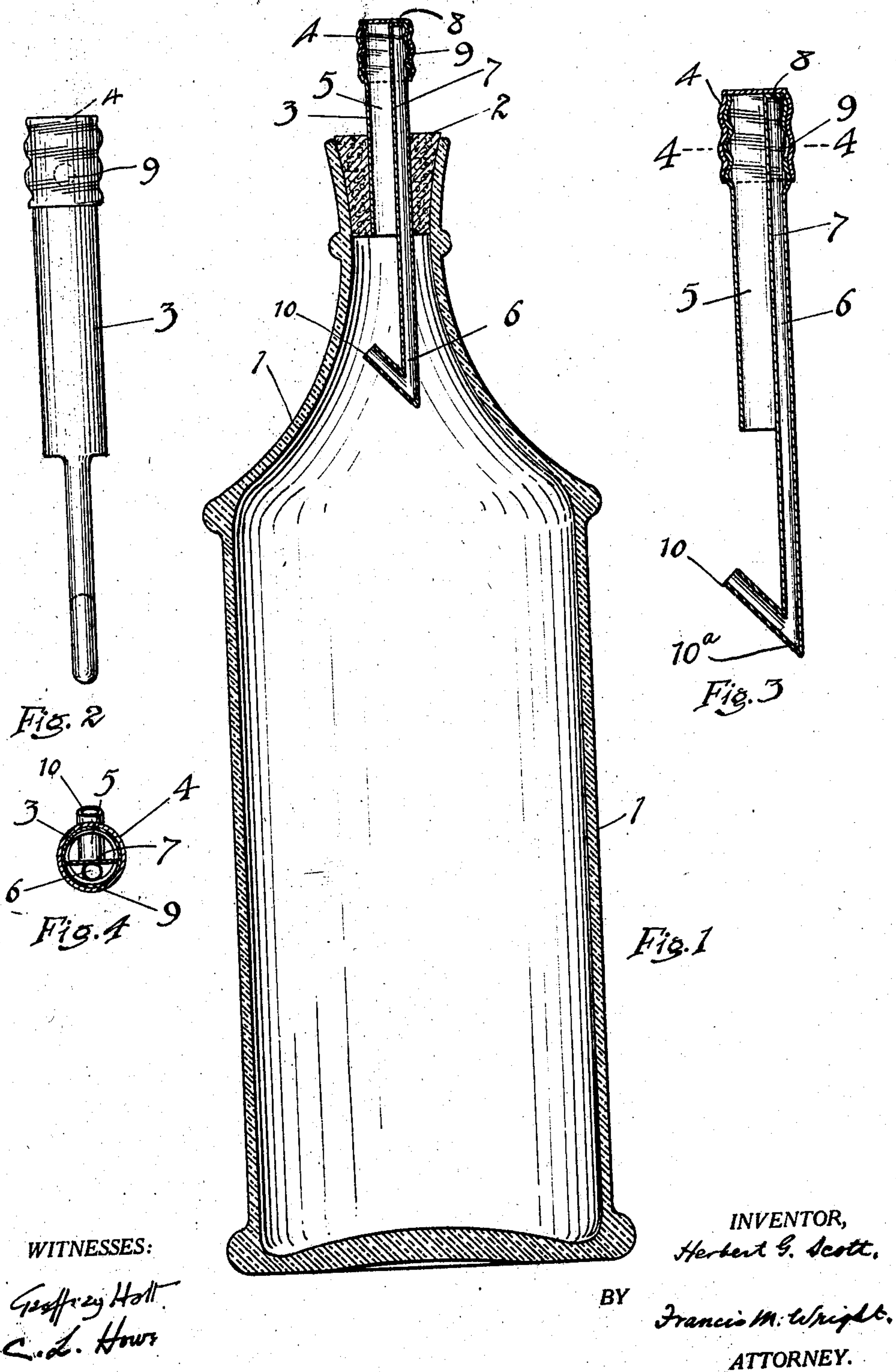


No. 885,792.

PATENTED APR. 28, 1908.

