# United States Patent

**Waxlax**

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[54] **BOTTLE FILLING DEVICE**


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[52] **U.S. Cl.**.....**141/286,** 239/548

[51] **Int. Cl.**.....**B65b 1/04,** B65b 3/04

[58] **Field of Search**.....141/286, 392, 44–59; 210/460, 461, 463; 239/562, 548; 128/139, 245, 269, 272, 275; 222/189



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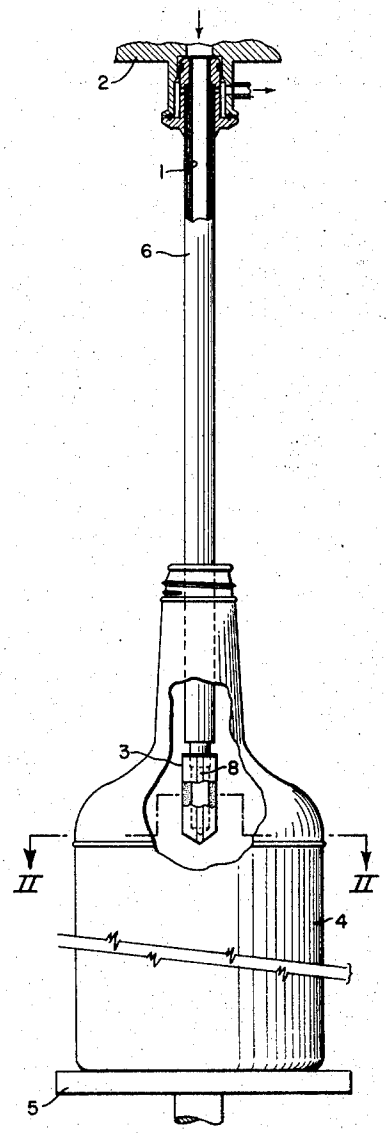
[57] **ABSTRACT**

Extending down from the lower end of a vertical filling tube is a porous nozzle that is adapted to be inserted in a bottle to be filled. Liquid is discharged from the side of the nozzle in extremely fine streams around it. Preferably, the porous side wall of the nozzle includes a narrow non-porous band extending from top to bottom to create an open vertical path past the liquid issuing from the nozzle for free escape of air from the bottle while it is being filled.


