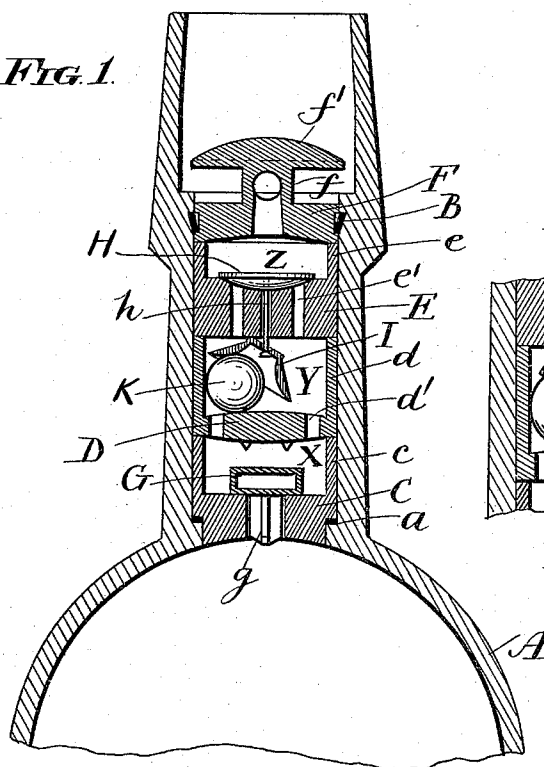


FIG. 3.

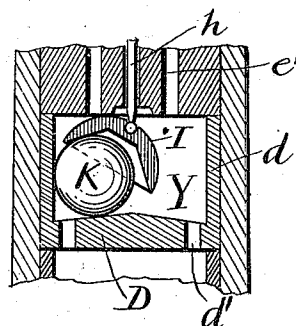


FIG. 2.

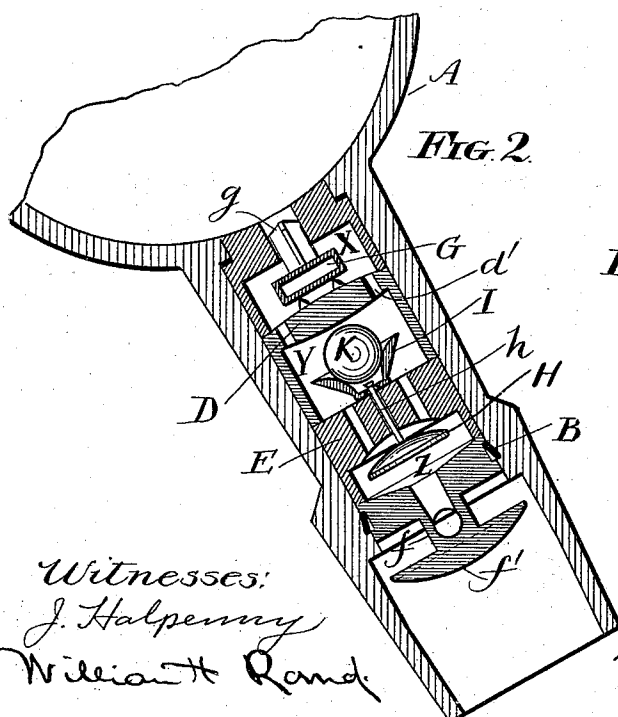
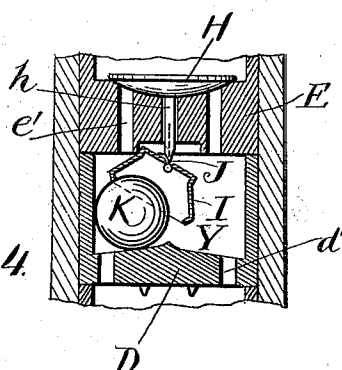


FIG. 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

FRANK T. ROBINSON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
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BOTTLE-STOPPER.

SPECIFICATION forming part of Letters Patent No. 535,556, dated March 12, 1895.

Application filed January 2, 1895. Serial No. 533,549. (No model.)

