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54 Nozzle for filling liquid in specified amounts.

57 A liquid filling nozzle comprises a tubular nozzle body 33 having an inlet 31 at an intermediate portion of the height of its peripheral wall for receiving a liquid forced thereinto in a specified amount at a time and a discharge outlet 32 provided by a lower-end

opening of the peripheral wall, and a liquid pushing-out rod 34 slidably fitted in the nozzle body 33 so as to open and close the inlet 31. At least a lower end surface of the rod 34 is rendered hydrophobic.

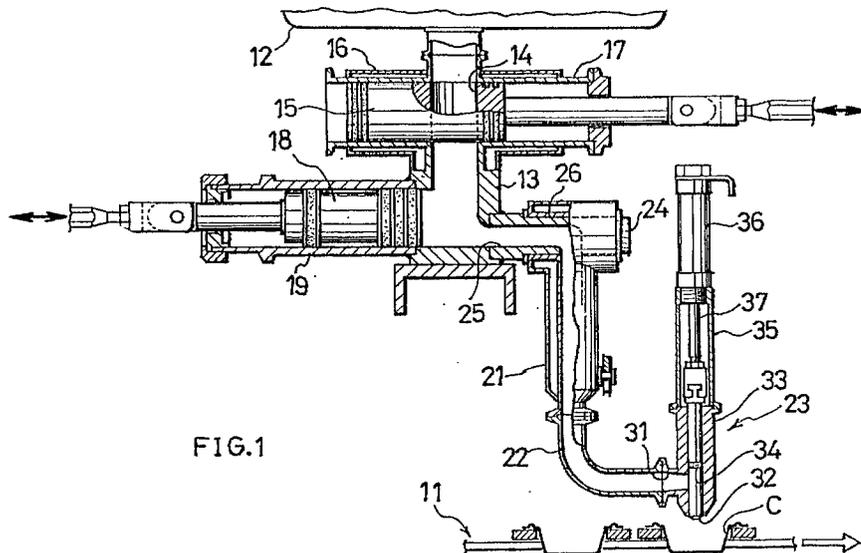


FIG.1

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BACKGROUND OF THE INVENTION

The present invention relates to a filling nozzle for use in filling a liquid of high viscosity, such as curry roux or like food, into containers in a specified amount in each container.

Such filling nozzles are already known which comprise a tubular nozzle body having an inlet at an intermediate portion of the height of its peripheral wall for receiving a liquid forced thereinto in a specified amount at a time and a discharge outlet provided by a lower-end opening of the peripheral wall, and a liquid pushing-out rod slidably fitted in the nozzle body so as to open and close the inlet.

When the nozzle is used for a liquid filling operation, the liquid in the nozzle body is wholly pushed out by the rod to fill a container with the completion of one cycle of filling operation. However, it is likely that the liquid forced out will partly adhere to the rod and remain thereon.

No problem will arise if the liquid portion remains adhering to the rod until the subsequent filling cycle is started, but the liquid is likely to fall off. When the falling liquid adheres to the surface of the container to be sealed, the container will not be sealed properly. Adhesion of the liquid to the container transport holder or the like is objectionable from the viewpoint of sanitation.

SUMMARY OF THE INVENTION

The main object of the present invention is to provide a nozzle for filling a liquid in specified amounts which comprises a tubular nozzle body having an inlet at an intermediate portion of the height of its peripheral wall for receiving the liquid forced thereinto in the specified amount at a time and a discharge outlet provided by a lower-end opening of the peripheral wall, and a liquid pushing-out rod slidably fitted in the nozzle body so as to open and close the inlet, the nozzle being characterized in that at least a lower end surface included in the entire outer surface of the rod is rendered hydrophobic.

With the liquid filling nozzle of the present invention, at least the lower end surface of the rod is so treated as to be hydrophobic and therefore will not permit the adhesion of the liquid thereto. If the liquid adheres to the rod and falls off inadvertently, the liquid is likely to adhere to the surface of the container to be sealed to result in imperfect sealing, or is likely to adhere to the container transport holder or the like to entail the problem of impaired sanitation, whereas the present invention has obviated such problems.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in vertical section of a filling apparatus including a filling nozzle embodying the invention; and

FIG. 2 is a sectional view showing the lower end portion of the nozzle on an enlarged scale.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the invention will be described below with reference to the drawings.

