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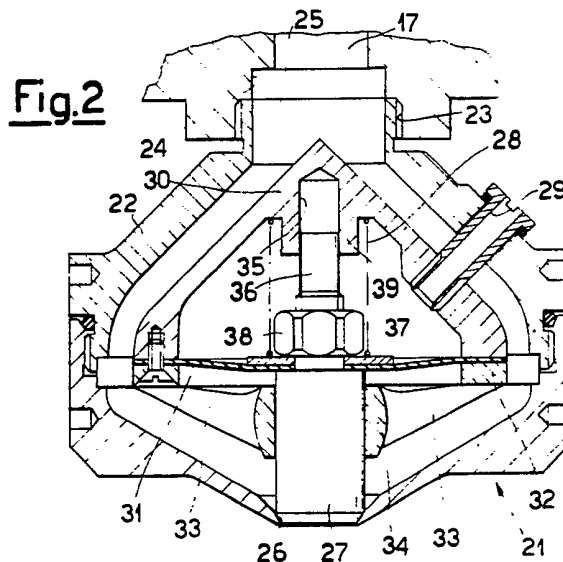
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(54) Drip-preventing nozzle for a metering unit for the packaging of a product with a fluid behaviour

(57) A drip-preventing nozzle, suitable for positioning downstream of a metering unit, and delivering a product above the mouth of a container to be filled, comprises a hollow body 21, provided with an inlet bore 25, suitable for being aligned with a lower delivery opening provided in the metering unit, and with an outlet bore 26, suitable for being aligned above the mouth of the container to be filled. Inside the hollow body is provided a shutter element 27 for shutting the outlet bore, where the shutter element is normally kept in its shutting position by a thrust element 28. A diaphragm 31 supports the shutter element 27 and is moved by the pressure of the product delivered by the metering unit to open the nozzle.