H. G. SCOTT.  
DISPENSING STOPPER.  
APPLICATION FILED JULY 2, 1907.



WITNESSES:

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# UNITED STATES PATENT OFFICE

HERBERT G. SCOTT, OF BERKELEY, CALIFORNIA.

## DISPENSING-STOPPER.

No. 885,792

Specification of Letters Patent.

Patented April 28, 1908.

Application filed July 2, 1907. Serial No. 381,873.

*To all whom it may concern:*

Be it known that I, HERBERT G. SCOTT, a subject of Great Britain, residing at Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Dispensing-Stoppers, of which the following is a specification.

This invention relates to dispensing stoppers for liquid receptacles, and especially to stoppers provided with an air inlet tube distinct from the liquid outlet tube or passage, and more particularly to stoppers in which the air inlet tube may be closed by the operator's finger or otherwise, to arrest the outflow of liquid. Prior attempts to make stoppers for these purposes have been characterized by pulsating irregularity of flow, uncertainty of action, lack of control of flow by the operator's closing the air vent, paucity of flow in proportion to the capacity of the outlet passage, and other objections, all of which it is the object of my invention to overcome. In all prior attempts, moreover, to control the flow, it is found that liquid is apt to trickle into the air-inlet tube or passage, and to wet the finger of the user, which is highly objectionable in most cases, especially when the bottle contains ink, or an injurious acid. This fault also it is one of the objects of my invention to cure.

In carrying out my invention in its preferred form, I effect changes in both the inner and the outer end of the air tube or passage. The outer end of the air passage I close, so that a column of air filling the diameter of the tube shall not meet head-on a column of water also filling the tube, which would set up the irregularly pulsing flow that characterized the prior attempts in this direction. Instead, I use a small vent, whereby the air is caused to pass into the air-passage or tube in relatively fine bubbles, which pass readily and with great speed (in case of a thin liquid) up through such liquid as may accidentally have trickled into the air-tube, so that a uniform and steady outflow of liquid is assured. This vent is preferably placed in the side of the air-tube, outside of the stopper, and in that side of the tube which comes uppermost when the bottle is tipped to empty the same. The described location of the vent is particularly fortunate, since the air readily slips into the tube and rises along its upper side, passing over the top of any water that may be in the tube; this advantage being present even in cases where the

vent is relatively large, although a vent of smaller area than the cross-section of the air-tube is regarded as preferable. The vent being in the top side of the tube, is readily closed by the finger of the user, to arrest the flow.

At the inner end of the air-tube I provide a liquid-baffle in the form of a bend or spout, directed towards that side of the bottle which has the outflow passage; the end of the spout being preferably in line with the outflow passage, so that if the latter were extended within the bottle, it would meet the end of said spout. The bend is preferably reflex or backward along the air-tube, and preferably the spout stands at an acute angle to said air tube. At the union of the spout and tube, the shape is preferably such as would be formed by beveling off the spout and tube to fit each other, and then joining the beveled parts; so that a pocket is formed at the joint, of V-shape, and greater in general diameter than the tube, so as not only to have sufficient capacity to hold the remnant of water that may dribble in through the spout when the bottle is stood up, leaving a clear air-passage above such remnant, but also to prevent a small drop of water from rising through the air-tube after the bottle is stood up. It will be understood that the relatively large pocket at said joint tends to break up or minimize the effect of the so-called capillary attraction in the air-tube, so that there is no tendency of a drop of water to rise therein. As illustrated in the drawings, the spout makes a sharp joint with the air tube or passage, which is the preferable construction, although not always necessary. It gives a sufficient length to the spout to enable it to constitute a water-baffle without making the spout project past the line of the outflow tube, thereby not only conducing to compactness of structure, but also serving to cause the drop of water present in the pocket or joint to escape therefrom without the necessity of unduly tipping up the bottle at the beginning of the pouring operation.

Other features and advantages will hereinafter appear.

In the accompanying drawing, Figure 1 is a vertical section of a bottle equipped with my improved dispensing stopper; Fig. 2 is a side view of the controlling tube detached; Fig. 3 is an enlarged longitudinal section of the same; Fig. 4 is a cross section on the line 4—4 of Fig. 3.