The illustrated filling apparatus comprises a tank 12 disposed above a container conveyor 11 for containing the liquid to be filled, a vertical filling pipe 13 connected at its upper end to the bottom wall of the tank 12, a horizontal check cylinder 17 intersecting an upper portion of the filling tube 13 at right angles therewith, housing a piston 15 therein and provided with a jacket 16 for preventing the liquid from solidifying, the piston 15 having a fluid channel 14 extending therethrough, a horizontal metering cylinder 19 projecting leftward from the lower portion of the filling pipe 13 and having a piston 18 therein, a movable filling pipe 22 rockably suspended from the lower end of the filling pipe 13 and provided with a jacket 21 for preventing the liquid from solidifying, and a filling nozzle 23 attached to the lower end of the filling pipe 22.

The filling pipe 13 is provided at its lower end with a horizontal cylindrical member 24 for suspending the filling pipe 22. The suspending member 24 has a communication channel 25 which has one end opened leftward for communication with the filling pipe 13 and the other end opened downward. A horizontal rotary tube 26 is fitted in the suspending member 24 so as to cover the downward opening of the channel 25. The filling pipe 22 has an upper end connected to the tube 26.

The filling nozzle 23 comprises a tubular nozzle body 33, and a rod 34 for pushing out the liquid to be filled. The nozzle body 33 has an inlet 31 formed at an intermediate portion of the height of its peripheral wall and connected to the lower end of the filling pipe 22, and a discharge outlet 32 provided by a lower-end opening of the peripheral wall. The rod 34 is slidably fitted in the nozzle body 33.

Connected by a yoke 35 to the upper end of the nozzle body 33 is a hydraulic cylinder 36, which has a piston rod 37 extending downward into the yoke 35. The pushing-out rod 34 has an upper end projecting upward beyond the nozzle body 33 and connected to the piston rod 37.

As shown in greater detail in FIG. 2, the lower end surface of the pushing-out rod 34 has a projecting tapered face 41 at an outward portion thereof

and a recessed conical face 42 at an inward portion thereof. An annular flat face 43 is formed at the boundary between the tapered face 41 and the conical face 42. The tapered face 41, the conical face 42 and the flat face 43 are all formed with a Teflon layer 44.

In the state shown in FIG. 1, the check piston 15 is in its leftward limit position to hold the check cylinder 17 open, the metering piston 18 is in its rightward limit position, and the liquid pushing-out rod 34 is in its lower limit position, holding the inlet 31 and the discharge outlet 32 closed. When the metering piston 18 is moved leftward in this state, the liquid to be filled flows out of the tank 12 into the filling pipe 13. Upon the metering piston 18 reaching its leftward limit position, the check piston 15 is moved rightward to close the check cylinder 17, and the pushing-out rod 34 is raised to open the inlet 31 and the outlet 32. The metering piston 18 is then moved rightward, whereby the liquid in the filling pipe 13 is forced through the inlet 31 into the nozzle 23, further discharged from the outlet 32 and filled into a container C as transported to a position below the outlet. If the nozzle 23 is rocked over a predetermined range when the liquid is delivered from the discharge outlet 32, the liquid fills the container C to a flat level without forming an upwardly bulging shape inside the container C. Upon the metering piston 18 reaching its rightward limit position, the feed of liquid from the filling pipe 13 is discontinued, where-upon the pushing-out rod 34 is lowered to force out the liquid from the nozzle 23. One cycle of filling operation is completed when the rod 34 reaches its lower limit position.

The Teflon layer 44 is formed by coating the lower end surface of the pushing-out rod 34. Teflon has a hydrophobic property, therefore repels the liquid even if the liquid tends to adhere to the rod end surface and consequently renders the end surface free from the liquid.

Although an unillustrated chromium plating layer is formed over the side surface of the rod 34 in the above embodiment, this layer may be replaced by a Teflon layer.

