

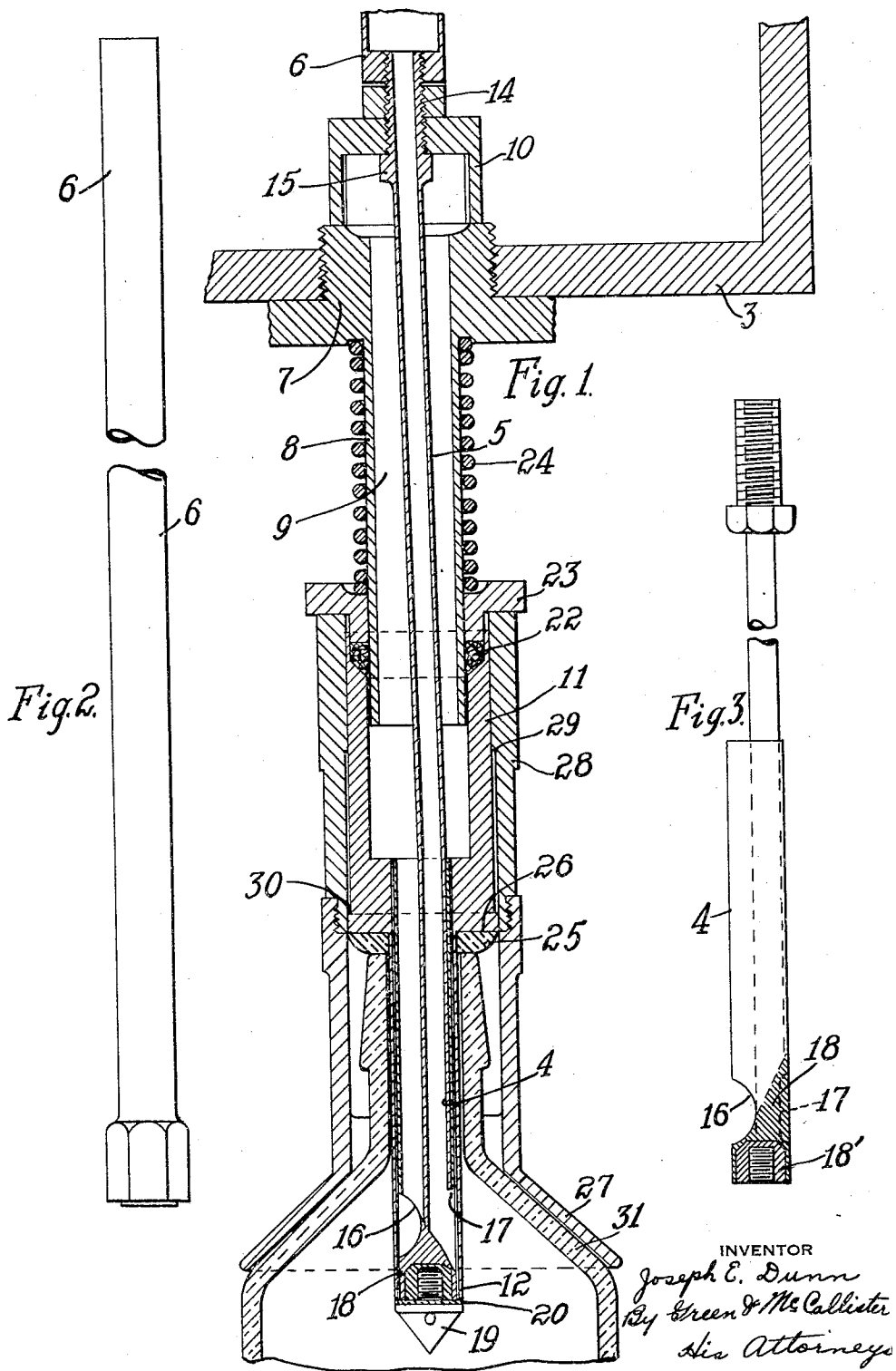
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BOTTLE FILLING NOZZLE

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BOTTLE-FILLING NOZZLE

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This invention relates to bottle filling apparatus and more particularly to a liquid delivery nozzle which may be employed as a part of an automatic machine such as is customarily employed in the commercial filling of bottles.