To all whom it may concern:

Be it known that I, FRANK T. ROBINSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Bottle-Stoppers, of which the following is a specification.

The subject of the present invention is a stopper of such construction that it will permit the bottle to be emptied of its contents but prevent its being refilled.

I am aware of stoppers of such construction that they will prevent liquid from being forced into the bottle under pressure when the bottle is inverted to such an extent that liquid could not flow into it by gravity and that will also prevent liquid from flowing into it by gravity when it is in such position that the liquid could do so if it were not for the presence of the stopper. These methods of fraudulently refilling the bottle have been effectually guarded against by a number of stoppers of which I am aware, but there is another simple method of refilling that has not been effectually guarded against by any patented stopper, and to provide a stopper that will guard against it and at the same time do all that the other stoppers above referred to will do is the object of the present invention. The method of refilling here referred to is to fill the neck of the bottle above the valve and then impart to the bottle a jiggling or jerking movement so directed that it will tend to throw the valve from its seat, the bottle being held in such position that if it were not for the presence of the stopper liquid could flow into it by gravity. If the bottle be kept immersed while given this movement it can be quickly filled unless the valve be so controlled that it cannot be thrown from its seat.

With this object in view the present invention consists in the features of novelty that are particularly pointed out in the claims, and in order that it may be fully understood I will describe it with reference to the accompanying drawings, which are made a part hereof, and in which—

Figure 1 is a vertical section of the upper portion of a bottle and of the improved stopper in place therein, the parts of the stopper being in the positions that they occupy under

all conditions excepting when the bottle is inverted far enough to unseat the valve. Figs. 2 is a similar view with the parts in the positions that they occupy when the bottle is inverted far enough to unseat the valve. Fig. 3 and 4 are sectional elevations of some of the parts showing slight modifications.

A represents the bottle in the neck of which the improved stopper is secured so that it cannot be removed. As shown in the drawings it rests upon a shoulder *a* on the interior of the neck and is held in place by a spring ring B which occupies oppositely located grooves formed in the neck of the bottle and side of the stopper, respectively.

The shell or frame-work of the stopper is preferably made in four separate parts lettered C, D, E and F, each of which has certain features fitting it for the duty it has to perform.

The part C takes the form of a ring having a cylindrical flange *c* which extends to the part D and forms, with said part D, a chamber X in which is located a valve G. This valve is sufficiently buoyant to float to its seat in case the bottle be inverted and liquid forced into the chamber X under pressure, the seat for the valve being, of course, around the opening of the ring. The stem *g* of the valve occupies the opening of the ring and guides the valve in its movement.

The part D takes the form of a disk having a cylindrical flange *d* which extends to the part E and forms, with said part E, a chamber Y. It is also provided, near its outer margin, with a sufficient number of openings *d'* to afford an ample passage for the liquid, and its top side is raised in the center, so that the floor of the chamber Y will have an outward slope in all directions, for a purpose that will appear presently.

The part E takes the form of a disk having a cylindrical flange *e* which extends to the part F and forms, with said part F, a chamber Z. It is also provided with a central perforation and a sufficient number of other perforations *e'* arranged around the central perforation to afford ample passage for the liquid.

The part F takes the form of a ring having a hollow stem *f* projecting from it and communicating with the opening of the ring, said stem being provided also with lateral open-

ings and surmounted by a disk f' . This part F is in the fact a shield for preventing access to any of the parts below it.

The top side of the disk E is provided with a 5 sphero-segmental depression forming the seat for a valve H which has a stem h that extends through the central perforation of the disk. The valve is of sufficient diameter to cover (when seated) all of the passages e' and its 10 under side is complementary to the valve-seat so that it cannot be unseated at any point by the limited oscillatory movement which it may have by reason of the lateral movement of its stem.