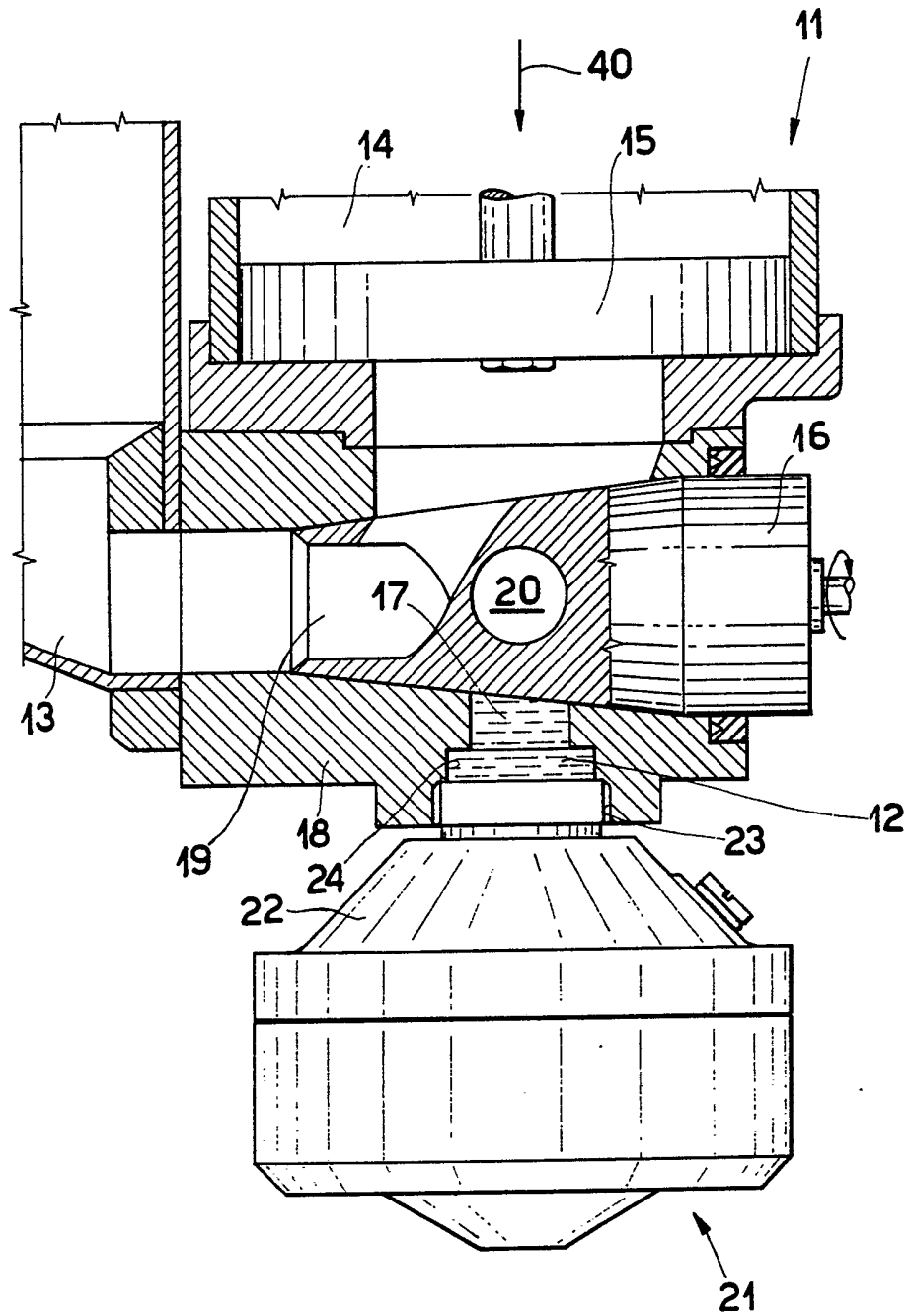


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Fig.1



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Fig.2

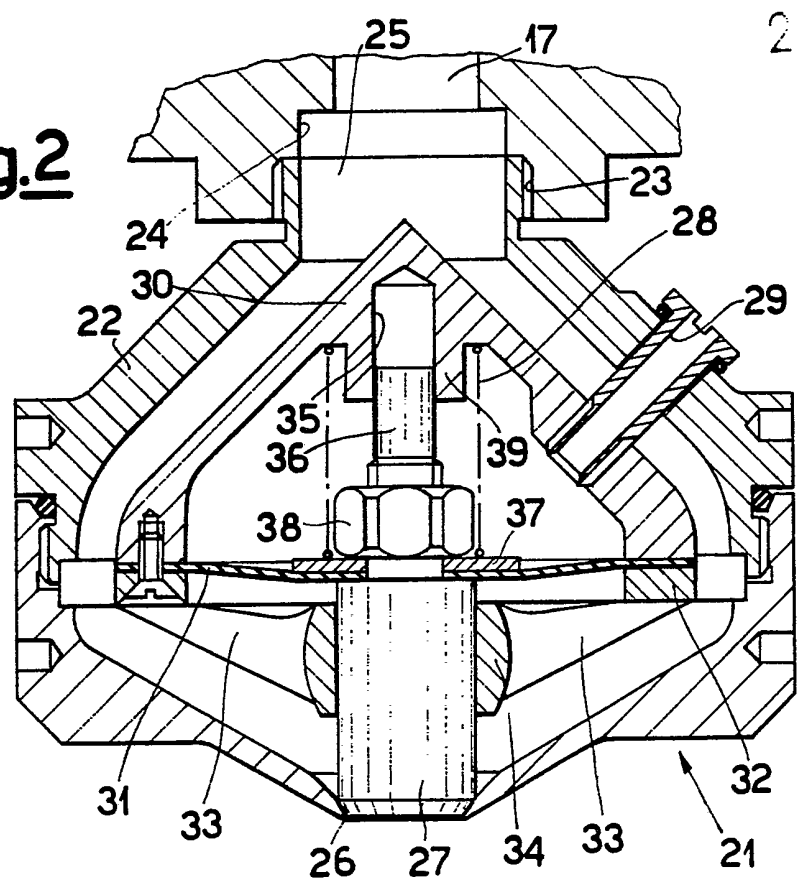
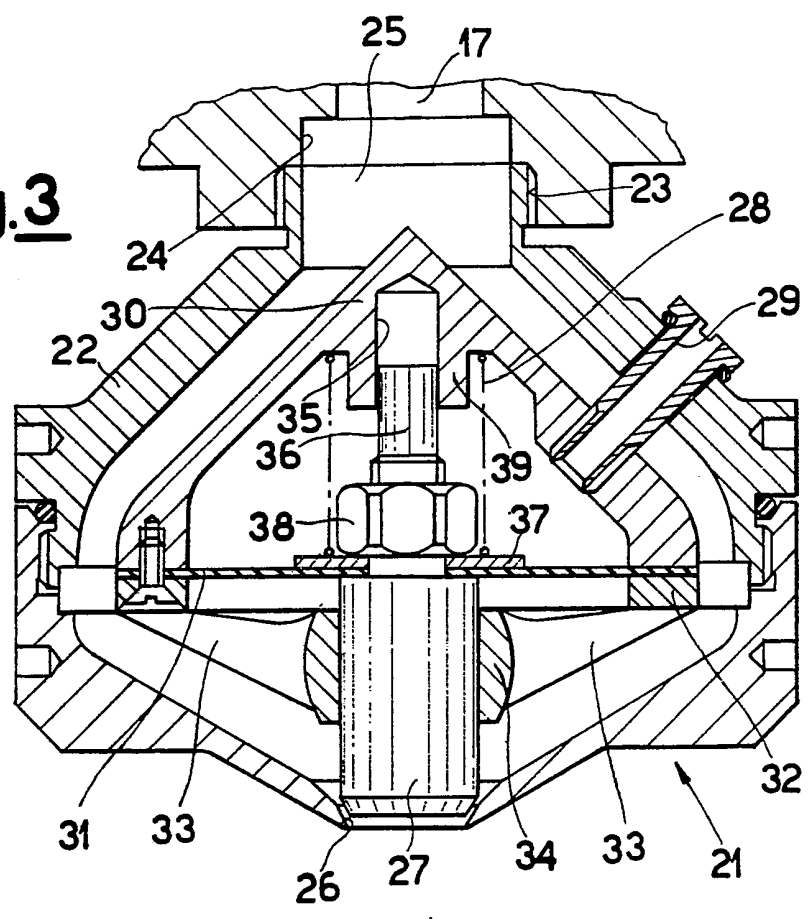