An object of this invention is to produce a bottle filling nozzle in which the various parts are so constructed and arranged as to minimize the possibility of damage to the parts due to carelessness of the operator or due to accidents during the operation of the machine in connection with which the nozzle may be employed.

A further object is to produce a nozzle structure in which the parts likely to be damaged, may be readily and easily replaced in case they are damaged.

A further object is to produce a strong, reliable and effective nozzle structure which is relatively simple in structure and is relatively cheap to build and which is more effective than nozzles now in use and known to me.

These and other objects which will be made more apparent throughout the further description of this invention are accomplished by means of apparatus herein illustrated and described.

In the drawings Fig. 1 is a longitudinal, sectional view of a nozzle embodying my invention and shown in connection with a fragmental sectional view of a liquid receptacle or tank. Fig. 2 is an elevation of an air vent extension, which forms a detail of my invention and is adapted to be so secured to the apparatus illustrated in Fig. 1 that it projects above the surface of the liquid contained in the tank. Fig. 3 is a partial elevation and partial sectional view of a spout which forms a detail of my invention.

The liquid delivery nozzle illustrated consists essentially of cooperating elements which provide a liquid passage, of ample area, from a liquid receptacle 3 to the delivery end of a spout 4. The apparatus also includes an air vent passage which extends from the delivery end of the spout 4 to a point above the level of the liquid within the receptacle 3 and which is formed by a

tube 5 and an extension tube 6, adapted to be secured to the upper end of the tube 5 and to extend upwardly through the tank 3 to a point above the level of the liquid contained therein.

One of the difficulties with such nozzles, as heretofore constructed, is that they are easily damaged, and particularly when used as a part of an automatic machine for filling bottles; and in addition, they are usually of such structure that the damage cannot be readily repaired without sending the entire nozzle back to the factory producing it. These disadvantages and difficulties are overcome and eliminated in nozzles embodying my invention by protecting the parts which are likely to be damaged and by so forming the structure that the necessarily frail parts are protected from breaking strains during the normal operation of the structure.

As shown, the structure includes what may be termed a plug member 7, which is adapted to be fitted into the discharge opening of the liquid receptacle 3 and for that purpose is provided with external screw threads. It is also provided with a downwardly extending, integrally formed extension 8 which, like the plug proper, is cored or drilled to form a liquid delivery passage 9 which communicates at its upper end with the interior of the tank 3. The upper end of the plug member 7, i. e., that portion which projects into the tank 3, is provided with a bridge 10, which is preferably integrally formed therewith, but is of such structure that it provides a free path for the liquid in the tank to the inlet end of the passage 9.

The extension 8 forms a guide for a flow controlling plunger member 11, which fits over the lower end thereof and, as shown, is provided with a downwardly extending, integrally formed tubular extension 12. The member 11, and its extension 12, provide a continuation of the liquid delivery passage 9.

The spout 4 is secured to the air vent tube 5, which extends downwardly through the spout to a point adjacent its lower end and is brazed or otherwise secured thereto along one side of its inner cylindrical face of the spout. The tube 5 is also preferably cylindrical, with

its upper end thickened to provide a screw threaded head 14 and a nut-like shoulder 15. The bridge 10 is provided with a tapped opening which is adapted to receive the screw threaded head 14 and in this way to secure the vent tube 5 and the spout 4 in place as a unitary part of the structure. The extension 12 of the plunger member 11 is preferably cylindrical and is of such interior dimensions that it provides a sliding fit between its interior surface and the external surface of the spout 4, which is also preferably cylindrical. A liquid delivery orifice 16 is formed in one side of the spout, preferably that side opposite to the line of connection of the tube 5, and is located near the lower end of the spout. The lower end of the tube 5 is provided with a vent, which registers with an air vent 17, formed in the lateral wall of the spout 4 and which is also located near the lower end of the spout and preferably diametrically opposite to the orifice 16.

It will be understood that the air vent, formed near the lower end of the tube 5, is, in effect, the same opening as the air vent 17 in the spout 4, and that consequently the lower end of the tube is sealed except for the opening provided by the vent 17.