**7 Claims, 3 Drawing Figures**



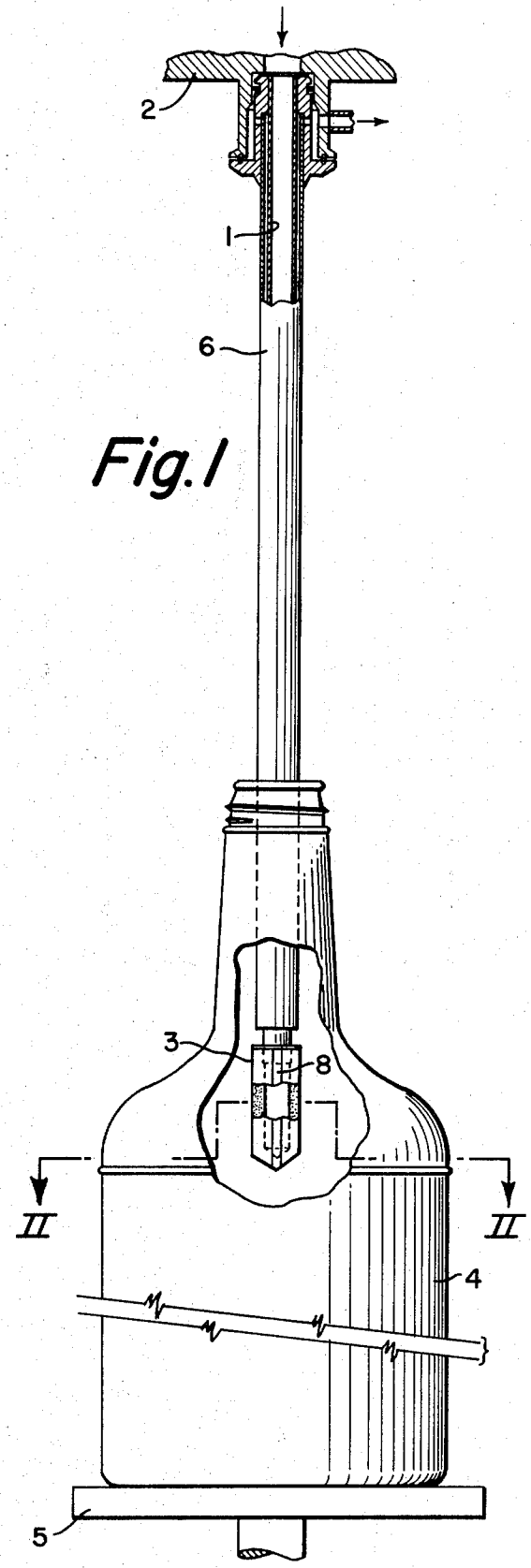



Fig. 1

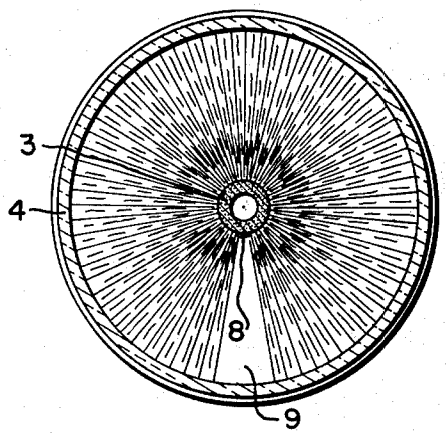



Fig. 2

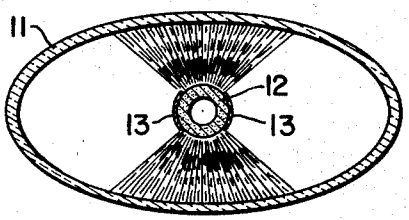



Fig. 3

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# BOTTLE FILLING DEVICE

In the usual bottle filling machine a vertical filling tube with an open lower end is inserted in a bottle, and liquid that is supplied to the tube is discharged from its lower end downwardly into the bottle. With some liquids, this produces foaming, especially if the liquid is introduced under pressure. The foam interferes with proper filling of the bottle and may overflow from it. When a sensing tube is used for cutting off the delivery of liquid to the bottle after it has reached a certain level, the foam may cause premature shutoff.

It is among the objects of this invention to provide a bottle filling device which permits a bottle to be filled rapidly under pressure, which does not cause foaming, and which provides for the free escape of air from the bottle during filling.

The invention is illustrated in the accompanying drawings, in which

FIG. 1 is a side view of the filling device in filling position, with parts broken away in vertical section;

FIG. 2 is a horizontal section taken on the line II—II of FIG. 1 showing liquid issuing from the porous nozzle; and

FIG. 3 is a horizontal section, similar to FIG. 2, of a modified embodiment of the invention.

Referring to FIGS. 1 and 2 of the drawings, a vertical filling tube 1 extends downwardly from a suitable supporting conduit 2, by which liquid is delivered to the upper end of the tube, preferably under pressure for rapid filling. Screwed or otherwise mounted on the lower end of the tube is the upper end of a hollow nozzle 3 that has a side wall and a lower end wall. To fill a bottle with the liquid the bottle 4 is placed on a support 5, which is then raised to insert the nozzle and the lower part of the filling tube in the bottle. The bottle is raised high enough to locate the upper end of the nozzle near the lower end of the bottle neck. The filling tube may be encircled by an outer tube 6, the upper end of which is adapted to be connected to means for producing a vacuum or suction in the tube. The lower end of the outer tube is spaced above the upper end of the nozzle and determines the level to which the bottle can be filled. That is, any liquid rising in the bottle above the lower end of the vacuum tube is sucked up through that tube.

It is a feature of this invention that the nozzle delivers the liquid from the filling tube to the bottle rapidly and without causing foaming when foaming liquids are the product. Accordingly, the side wall of the nozzle is porous and its lower end wall also can be porous if desired. Such a nozzle can be made from various materials, such as powdered metal or ceramic material. The pores of the nozzle are very fine so that, under pressure, extremely fine streams or jets of liquid will issue from it from top to bottom, but when the flow to the filling tube is shut off the liquid column in the tube will not drip from the nozzle. The fine streams may impinge upon the inner surface of the side wall of the bottle around the nozzle and flow down that wall. Due to the fineness of the streams, foaming in not produced. Also, because the flow of liquid is broken up by the porous nozzle into fine streams, splashing below the nozzle is avoided that might cause some of the liquid to escape from the bottle. These advantages are especially pronounced when the liquid is introduced under considerable pressure for rapid filling. Such a nozzle therefore is an improvement over the conventional filling tube.