Referring to the drawing, 1 indicates the bottle and 2 the stopper thereof. Through a perforation in said stopper is passed a dispensing tube 3, closed at the outer end by a screw cap 4. This tube has two conduits, a lower conduit 5, through which the liquid escapes, and an upper conduit 6, through which air is admitted to the interior of the bottle to take the place of the liquid. The conduits 5, 6, are spoken of as lower and upper respectively, because they assume these relative positions when the bottle is tilted to dispense the liquid. The lower conduit 5 extends only as far as the inner end of the stopper, and is, of course, freely open at both ends to permit the liquid to flow therethrough. The upper conduit 6 is separated from the lower conduit 5 by a partition 7. At its outer end it is closed, as shown at 8, and at its inner end is extended a considerable distance into the interior of the bottle. In the outer wall of the tube, which forms the upper wall of the upper conduit 6, near its outer end, is an aperture 9, for admitting air, which aperture is in a convenient location to be closed by the end of the finger of the operator when holding the bottle.

It is found that with this device, the flow of the liquid can at any time be instantaneously arrested, without subsequent dripping of the liquid, by closing the air inlet aperture 9 with the finger.

One advantage of this position of the air inlet or vent 9 is that the finger can be applied thereto rapidly and conveniently, to stop the entrance of air and arrest the flow of the liquid from the bottle, and without danger of the finger coming into contact with the liquid which is flowing out of the bottle.

The present construction possesses another advantage not found in prior devices of this character, even when no liquid baffle is provided upon the inner end of my air-inlet tube or passage. Where there is no baffle, a certain amount of liquid dribbles into the air tube, and in prior devices the presence of such liquid therein causes an irregular or pulsating flow from the bottle through the liquid passage, the pulsations and irregularities increasing in force with the flow; but with a bottle equipped with an air inlet tube whose outer end conforms with my invention, the flow of liquid from the bottle is substantially uniform and regular, notwithstanding the presence of liquid in the air tube. In the prior devices, a reciprocating motion of the liquid is set up in the air tube, and such motion increases in intensity, with the result just noted.

In the form of my invention in which the air inlet or vent is placed in the side of the air-tube at some distance from the closed outer end thereof, the drops of liquid present in the air tube can settle in the space or pocket between said vent and said closed

end, and not affect the inflowing air, thus further conducing to uniformity of outflow of liquid from the bottle.

Another important feature of the invention is the return bend constituting a liquid baffle on the inner end of the air-tube or passage. While, without this return bend or baffle, the air tube as described is valuable, still the baffle renders the device still more perfect, as it almost or entirely prevents the entry of any liquid from the bottle into the air tube. The outflow of the liquid through the liquid conduit creates a suction at the bent inner end of the air conduit, to draw out therefrom any liquid which might have entered. It is an advantage that the bend or spout should set back sharply at an acute angle, as already explained; as if any liquid dribbles into the spout when the bottle is stood up, none of it is likely to travel up into the air conduit 6 or out through the vent 9. The pocket at the joint of the spout and air tube or passage 6, referred to in the introductory part of the specification, is marked 10<sup>a</sup> at Fig. 3, and it will be seen is of greater cross-section than either 10 or 6, for the purpose specified. The provision of both the air-vent at the closed outer end of the air-tube, and the liquid-baffle at the inner end thereof, is of great value in the case of large vessels, containing a heavy body of liquid.

The operator having placed the end of his finger adjacent to the aperture 9 in the air conduit, inverts the bottle or other receptacle, with said air conduit uppermost, until the liquid runs out through the end of the liquid passage. Whenever it is desired to arrest the flow of the liquid, the operator closes the aperture 9 with the end of his finger, and this immediately arrests the flow; by removing the finger the flow of the liquid will recommence. In this way it is possible to dispense liquid from the receptacle with the greatest exactitude. If the parts be made sufficiently small, the device can be used as a dropper and will dispense the liquid drop by drop, the finger being removed to allow each drop to escape.