15 I is a cup which may be connected with the valve by any suitable means so long as it is allowed to tilt or swing in the manner hereinafter described and is restrained against any considerable sidewise displacement. As 20 shown in Figs. 1, 2 and 3 the valve-stem itself is the only connecting medium. It passes through a flaring opening in the bottom of the cup and has at its lower end an enlarged head. It is in fact a screw tapped into the 25 valve. As shown in Fig. 4 the stem is integral with the valve and the cup is connected to the lower end of the stem by means of a flexible wire J. To secure this wire to the valve-stem the latter may be provided with a 30 bore or socket in which the wire is soldered and to secure it to the cup it may be passed through a perforation in the bottom thereof and knotted or upset to prevent its being withdrawn, the knotting or upsetting being 35 done, of course, before the wire is secured to the stem. Sufficient clearance is left between the end of the stem and the cup and between the wire and the cup to allow the cup perfect freedom of movement about its point of at- 40 tachment; but my invention is not limited to any particular means for connecting this cup with the valve, but on the contrary it includes any means that will produce the desired result.

45 Within the chamber Y and beneath the cup is a spherical weight or ball K. The floor of the chamber being highest at the center this ball will always find a position at the side of the chamber and will hold the cup in a tilted 50 position as shown in Figs. 1, 3 and 4 until the bottle is inverted far enough to allow the ball to roll into the cup and thereby unseat the valve. The connection between the cup and valve is of such length that the cup will al- 55 ways have contact with the ball, and the distance between the floor and ceiling of the chamber is such that when in the position shown in Fig. 1 the cup will bear against the ceiling, the point of contact with the cup be- 60 ing between its center and its periphery. This cup acts precisely as a lever of the first order would. It has a fulcrum (its point of contact with the ceiling) located between the point where the power is applied (which is the point 65 against which the force of the ball is exerted) and the point where the load is applied (which is the point of attachment to the valve-con-

nection). Preferably the cup has a well-defined angle at its fulcruming point, but this is not essential and in Fig. 3 is shown a cup 70 that is curved continuously. In Figs. 3 and 4 the ceiling of the chamber Y is shown as provided with a depression but this depression is not necessary unless the bottom of the cup be rounded or else the nature of the con- 75 nection between the cup and the valve be such that something is needed in order to restrain the sidewise movement of the cup. Where the bottom of the cup is rounded the depression is necessary in order to hold the 80 cup bottom upward, with the valve in it, while the liquid is being poured out. Where the connection between the cup and valve would allow of a sidewise movement of the cup the shoulder resulting from the depression will 85 restrain it. In any event the corner resulting from the depression will form the bearing point for the cup but it is not necessary to provide a special bearing point, because the cup will find its own bearing point, whatever 90 be the character of the surface which the ceiling of the chamber presents to it. In Fig. 4 is shown a cup with an inturned marginal flange j with which the ball has contact, the parts being so proportioned that when in the 95 positions shown, a line drawn through the ball and cutting its points of contact with the cup and the floor of the chamber will pass below the ball's diameter. With any of these constructions, the ball, acting through the 100 cup as a lever, will hold the valve seated until the bottle is inverted far enough to permit the ball to roll into the cup as shown in Fig. 2. Then the valve will unseat and will remain unseated until the bottle is again 105 placed in such position that the ball will roll out of the cup. It will be seen that if the ball be omitted the cup will hang, pendent, and will tend to hold the valve seated until the bottle is tipped to such an extent that a 110 line drawn vertically through the center of gravity of the cup passes inside of its fulcruming point; but without the ball, and with the cup pendent, a quick endwise jerk will throw both the cup and valve upward, and 115 thus unseat the valve. With the ball present, however, this movement will tend to hold the valve seated all the more tightly, because the force of the ball will be directed against the cup outside of its fulcruming 120 point and will be transmitted to the valve through the connections. By using this ball and maintaining it normally in such position that a line that is parallel with the neck of the bottle and that passes through the center 125 of gravity of the ball is at one side of a line that is parallel with it and that passes through the center of gravity of the ball when the latter is in position to permit the valve to unseat, and at the same time providing means for pre- 130 venting the ball from moving from its normal position in a direction that is parallel with the direction in which the valve moves in unseating, the chances of throwing the valve

from its seat by the jiggling motion described are reduced to a minimum.

