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EUROPEAN PATENT APPLICATION

②① Application number: 85200390.4

⑤① Int. Cl.⁴: **B 65 B 39/00**
B 65 B 39/04

②② Date of filing: 15.03.85

③③ Priority: 16.03.84 JP 51635/84

④③ Date of publication of application:
25.09.85 Bulletin 85/39

⑧④ Designated Contracting States:
CH DE FR GB LI NL SE

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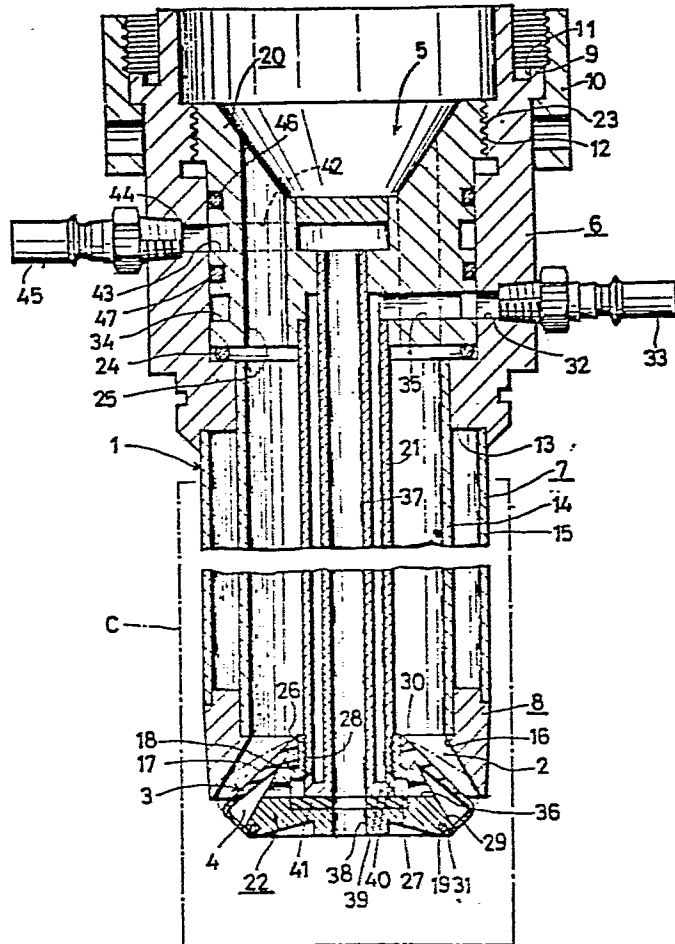
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⑤④ Liquid filling nozzle.

⑤⑦ A liquid filling nozzle which comprises a tubular nozzle main body (1) a short tubular elastic body (3) disposed in an opening at the lower end of the main body and opposed to the edge portion of the lower end opening with an annular liquid passing clearance (2) formed therebetween, a suspending member (5) having the elastic body (3) suspended therefrom and extending along the inner peripheral surface of the elastic body to define an annular pressurized fluid chamber (4) along with the elastic body, and means for supplying a pressurized fluid to the chamber to inflate the elastic body.

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LIQUID FILLING NOZZLE

The present invention relates to a liquid filling nozzle for filling liquid or flowable food or the like into containers in a specified quantity for each container.

For an efficient filling operation, it is required that the filling nozzle be capable of sharply cutting the flow of the liquid to be handled. To assure this, known filling nozzles are provided at the orifice portion with a metal net or a damper. By the pressure of the liquid or mechanical means, the damper is opened and closed in order to fill every specified quantity of liquid. In the case the nozzles of the former type, the metal net becomes clogged up when filling a juice or the like containing a fibrous material such as the flesh of fruit, or the metal net impedes the flow of liquid when handling a viscous liquid such as fresh cream or yoghurt. Thus, it is difficult to carry out a rapid and smooth filling operation. The nozzle of the latter type is free of the above problems which are attributable to the presence of the net, but fibrous materials are likely to adhere to the damper to render the damper no longer operable accurately. Further when the liquid is fresh cream, the opening and closing movement of the damper gives rise to a churning phenomenon, possibly solidifying the fresh cream. The solidified portion, if contained in the product, will reduce the quality of the product. Furthermore, when the solid cream adheres to the damper, the damper will not operate properly, failing to cut the flow of liquid sharply.

The main object of the present invention is to provide a nozzle for filling a liquid of whatever type into containers quickly and smoothly.

The invention provides a liquid filling nozzle comprising a tubular nozzle main body, a short tubular elastic body disposed in a lower end opening of the main body and opposed to the edge portion of the lower end opening with an annular liquid passing clearance formed therebetween, a suspending member having the elastic body suspended therefrom and extending along the inner peripheral surface of the elastic body to define an annular pressurized fluid chamber along with the elastic body, and means for supplying a pressurized fluid to the chamber to inflate the elastic body.