Commercially considered, it is an important feature of the invention that the two conduits 5, 6, should form parts of a single tube, for this permits of the end of the tube being closed by a single cap. While the device would operate equally as well if made of two separate tubes, this would in general be an inconvenient construction, for obvious reasons. In certain cases, as in laboratory work, it may be permissible or even preferable, to so make the liquid and air conduits in separate tubes, each with a separate cap.

The device is of special utility for all bottles from which it is desired to arrest the flow instantaneously, such as ink bottles, those containing medicinal liquids from which pre-



scriptions are filled, or those used in laboratory work, also cans, such as oil cans. When of small size, the invention may also be used as a liquid dropper for dispensing remedies  
5 and other purposes.

I claim;—

1. A dispensing stopper for liquid receptacles, provided with a tube having a longitudinal partition therein, dividing the same into  
10 a liquid conduit and an air conduit, the air conduit being closed at its outer end and having a vent in its side.

2. A dispensing stopper provided with a liquid outlet passage and an air inlet conduit  
15 closed at its outer end, said air conduit being provided with an air-inlet hole formed in the wall thereof.

3. A dispensing stopper provided with a liquid outlet passage and an air inlet conduit  
20 closed at its outer end, said air conduit provided with an air-inlet hole formed in the wall thereof and spaced from the outer end, to form a pocket between the hole and the closed end of the conduit.

4. A dispensing stopper provided with a liquid outlet passage and an air inlet conduit  
25 closed at its outer end, said conduit provided with a vent hole formed in the wall thereof, on the side of the conduit which is uppermost when the receptacle is canted to discharge the liquid.  
30

5. A dispensing stopper provided with a liquid outlet passage and an air inlet conduit  
35 closed at its outer end, said air conduit being provided outside of the stopper with a vent-hole smaller than the inner diameter of the conduit.

6. A dispensing stopper provided with a liquid outlet passage and an air inlet conduit  
40 closed at its outer end, said conduit provided with a vent hole formed in the wall thereof, on the side of the conduit which is uppermost when the receptacle is canted to discharge the liquid, said hole spaced from  
45 the closed outer end of the conduit, to form a pocket between said hole and said end.

7. A dispensing stopper provided with a liquid outlet passage and an air inlet conduit,  
50 the latter constructed to extend within the liquid receptacle and bent reflexly at its inner end to form a liquid-baffle, and having its outer end closed and provided with a vent.

8. A dispensing stopper provided with a liquid outlet passage and an air inlet conduit  
55 in proximity thereto, the air inlet conduit

being closed at its outer end and having a vent of substantially less area than the inner cross-section of the conduit, and constructed to project within the receptacle, and having  
60 at its inner end a reflex bend to form a liquid baffle.

9. A dispensing stopper provided with a cylindrical outlet tube within which is secured an air inlet tube, a cap being threaded  
65 upon the first tube, the air-inlet tube having a closed end and a vent-hole in its side covered by said cap.

10. A dispensing stopper having an outlet passage and an air inlet conduit closed at its  
70 outer end and having a vent in its side and formed to project within the receptacle and having a liquid-baffle at its inner end; said vent provided in the side of the conduit which is uppermost when the receptacle is  
75 canted to discharge the liquid.

11. A dispensing stopper having an outlet passage and an air inlet conduit, the latter  
80 formed at its inner end with a reflex spout, and a pocket being provided at the junction of the spout with the tube; said pocket being substantially greater in cross-section than the air conduit.

12. A dispensing stopper provided with a liquid outlet and an air inlet conduit in proximity thereto, the air inlet conduit closed at  
85 its outer end and having a vent in its side and constructed to project within the receptacle and having a liquid-baffle in the form of an acute reflex bend, the inner end of said conduit being about in line with the outflow pas-  
90 sage, and a pocket or enlargement being formed at said bend, and said vent being provided in the side of the conduit which is uppermost when the receptacle is canted to  
95 discharge the liquid.

13. A dispensing stopper provided with a tube having a longitudinal partition therein  
100 dividing the same into a liquid outlet passage and an air inlet conduit, a cap being threaded upon the tube, and said conduit having a closed end and provided with a vent which is closed by said cap.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HERBERT G. SCOTT.

Witnesses:

C. L. HOWE,

D. B. RICHARDS.