Fig.3



"DRIPPING-PREVENTING NOZZLE FOR A METERING UNIT FOR THE PACKAGING OF A PRODUCT WITH A FLUID BEHAVIOUR"

The present invention relates to a dripping-preventing nozzle for a metering unit for the packaging of a product having a fluid-like behaviour.

5 The use of metering units of volumetric type, for filling and packaging a fluid-behaving product inside containers which are transferred after each other under a delivery nozzle of the same filling metering unit, is known.

10 Plunging nozzles are known, which prevent the dripping, but they undoubtedly represent a slowing down element of the container filling process, in that they require a step of introduction into, and a step of extraction from, each individual container.

15 Furthermore, nozzles for delivery above the container mouth or opening are known, which are provided, in their interior, with a plurality of small bores which make it possible, once that the delivery thrust of the product being fed is ended, the liquid to be retained, preventing it from dripping, due to a phenomenon of surface tension, with the so-said meniscus being formed.

20 If, on one hand, such nozzles prevent the dripping, on the other hand they slow down the filling process, in that they have a small free cross-section surface-area available for the passage of the product, which is only  
25 constituted by the sum of the surface areas of all individual bores.

This phenomenon results more evident if the container to be filled has a filling opening with a relatively small surface area, such as, e.g., the opening

of a bottle, or of a similar container.

5 The purpose of the present invention is to provide a dripping-preventing nozzle for a metering unit, which makes it possible a high packaging and filling rate to be reached, without it having to be introduced into the container, and without such a complex and expensive structure, as the structure of the plunging nozzles known from the prior art, and without a long filling time, such as the filling time required by the above mentioned  
10 nozzles with meniscus effect.

These and still other purposes according to the present invention are achieved by providing a dripping-preventing nozzle for a metering unit for the packaging of a product with a fluid-like behaviour, of the type  
15 suitable for being positioned, with the possibility of removal, under said metering unit, and delivering said product above the mouth of a container to be filled, characterized in that it is constituted by a hollow body, provided with an inlet bore, suitable for being aligned  
20 with a lower delivery opening provided in said metering unit, and with an outlet bore, suitable for being aligned above said mouth of the container to be filled, inside said hollow body a shutter element for shutting said outlet bore being provided, with said shutter element  
25 being normally kept in its shutting position by a thrust element, and being suitable for being shifted into its opening position by the pressure applied by said product, each time that said product is delivered into the interior of said hollow body by said metering unit.