As shown in Fig. 3, the lower end of the spout is partially filled with solder or brazing metal 18 so as to reinforce the connection between the tube 5 and the spout and also to insure the sealing of the air vent in the tube 5 and to prevent leakage of liquid from the spout into the tube 5 through the opening in the lower end of the tube. This brazing material 18 is also preferably formed so that it forms a guiding surface, such as shown in Fig. 3, for the liquid issuing through the orifice 16.

The lower end of the spout carries a bolt 19 which is screwed into a suitably tapped aperture formed in the closed end of the spout. As shown the tapped aperture for receiving the threaded shank of the bolt is formed in a metallic plug 18', which is secured into the lower end of the spout by the brazing or soldering metal 18. The bolt 19 is axially located with relation to the spout and its edges extend beyond the external edges of the spout for the purpose of forming a seat for the lower end of the extension 12 of the plunger member 11. As shown, a fibre or rubber washer 20 is located between the upper face of the head of the bolt 19 and the lower end of the spout for the purpose of insuring a liquid tight closure for the lower end of the plunger member 11 or its extension 12.

The sliding joint between the extension 8 and the member 11 is sealed against leakage by means of fibrous or other suitable packing 22, which is held in place by a gland head 23, having a flange which slidably fits the extension 8 and which projects down-

wardly into the packing or gland recess formed in the upper end of the member 11.

The member 11, and consequently its extension 12, are normally pressed downwardly by means of a coil spring 24, which surrounds the extension 8 and operates between the body portion of the plug member 7 and the gland head 23, which, by reason of the pressure of the spring, in effect constitutes a portion of the plunger member 11. With this arrangement the lower end of the plunger member, i. e., its extension 12, is normally held against the washer 20 and consequently normally shuts off the flow of liquid through the orifice 16 of the spout 4; and, in addition, the contact of the member 11 with the washer 20 limits the downward, or spring pressed movement of the member 11.

A rubber or flexible stop 25 surrounds the extension 12 and, by snugly fitting the extension, is held against the shoulder 26 of the member 11 occasioned by the difference between the diameter of that member and its extension 12.

A bottle guide 27 surrounds the member 11 and its extension and is guided in its movements by the member 11. As shown, the upper portion of the guide 27 consists of a sleeve 28, which slides on the external surface of the member 11 and is provided with an internal shoulder 29, which is adapted to engage a shoulder or offset 30, formed near the lower end of the member 11, for the purpose of limiting the downward movement of the bottle guide. The lower end of the guide is adapted to receive and position a bottle so that the extension 12, and the spout 4 enclosed thereby, will enter the bottle. For this reason the bottle guide 27 is so formed that it readily receives the neck of the bottle and has bottle shoulder engaging portions which primarily function as a bottle positioning means, as is usual in connection with such bottle guides.

The tubular air-vent extension 6 is adapted to be screwed onto the upper end of the vent tube 5, and as previously stated, its upper end projects above the level of the liquid contained in the tank 3, for the purpose of providing a free air passage from the vent opening 17 to a point above the liquid in the tank. It will also be apparent that in the arrangement illustrated the tube 5 is flexed sufficiently to permit its upper end to be screwed into the opening provided therefor in the bridge which is preferably axially aligned with relation to the extension 8 of the plug member 7 and with the extension 12 of the plunger member 11. With this arrangement the structure is materially simplified and the operation of securing the tube 5 to the bridge and of consequently securing all the parts in operating position on the plug member 7 is materially simplified, and in addition the structure of the assembled nozzle is mate-

rially simplified over similar structures now in use and known to me.

It will be apparent that in a liquid filling nozzle embodying my invention, the only portion of the nozzle which is limited as to size is that portion which is adapted to be inserted into the neck of a bottle to be filled. In other words, the only elements of the nozzle illustrated which, of necessity, must be of relatively small diameter, are the spout 4, the vent tube 5 and the extension 12, forming a part of the plunger member 11. For this reason all the liquid passages may be so proportioned as to produce a rapid filling of the bottles. This is a material advantage, and one of the features of my invention. It is well known that the resistance of flow of a liquid increases proportionately to the rate of flow.