Claims

1. A nozzle for filling a liquid in specified amounts comprising:
 - a tubular nozzle body 33 having an inlet 31 at an intermediate portion of the height of its peripheral wall for receiving the liquid forced thereinto in the specified amount at a time and a discharge outlet 32 provided by a lower-end opening of the peripheral wall, and
 - a liquid pushing-out rod 34 slidably fitted in the nozzle body 33 so as to open and close the inlet 31,

the filling nozzle being characterized in that at least a lower end surface included in the entire outer surface of the rod 34 is rendered hydrophobic.

2. A nozzle as defined in claim 1 wherein the lower end surface of the rod 34 has a projecting tapered face 41 at an outward portion thereof and a recessed conical face 42 at an inward portion thereof.
3. A nozzle as defined in claim 2 wherein the rod 34 is movable upward and downward to a lower limit position where the upper end of the tapered face 41 is at the same level as the lower end face of the nozzle body 33.
4. A nozzle as defined in claim 1 wherein the lower end surface of the rod 34 is formed with a Teflon layer 44 and thereby rendered hydrophobic.

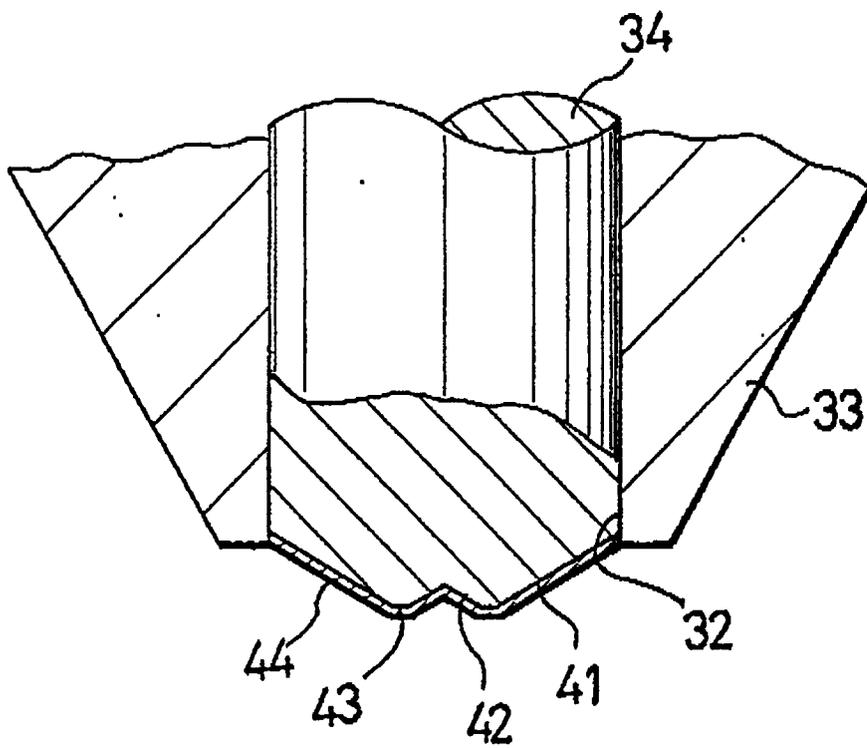


FIG.2



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 197 575 (EXTER HOLDING BV) * page 2, line 14 - page 3, line 6; figures *	1	B65B39/00 B65B65/06
A	* claims 5,7 * ---	2-4	
A	DE-A-2 349 123 (AMMANN) * page 13, paragraph 3; figures *	1,2	
A	US-A-4 363 429 (SCHINDLER) * abstract; figures *	1,2	
A	EP-A-0 106 090 (RATIONATOR-MASCHINENBAU GMBH) * page 3, line 11 - line 15; figures *	1,2	
A	US-A-3 786 837 (PIPKINS) * abstract; claim 2; figure 4 * -----	1,4	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65B
Place of search	Date of completion of the search	Examiner	
THE HAGUE	16 JUNE 1993	GINO C.P.G.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
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P : intermediate document		
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