Although I have called the part lettered I a cup, still it is in fact and in effect a continuous lever, or in other words a lever having a circular surface for receiving the power, a circular fulcruming surface within the surface for receiving the power, and a point for attaching the load within the fulcruming surface, and any device having these characteristics, whether it be truly a cup or not, is within the scope of that term as used in this specification.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a valve-seat, a valve, an inverted cup located below the valve, means connecting them and permitting the cup to tilt, a loose ball located beneath the cup, and a support for the ball, said support being independent of the cup, substantially as set forth.

2. The combination of a valve-seat, a valve, an inverted cup located below the valve, means connecting them and permitting the cup to tilt, a loose ball located beneath the cup, a support for the ball, and means for holding the ball normally with its center of gravity in a vertical line that is at one side of a vertical line passing through the center of the cup, substantially as set forth.

3. The combination of a valve-seat, a valve, an inverted cup, located below the valve, means connecting them and permitting the cup to tilt, a bearing with which the cup has contact when tilted, the point of contact with the cup being between its center and its periphery, a loose ball located beneath the cup, and a support for the ball, substantially as set forth.

4. The combination of a valve-seat, a valve, an inverted cup located below the valve, means connecting them and permitting the cup to tilt, a loose ball located beneath the cup, a support holding the ball in contact with the cup, a bearing with which the ball causes the cup to engage at a point between its center and its periphery, and means holding the ball normally with its center of gravity in a vertical line that is at one side of a vertical line passing through the center of the cup.

5. The combination of a valve-seat, a valve, an inverted cup located below the valve, means connecting them and permitting the cup to tilt, a loose ball located beneath the cup, a support holding the ball in contact with the cup, said support being sloped so as to hold the ball normally with its center of gravity in a vertical line that is at one side of a vertical line passing through the center of the cup, and a bearing with which the ball causes the cup to engage at a point between its center and its periphery, substantially as set forth.

6. The combination of a valve-seat, a valve, an inverted cup located below the valve, a stem extending downward from the valve and having a loose connection with the cup so as

to permit the cup to tilt, a loose ball located beneath the cup, a support holding the ball in contact with the cup, a bearing with which the ball causes the cup to engage at a point between its center and its periphery, and means holding the ball normally with its center of gravity in a vertical line that is at one side of a vertical line passing through the center of the cup, substantially as set forth.

7. The combination of a valve-seat, a valve, an inverted cup located below the valve and having a flaring opening in its bottom, a stem extending downward from the valve and through the opening of the cup and provided at its lower end with an enlargement, the opening being of sufficient size to permit the cup to tilt, a loose ball located beneath the cup, a support holding the ball in contact with the cup, a bearing with which the ball causes the cup to engage at a point between its center and its periphery, and means holding the ball normally with its center of gravity in a vertical line that is at one side of a vertical line passing through the center of the cup, substantially as set forth.

8. The combination of a perforated part having on its top side a valve-seat, a valve located above said part, an inverted cup located below said part, means connecting the valve and cup and permitting the cup to tilt, said connecting means being of such length that when the cup is tilted it will come in contact with the under side of the part first aforesaid, the point of contact being between the center and the periphery of the cup, a loose ball located beneath the cup, and a support holding the ball in contact with the cup and the cup tilted and in contact with the under side of the part first aforesaid, substantially as set forth.

9. The combination of a valve-seat, a valve having a rigid stem, an inverted cup located below the valve, and loosely connected to said stem so as to be capable of tilting but incapable of lateral displacement, a bearing with which the cup engages when tilted, the point of contact with the cup being between its center and its periphery, a ball located beneath the cup, and a support for the ball, substantially as set forth.

10. The combination of a valve and means for holding it normally seated, said means including a ball, means for holding the ball normally with its center of gravity in a line that is parallel with the neck of the bottle and that is at one side of a parallel line that passes through its center of gravity when it is in position to permit the valve to unseat, and means preventing the ball from moving from its normal position in a direction that is parallel with the direction in which the valve moves in unseating substantially as set forth.

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