However, since the liquid normally would issue from all around the porous nozzle and throughout its length and flow laterally over to or nearly to the side wall of the bottle, a more or less solid body of liquid would fill the space between the nozzle and the bottle side wall around it, which might interfere with escape of air from the bottle as the liquid level rises. Such interference can cause the air to expel some of the liquid from the bottle, or, when a sensor tube is used for shutting off the liquid entering the bottle, the escaping air may cause liquid to occlude the sensor tube, thereby prematurely shutting off the fill. These possible difficulties can be avoided by providing the porous side wall of the nozzle with a narrow non-porous stripe or band 8 that extends substantially from top to bottom of the porous area. The band can be formed from a thin coating of impervious material on the nozzle or in other ways. This band should be as narrow as possible in order not to reduce the porous area any more than is necessary. On the other hand, the non-porous band must be wide enough to accomplish its purpose, which is to provide a gap 9 (FIG. 2) in the liquid issuing from the nozzle, up through which air in the bottle can pass freely and escape without carrying liquid with it. Thus, the non-porous band produces or creates an open vertical path extending past the fine streams of liquid issuing from the nozzle, and the air flows upwardly through this path. The path can be quite narrow. It has been found that a non-porous band that extends between about 20° and 35° around the nozzle is sufficient.

The same problem with the same solution can occur when the bottle 11 that is being filled is oval or elliptical in horizontal section, as shown in FIG. 3, but in this case another problem arises when a readily foaming liquid is used. If the liquid issuing from the side of the porous nozzle 12 does not impinge upon the inner surface of the bottle but falls down into the body of liquid below it, it will produce foam. On the other hand, if enough pressure is used to cause the fine streams to strike the wall of the bottle all around the nozzle, they will strike the area closest to the nozzle with such force that it may cause foaming. Such a possibility can be avoided by using less pressure and providing the side wall of the nozzle with two non-porous vertical bands 13, wider than the one in FIGS. 1 and 2, spaced diametrically opposite each other. The bottom of the nozzle should not be porous. In filling the bottle the nozzle and bottle are so oriented that these two bands will face the side wall of the bottle where it is located farthest from the nozzle, so the liquid will issue from the nozzle only toward the closer walls and foaming will be avoided. At the same time, of course, the two non-porous bands form vertical air passages through the liquid as previously described.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A bottle filling device comprising a vertical filling tube having an upper end for receiving a liquid and a lower discharge end, and a hollow nozzle secured to said lower end and extending downwardly therefrom and adapted to be inserted in a bottle, the nozzle having a side wall and a lower end wall, the major area of the side wall being porous for passage of liquid outwardly therethrough in a multiplicity of fine streams, said side wall including a narrow non-porous band extending substantially from top to bottom of the porous area to create an open vertical path pass the liquid issuing from the nozzle for free escape of air from a bottle while the bottle is being filled.

2. A bottle filling device according to claim 1, in which the nozzle is provided with two of said non-porous bands spaced diametrically opposite each other.

3. A bottle filling device according to claim 1, in which said band extends around the nozzle for between about 20° and 35°.

4. The combination with a container having an open upper end, of a vertical filling tube extending down into the container and provided with an upper end for receiving a liquid under pressure, the tube having a lower discharge end, and a hollow nozzle in the container secured to the lower end of the tube and extending downwardly therefrom, the nozzle having a side wall and a lower end wall, the major area of said side wall being porous so that liquid can issue therefrom in a multiplicity of fine streams, and said side wall including a narrow non-porous band extending substantially from top to bottom of the porous area to create an open vertical path past the liquid issuing from the nozzle for free escape of air from the container while it is being filled.



5. The combination recited in claim 4, in which the bottle is substantially oval in horizontal section, the nozzle is provided with two of said non-porous bands disposed diametrically opposite each other, and the bands face the side wall of the bottle where it is located farthest from the nozzle.

6. The combination recited in claim 4, in which the nozzle is provided with two of said non-porous bands spaced diametrically opposite each other.

7. The combination with a bottle that is substantially oval in horizontal section and that has a neck, of a vertical filling tube extending down through said neck and provided with an upper end for receiving a liquid under pressure and a lower discharge end, and a hollow nozzle in the bottle below said neck secured to the lower end of the tube and extending downwardly therefrom, the nozzle having a side wall and a lower end wall, the major area of the nozzle side wall being porous so that liquid can issue therefrom in fine streams, said side wall including two non-porous bands disposed diametrically opposite each other and extending substantially from top to bottom of the porous area to create a pair of open vertical paths past the liquid issuing from the nozzle for free escape of air from the bottle while it is being filled, said bands facing the side wall of the bottle where it is located farthest from the nozzle.

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