30 The structural and functional characteristics and the advantages of a nozzle according to the present

invention will be better understood from the following exemplifying and non-limitative disclosure, referred to the relevant schematic drawings, wherein:

5 Figure 1 shows a partially sectional view of a nozzle according to the present invention, applied to a metering unit in its shut condition, and retaining the fluid-behaving product to be charged to the container,

Figure 2 shows a magnified sectional view of the nozzle in its shut condition, and

10 Figure 3 shows a sectional view equivalent to that of Figure 2, with the nozzle being in its open condition, and with the product being delivered towards the container.

Referring to the figures, an at least partial view is shown of a metering unit, generally indicated by the reference number 11, which intakes a fluid-behaving product 12 from a supply duct 13, up to the interior of a cylinder 14 of a pumping unit, inside which a piston 15 is slidingly contained.

20 A closure element, generally indicated by the reference numeral 16, is of revolving type, and acts as a stopcock, by intercepting and selectively connecting the supply duct 13 with the cylinder 14, or with a chamber 17 axially aligned with said cylinder 14, and positioned inside the bottom portion of the body 18 of the metering unit 11. For that purpose, inside the revolving closure element 16 there are provided an inner elbow-channel 19, which, during the step of intake of the product to be packaged, connects the supply duct 13 with the cylinder 14; and a further channel 20, which connects the cylinder 14 with a nozzle, having the structure according to the

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present invention, and generally indicated by the reference numeral 21, during the step of delivery of the product to an underlying container (not depicted in the figures).

5           The nozzle 21 is composed by an outer hollow body 22, e.g., constituted by two half-bodies, which is mounted on the body 18 of the metering unit 11 in correspondence of the undercut 23 of an outlet opening 24 of the chamber 17 of the metering unit.

10           The hollow body 22, positioned, e.g., by screwing-down inside said undercut 23, has an inlet through-bore 25, with, e.g., a cross-section of circular shape, which can be aligned with the opening 24 and the chamber 17 of the body 18, as well as with the further channel 20 of the closure element 16, when this latter is so positioned  
15 as to connect the cylinder 14 with the nozzle 21.

          The hollow body 22 is furthermore provided with an outlet bore 26, having, e.g., a circular cross-section, which can be aligned above the inlet mouth of a container  
20 to be filled (not shown in the figures).

          Inside the hollow body 22, a shutter element 27 for said outlet bore 26 is provided, with said shutter element 27 being normally maintained in its shutting position inside said same outlet bore 26 by a thrust element, represented, for exemplifying purposes, by a  
25 spring 28. The shutter element 27 is axially shiftable to an opening position by means of the pressure of the product 12, each time that said product 12 is fed to the interior of said hollow body 22 by said metering unit 11,  
30 flowing through the revolving closure element 16.

          More precisely, in the depicted example, inside said

hollow body 22 a closed chamber is provided, which is connected with the outer environment surrounding said hollow body 22, by means of a vent duct 29. The chamber comprises a bell-shaped portion 30, from which said vent duct 29 branches off, which is closed by a yielding membrane 31 constituting a wall portion for said chamber.

The wall membrane 31 supports said shutter element 27, of an essentially cylindrical shape, which is positioned perpendicularly to it, with its axis being coaxial with the axis of said same bell-shaped portion 30.

Said bell-shaped portion 30 and said membrane 31 are positioned above an annular flange 32 which is used in order to true them, as well as in order to support them, relatively to the hollow body 22 of the nozzle 21.

The annular flange 32 is in fact provided with radial element - or spikes 33, radially directed inwards and supporting a sleeve 34 inside which the shutter element 27 is freely rotatable and axially slidable, and in correspondence of the inner end of the bell-shaped portion 30, a dead hole 35 is provided, inside which a freely rotatable and axially slidable tang 36 is received, which axially protrudes from said shutter element 27.

The tang 36 cooperates also as a trueing means for the spring 28, by keeping it so positioned as to interact between said membrane 31, with the interposition of a stop washer 37 locked by a compression nut 38, and said inner end of the bell-shaped portion 30, which is equipped with a cylindrical sleeve-shaped shoulder 39 inside which the dead hole 35 is provided. In this way,



the spring 28 is maintained positioned: at an end, by the compression nut 38, and at its other end, by the sleeve-shaped cylindrical shoulder 39.

5 Thus, a dripping-preventing nozzle for a metering unit according to the present invention is easy to manufacture, and is endowed with a perfect functionality.