According to the present invention, the elastic body is inflated or contracted to close or open the opening of the nozzle main body at its lower end. Since no metal net is used, the nozzle is free of the above problems due to the presence of the net, while the nozzle which does not include any mechanically operable part such as a damper has no likelihood of causing churning. Accordingly the nozzle sharply cuts the flow of a liquid of whatever type to assure a quick and smooth filling operation.

Now, an embodiment of the invention will be described for illustrative purposes only with reference to the accompanying drawing.

The drawing is a view in vertical section showing a liquid filling nozzle of the present invention.

The nozzle of the invention comprises a tubular nozzle main body 1, a short tubular elastic body 3 disposed in a lower end opening of the nozzle main body 1 and opposed to the edge portion of the lower end opening with an annular liquid passing clearance 2 formed therebetween, a suspending member 5 having the elastic body 3 suspended therefrom and extending along the inner peripheral surface of the elastic body 3 to define an annular pressurized fluid chamber 4 along with the elastic body 3, and means for supplying a pressurized fluid to the chamber 4 to inflate the elastic body 3.

The nozzle main body 1 comprises an upper member 6, an intermediate member 7 and a lower member 8, which are joined to one another in alignment. The upper member 6 has a larger diameter than the other members 7 and 8. The upper member 6 is formed on the outer periphery of its upper end with an outer flange 9, which is engaged by an inner flange of a nut 10. The nozzle is removably attached to the main body of a filling machine (not shown) by fitting the flanged nut 10 to the machine

main body. An annular groove 11 is formed in the upper surface of the outer flange 9 and has an unillustrated O-ring fitted therein. The upper member 6 is internally threaded as at 12 at a portion thereof close to its upper end and has an inner flange 13 on the inner periphery of its lower end. The intermediate member 7 has a double structure which comprises inner and outer tubes 14, 15 arranged concentrically with a space formed therebetween, whereby condensation of water vapor is prevented during filling operation. The upper end of the inner tube 14 is fitted in the inner flange 13 intimately and fixedly. The lower end of the tube 14 is fitted in the lower member 8 intimately and fixedly. On the other hand, the outer tube 15 has an upper end secured to the lower end of the upper member 6 and a lower end fixedly joined to the upper end of the lower member 8. A downwardly tapered inner surface 16 is formed at the lower end opening edge portion of the lower member 8 to define the liquid passing clearance 2.

The elastic body 3 is integrally molded of rubber for food use and is substantially L-shaped in cross section. The upper portion of the elastic body 3, which is approximately $\frac{2}{3}$ of the whole, is tapered upward, so that the elastic body 3 has an upwardly tapered outer surface 17 and is formed on its inner periphery with flanges 18, 19 at the upper and lower ends thereof, respectively.

The suspending member 5 comprises a short solid cylinder 20 intimately fitted in the upper member 6 of the main body 1, a pressurized fluid tube 21 fixed at its upper end to the central portion of the bottom of the solid cylinder 20, and a cone 22 fixed to the lower end of the fluid tube 21. The solid cylinder 20 has an externally threaded upper portion 23, which is screwed in the internally threaded portion 12 of the upper member 6. Between the bottom surface of the solid cylinder 20 and the upper surface of the inner flange 13 of the upper member 6, there is a small clearance in which an O-ring 24 is provided. A plurality of bores 25 extending through the cylinder 20 are equidistantly arranged on a circumference having a given radius from the center of the cylinder. These bores 25 serve as liquid channels. The fluid tube 21 has an externally threaded lower end portion 26. The cone 22 has a central hollow portion 27, from which a threaded bore 28 extends upward through the cone. The externally threaded portion 26 of the fluid tube 21 is screwed in the threaded bore 28. The conical surface 29 of the cone 22 is formed with annular grooves 30, 31 at its upper and lower ends, respectively. The

elastic body 3 is fitted over the cone 22 to cover the conical surface 29, and the flanges 18, 19 of the elastic body 3 are fixely fitted in the annular grooves 30, 31, respectively, whereby the annular pressurized fluid chamber 4 is formed between the elastic body 3 and the cone 22. The upper member 6 has a pressurized fluid inlet-outlet opening 32 formed in the peripheral wall of a lower portion thereof. A pressurized fluid supply pipe 33 is fitted in the opening 32 from outside. An annular groove 34 in communication with the inlet-outlet opening 32 is formed in the outer peripheral surface of the solid cylinder 20. An upper fluid channel 35 extends from the bottom of the groove 34 to communicate with the upper end of the fluid tube 21. On the other hand, the cone 22 is formed with lower fluid channels 36 for holding the lower end of the fluid tube 21 in communication with the fluid chamber 4.