In the nozzle illustrated I provide adequate liquid passages through the plug member 7, its extension 8 and the body of the plunger member 11, and I make the liquid passages of small diameter—i. e., those formed within the spout 4 and the extension 12—as short as is possible without interfering with the function of the apparatus. In addition, the structure illustrated is so formed that it is possible to employ a relatively short spout, and this is important because the liquid passage through the spout is necessarily the passage of smallest diameter and consequently the rate of liquid flow through this spout must necessarily be high. It is, however, apparent that by shortening the spout the resistance to flow through the spout is correspondingly lessened, with the result that a rapid flow into the bottle may be obtained. The importance of decreasing the resistance to flow will be realized when it is considered that the available head of liquid is necessarily limited in bottle filling apparatus.

The operation of the apparatus is as follows: A bottle 31 is moved to position below the lower end of the extension 12, and the bolt 19. Means, such as a lifting table (not shown), are employed for raising the bottle after it is in place below the nozzle. During the upward movement of the bottle it first encounters the lower end of the bottle guide 27 which normally hangs below the lower end of the tip nut 19 by reason of the fact that the shoulder 29 normally engages the external shoulder 30 formed on the plunger member 11. The member 27 guides the bottle, during its upward travel or the relative movement between it and the extension 12, so that the extension 12 enters the neck of the bottle and so that the upper edge of the neck of the bottle finally engages the stop 25. The bottle continues to move upwardly and in the further upward movement, but during this portion of its movement it lifts the plunger 11 against the pressure of the spring 24 and

moves with the extension 12 and plunger member 11. This movement of the extension opens the liquid discharge orifice 16 and the air vent opening 17 both of which are formed in the spout 4. It is apparent that the spout 4, which is secured to the vent tube 5 at all times remains stationary, in the particular form of apparatus illustrated. The opening of the orifice permits a flow of liquid from the tank 3, through the communicating passages and the delivery orifice 16 into the bottle. This flow continues until the liquid level within the bottle rises sufficiently to close the vent opening 17. A further flow of liquid into the bottle is then prevented by the building up of air pressure within the bottle, due to the fact that the interior of the bottle is sealed, its upper edge being in contact with the rubber or flexible stopper 25. The bottle then moves downwardly and it will be apparent from the previous description that the seal between it and the stopper 25 is not broken until the orifice 16 is closed by the downwardly moving extension 12. As a matter of fact the pressure seal between the upper edge of the bottle and the stopper 25 is not broken until the extension 12 is seated on the washer 20, since the downward movement of the plunger member 11 and the extension 12 is stopped only by such a seating of the extension 12 or the washer 20, which is held in place on the spout 4 by the tip nut 19.

It will be apparent that the operation of the unitary nozzle structure will be the same even though the nozzle structure is moved downwardly while the bottle, to be filled, remains stationary. The relative motions will be exactly the same under such circumstances and consequently, the function and the effect of the different parts will not be varied.

Another feature of my invention is the fact that but one gasket need be employed for preventing leakage of the liquid. It will be apparent that leakage between the outer surface of the spout 4 and the inner surface of the extension 12 is not objectionable and it is therefore not necessary to provide a tight fit between these parts. It will also be apparent that the spout 4 and its supporting tube 5 are protected by the relatively rigid structure made up of the telescoping parts 8, 11 and 12, no one of which is in fact guided by the spout 4. It is therefore apparent that there is little likelihood of the spout 4 or the tube 5 being bent or otherwise damaged during the operation of the device. It is, however, apparent that the entire structure may be readily disassembled by merely removing the tip screw 19. As soon as this screw is removed the bottle guide 27 and the plunger member 11, with its extension 12, slide downwardly off of the guide 8 and the spout 4. The coil spring 24 necessarily follows this movement and when the parts are removed from the guide 8 and spout 4 the gland head 23 is loose, and can

therefore be removed. This permits the plunger member 11 to move down through the sleeve 28, forming a part of the bottle guide 27. It will therefore be apparent that the entire apparatus is disassembled by the removal of the tip bolt 19 and that the operation of replacing the spout 4 and air vent 5, or any other part of the liquid nozzle, is a relatively simple operation and can be performed by a novice.

While I have illustrated but one form of my invention it will be apparent that various changes, modifications, additions and omissions may be made in the illustrated embodiment without departing from the spirit and scope of the invention as set forth by the appended claims.