10 In fact, during the operation of the metering unit 11, when the revolving closure element 16 is positioned with its further channel 20 being axially aligned with the cylinder 14 and the inlet bore 25 of the nozzle 21, when the piston 15 moves downwards according to as shown by the arrow 40, the product 12 enters the hollow body 22 of the nozzle 21. The pressure of the product 12 acts on the membrane 31 and, by compressing the spring 28, causes  
15 the shutter element 27 to come off from the outlet bore 26, enabling the product 12 to escape towards an underlying container (not shown in the figures).

20 Once that the downstroke of the piston 15 is ended, the closure element 16 is revolved by  $90^{\circ}$ , so that the connection between the cylinder 14 and the nozzle 21 is interrupted, and through the elbow-channel 19 the intake of a further amount of product 12 from the supply duct is allowed.

25 A residual amount of product 12 remains inside the chamber 17 blocked by the closure shutter element 27, which is returned by the spring 28 to shut the outlet bore 26. The movement of the membrane 31 is allowed by the presence of the duct 29, which makes it possible the air contained inside the chamber defined by the same  
30 membrane 31 and by the bell-shaped portion 30 to be vented to the outside.

The advantage of a nozzle according to the present invention is that at the time at which the pressure caused by the product pushed by the piston 15 ends, the nozzle 21, or, better, the outlet bore 26 is shut again  
5 by the shutter element 27, without even a minimum dripping.

A dripping-preventing nozzle according to the present invention is, as one can easily observe, relatively simple to manufacture, and, thanks to the dimension of the outlet bore 26, it secures a rather high  
10 free cross-section surface-area available for the passage of the product during the delivery step. Simultaneously, by this way the delivery of the product is allowed from the metering unit directly above the mouth of the containers, with the filling time being minimized.

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1. Dripping-preventing nozzle for a metering unit for the packaging of a product with a fluid-like behaviour, of the type suitable for being positioned, with the possibility of removal, under said metering unit, and delivering said product above the mouth of a container to be filled, characterized in that it is constituted by a hollow body, provided with an inlet bore, suitable for being aligned with a lower delivery opening provided in said metering unit, and with an outlet bore, suitable for being aligned above said mouth of the container to be filled, inside said hollow body a shutter element for shutting said outlet bore being provided, with said shutter element being normally kept in its shutting position by a thrust element, and being suitable for being shifted into its opening position by the pressure applied by said product, each time that said product is delivered into the interior of said hollow body by said metering unit.

2. Dripping-preventing nozzle according to claim 1, characterized in that inside said hollow body a chamber is provided, which is connected with the outer environment surrounding said hollow body by means of a vent duct, a portion of wall of said chamber supporting said shutter element, being yielding and being normally maintained by said thrust element in such a position as to bring said shutter element into the position of closure of said outlet bore of said hollow body.

3. Dripping-preventing nozzle according to claim 2, characterized in that said chamber comprises a rigid, bell-shaped portion, from which said vent duct branches

off, and a portion of yielding membrane-wall, with said chamber being provided inside the interior of said hollow body, supported on an annular flange.

5 4. Dripping-preventing nozzle according to claim 3, characterized in that said shutter element is of essentially cylindrical shape, is constrained on said portion of yielding membrane wall, positioned perpendicularly to it, and with its axis being coaxial with the axis of said rigid bell-shaped portion, with  
10 said thrust element being positioned inside said chamber and interacting between an inner end of said bell-shaped portion and said membrane wall portion.

15 5. Dripping-preventing nozzle according to claim 4, characterized in that said thrust element is a spring, and that from said shutter element a tang coaxial with said shutter element and with said spring protrudes into the interior of said chamber.

20 6. Dripping-preventing nozzle according to claim 3, characterized in that outside said chamber, from said annular flange spikes protrude inwards, which support a sleeve inside which said shutter element is freely rotatable and axially slidable.

25 7. Dripping-preventing nozzle according to claim 5, characterized in that inside an inner end of said bell-shaped portion, a dead bore is provided, which is suitable for receiving said tang in a freely-rotatable and axially-slidable way.

30 8. Dripping-preventing nozzle according to claim 4, characterized in that said inner end of said bell-shaped portion is provided with a cylindrical, sleeve-shaped shoulder directed towards the interior of said chamber,

and that said shutter element is constrained on said membrane wall portion by means of a compression nut which engages a tang coaxially protruding from said same shutter element, with said thrust element being maintained positioned at an end on said cylindrical sleeve-shaped shoulder, and, at its other end, on said compression nut.

9. A nozzle constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

10. A metering unit for packaging a product including a nozzle according to any one of the preceding claims.