An air vent tube 37 having a smaller diameter than the fluid tube 21 is inserted through the tube 21 concentrically therewith. The cone 22 is formed with an air inlet 38 extending downward from its hollow portion 27 and having a lower end open at the bottom surface of the cone 22. The air vent tube 37 has a lower end communicating with the upper end of the air inlet 38. The lower end of the air vent tube 38 is connected to the lower end of the fluid tube 21 by an annular end wall 39, whereby the open lower end of the fluid tube 21 is closed. However, immediately above the end wall 39, the fluid tube 21 has a plurality of ports 40 for holding the lower end of the tube 21 in communication with the hollow portion 27 of the cone 22. An annular packing 41 is provided between the lower surface of the end wall 39 and the bottom surface of the hollow portion 27. The upper end of the air vent tube 37 is fixedly joined to the solid cylinder 20 at a location above the upper end of the fluid tube 21. The cylinder 20 has an air channel 42 extending radially thereof and communicating with the upper end of the air vent tube 37. The outer end of the air channel 42 communicates with an annular groove 43 formed in the outer peripheral surface of the solid cylinder 20. An air outlet 44 formed in the peripheral wall of the upper member 6 communicates with the air channel 42 via the annular groove 43. An air discharge pipe 45 is connected to the air outlet 44 from outside. While the upper and lower two annular grooves 43, 34 are formed in the outer periphery of the solid cylinder 20, O-rings 46, 47 are fitted around the cylinder 20 and positioned above the upper groove 43, and between the upper and lower grooves 43, 34, respectively.

When a pressurized fluid is supplied to the inlet-outlet opening 32 via the supply pipe 33, the fluid flows into the fluid chamber 4 by way of the tube 21, etc., inflating the elastic body 3 from a solid-line state shown to a state indicated in broken lines to bring the elastic
5 body 3 into intimate contact with the tapered surface 16 of the lower member 8 at its lower end opening. Consequently, the lower end opening of the nozzle main body 1 is closed. When the supply of the fluid is discontinued and the fluid is discharged from the chamber 4, the elastic body 3 contracts to the original state shown in solid lines, whereby
10 the opening of the nozzle main body 1 is opened. In this state, a liquid is filled into a container C. As the liquid is progressively filled in, the air within the container C is replaced by the liquid and discharged from the container C through the air vent tube 37, etc.

During filling, air may be discharged from the interior of the
15 container directly to the atmosphere, or forcedly withdrawn by a vacuum pump or the like. Air, water, oil or the like can be suitably selected for use as the pressurized fluid.

The figures used in the claims are only meant to explain more clearly the intention of the invention and are not supposed to be any
20 restriction concerning the interpretation of the invention.

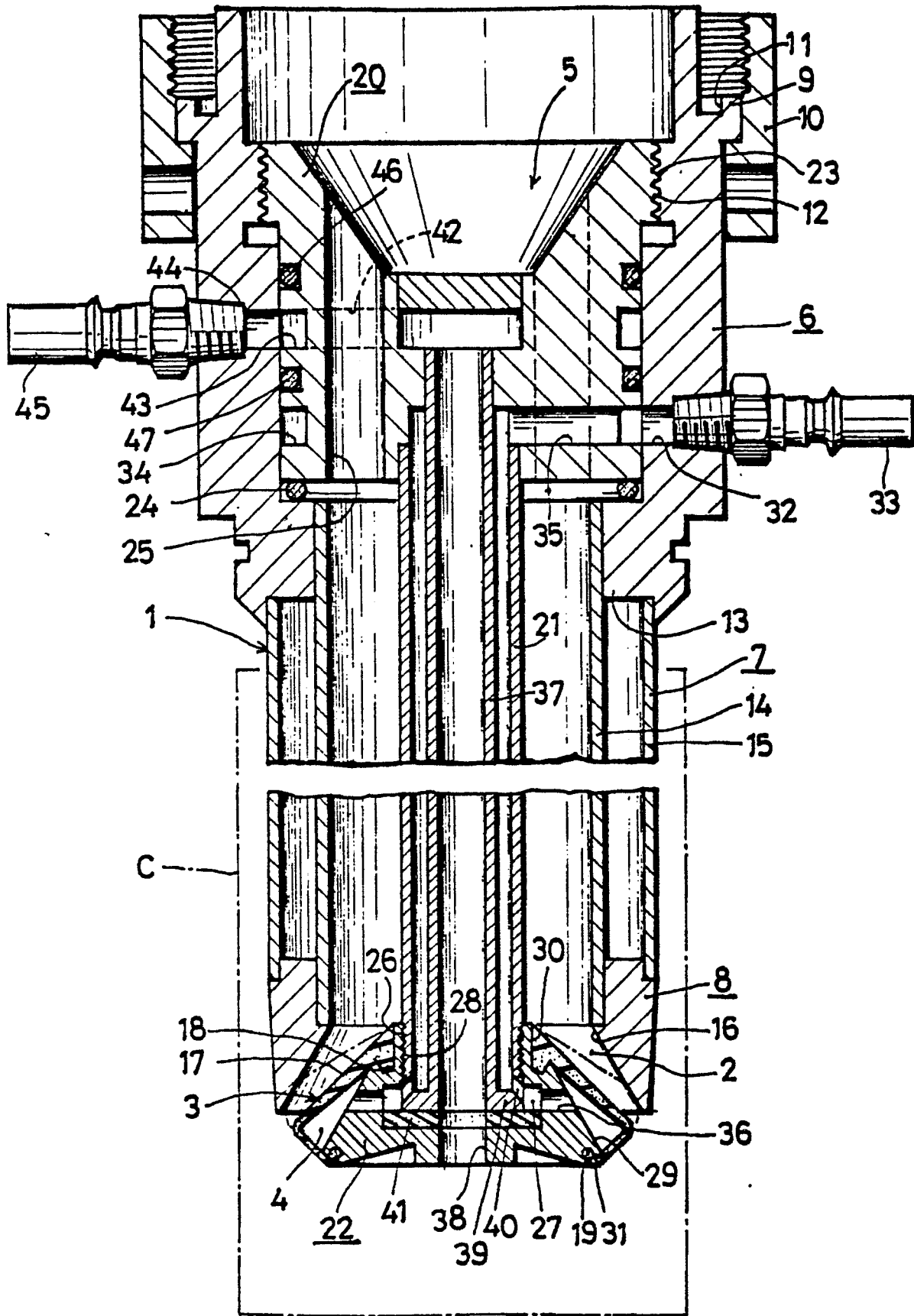
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CLAIMS