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

1. In combination in a liquid supply nozzle, a member having a liquid delivery passage formed therein communicating with a source of liquid supply, a spout spaced from said member, a vent tube extending through said passage, detachably secured to said member and secured to said spout, flow controlling means slidably mounted on said member, surrounding said spout and said tube, and establishing communication between said spout and said passage, for controlling the flow of liquid through said spout, and means secured to said spout for limiting the movement of said flow controlling means in one direction along said member.

2. In combination in a liquid supply nozzle, a member having a liquid delivery passage formed therein, communicating with a source of liquid supply, a spout spaced from but in axial alignment with said passage, a bendable vent tube extending through said passage, secured at one end to said member, and at the other end to said spout, flow controlling means slidably mounted on said member, surrounding said tube and said spout, establishing communication between said passage and said spout and for controlling the flow of liquid through said spout, a stop located at the end of said spout and a coiled spring surrounding said member for yieldingly holding said flow controlling means in contact with said spout.

3. In combination in an apparatus of the character described, a tank having a liquid delivery orifice, a member secured thereto and having a passage therein communicating with said orifice, a tubular liquid delivery spout axially aligned with said passage but spaced from said member, a bendable air vent tube secured to said spout and extending therethrough eccentrically thereof and secured to said member in axial alignment with said passage, a liquid control plunger slidably mounted on said member, surrounding said air vent tube and said spout and

forming a means of communication between said passage and said spout.

4. In combination in a bottle filling nozzle, an air vent tube adapted to extend into a bottle to be filled, a spout surrounding and secured to said tube, and adapted to extend into a bottle to be filled, a liquid delivery member surrounding said tube and to which said tube is attached, a movable member surrounding said tube and spout and establishing communication between said liquid delivery member and said spout, and means carried by said spout for holding said movable member in place on said liquid delivery member and for cooperating therewith to shut off the flow of liquid through said spout.

5. In a bottle filling nozzle, a liquid delivery member communicating with a source of liquid supply, a relatively short spout spaced therefrom but aligned therewith and a movable plunger member, guided by said first mentioned member, surrounding the end thereof and said spout and forming a means of communication between said liquid delivery member and said spout.

6. In combination in a bottle filling nozzle, a tank having an orifice in its bottom, a hollow plug member in said orifice having an axial extension, a flow controlling plunger member around the end of said plug extension, said plunger member having an apertured bottom spaced from said extension, an extension for said plunger member, a spout member associated with said apertured bottom and with said plunger extension, said spout having a relatively large delivery orifice, means for maintaining said members in operative position, and a vent tube passing eccentrically through said members, secured at its top to said plug member by means of an associated bridge, and at its bottom to said spout member, said vent tube having a slot for carrying off air, foam and the like and the sealing of which by the rise of the liquid level thereto stops the further delivery of liquid to an associated container.

7. In combination in a bottle filling nozzle, a tank having an orifice in its bottom, a hollow plug member in said orifice having an axial extension, a flow controlling plunger member around the end of said plug extension, said plunger member having an apertured bottom spaced from said extension, an extension for said plunger member, a spout member associated with said apertured bottom and with said plunger extension, said spout having a relatively large delivery orifice, means for maintaining said members in operative position, and a vent tube passing eccentrically through said members, secured at its top to said plug member by means of an associated bridge, and at its bottom to said spout member, said vent tube having a slot for carrying off air, foam and the like and the sealing of which by the rise of the liquid

level thereto stops the further delivery of liquid to an associated container, and a guide for said container operatively associated with said flow controlling plunger.

- 5 8. In combination in a bottle filling nozzle, a tank having an orifice in its bottom, a hollow plug member in said orifice having an axial extension, a flow controlling plunger member around the end of said plug extension, said plunger member having an apertured bottom spaced from said extension, an extension for said plunger member, a spout member associated with said apertured bottom and with said plunger extension, said
10 spout having a relatively large delivery orifice, means for maintaining said members in operative position, and a vent tube passing eccentrically through said members, secured at its top to said plug member by means of
15 an associated bridge, and at its bottom to said spout member, said vent tube having a slot for carrying off air, foam and the like and the sealing of which by the rise of the liquid level thereto stops the further delivery
20 of liquid to an associated container, and a single gland head operatively associated with said flow controlling plunger and a liquid-tight packing joint between said members.

25 In testimony whereof, I have hereunto subscribed my name this 14th day of February, 1929.

JOSEPH E. DUNN.

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