1. A liquid filling nozzle comprising a tubular nozzle main body (1), a short tubular elastic body (3) disposed in a lower end opening of the nozzle main body (1) and opposed to the edge portion of the lower end opening with an annular liquid passing clearance (2) formed therebetween, a suspending member (5) having the elastic body (3) suspended therefrom and extending along the inner peripheral surface of the elastic body (3) to define an annular pressurized fluid chamber (4) along with the elastic body (3), and means for supplying a pressurized fluid to the chamber (4) to inflate the elastic body (3).
2. A liquid filling nozzle as defined in claim 1 wherein the elastic body (3) is made of rubber.
3. A liquid filling nozzle as defined in claim 1 or 2 wherein the nozzle main body (1) has a downwardly tapered inner surface (16) at its lower end opening edge portion, and the elastic body (3) has an upwardly tapered outer surface (17).
4. A liquid filling nozzle as defined in any one of claims 1 to 3 wherein the suspending member (5) comprises a short solid cylinder (20) intimately fitted in an upper portion of the nozzle main body (1) and having liquid channels (25), a pressurized fluid tube (21) fixed at its upper end to the central portion of the bottom of the short solid cylinder (20), and a cone (22) fixed to the lower end of the fluid tube (21), the cone (22) having its conical surface (29) covered with the elastic body (3) for a clearance

therebetween to serve as the fluid chamber (4), the nozzle main body (1) being formed with a pressure fluid inlet-outlet opening (32) in the peripheral wall of the portion having the solid cylinder (20) fitted in, the solid cylinder (20) being provided with an upper pressurized fluid channel (35) for
5 holding the fluid inlet-outlet opening (32) in communication with the upper end of the fluid tube (21), the cone (22) being provided with a lower pressurized fluid channel (36) for holding the lower end of the fluid tube (21) in communication with the fluid chamber (4).

5. A fluid filling nozzle as defined in claim 4 wherein an air vent
10 tube (37) having a smaller diameter than the fluid tube (21) is inserted through the fluid tube (21) concentrically therewith, and the cone (22) is formed with an air inlet (38) having a lower end open at the bottom surface of the cone (22), the air vent tube (37) having a lower end in communication with the upper end of the air inlet (38) and an upper end communicating with
15 an air channel (42) formed in the solid cylinder (20), the nozzle main body (1) being formed in its peripheral wall with an air outlet (44) communicating with the air channel (42).





European Patent
Office

EUROPEAN SEARCH REPORT

0155736

Application number

EP 85 20 0390

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 4)
A	US-A-3 195 586 (VOGT) * Column 4, lines 31-70; column 8, lines 30-61; figure 4 *	1,2	B 65 B 39/00 B 65 B 39/04
A	US-A-2 761 607 (AYARS) * Column 3, lines 27-40; figure 1 *	3,5	
			TECHNICAL FIELDS SEARCHED (Int Cl 4)
			B 65 B B 67 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12-06-1985	Examiner CLAEYS H.C.M.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	