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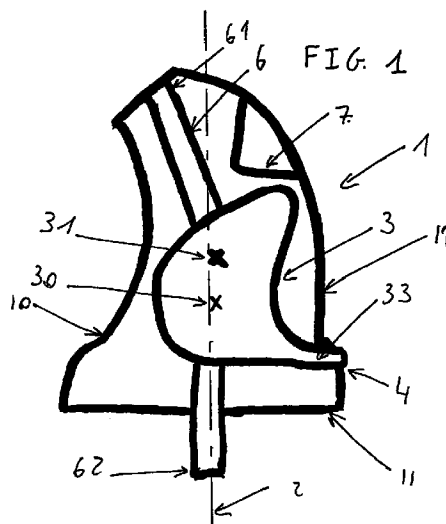
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(54) **Blocking nozzle for a pressurised container**

(57) The present invention relates to a nozzle (1) for a pressurised container, the container having a longitudinal axis (2), the nozzle (1) co-operating with an actuator and comprising releasable blocking means for blocking the co-operation with the actuator, characterised in that the blocking means comprise a cam (3) having a centre of gravity (30), the cam (3) rotating around an axis (31), whereby the axis (31) does not intersect the centre of gravity (30) of the cam (3), the cam (3) thereby having a principal direction (32), the principal direction (32) being contained in a plane normal to the axis (31) around which the cam (3) rotates, the principal direction (32) intersecting both the centre of gravity (30) of the cam and the axis (31) around which the cam (3) rotates, the cam (3) further comprising a projecting part (33), the projecting part (33) reversibly interlocking with a locking piece (4) depending on the angle (5) between the principal direction (32) of the can and the longitudinal axis (2) of the container.



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Description

Technical field

[0001] The invention relates generally to nozzles for pressurised containers, and more particularly to such nozzles which are blocking nozzles.

Background of the invention

[0002] Nozzles are widely used for pressurised containers. Pressurised containers generally have a substantially cylindrical shape with a longitudinal axis, whereby a nozzle can be placed onto the longitudinal extremity of such containers. In existing pressurised containers, such nozzles are usually co-operating with an actuator such as a valve located onto the pressurised container: the nozzle would typically comprise a part which cooperates with the valve so as to allow opening of the valve when a pressure is applied onto the nozzle, for example using a finger. Design of the nozzle could facilitate actuation by means of a leverage effect. The nozzle may also have other uses such as facilitating foaming of a foaming composition, or improving the ergonomic characteristics of the container.

[0003] Such containers typically contain a product to be dispensed by the container together with a propellant. The product is generally liquid within the container. The propellant used may be of different types. The type which is most widely used is the liquefiable propellant. The liquefiable propellant is such that it will have a liquid phase at the pressure existing inside the can. Consequently, liquefiable propellants have a liquefaction pressure between the atmospheric pressure and the inner can pressure. The advantage of such propellants is that they can be inserted within the can in relatively large quantities as they are liquefied, so that there will be a sufficient amount of propellant to maintain the pressure in the aerosol because the propellant will partially vaporise if the pressure drops, thus maintaining the pressure. Indeed, the liquid part of the propellant is acting as a reservoir for maintaining the pressure inside the can, so that all of the product can be expelled. Such propellant include propane, or CFC's, which are not used anymore for environmental reasons. There are also propellants which are not liquefiable, such as air. By not liquefiable, it is meant that they are not liquefiable at pressures such as the pressure existing in an aerosol can. Indeed, air can be liquefied, but liquefaction requires a pressure well above the pressure of any current aerosol can. Such propellants have the advantage that they can be inert, unlike propane, for example, which is flammable. However, as no liquefaction occurs within the aerosol container, there is no pressure reservoir, so that the pressure within the can will not be maintained if part of the propellant is expelled before all of the propellant gas has been used. Consequently, using such a propellant, it often occurs that the product cannot

be completely expelled. Indeed, there might be propellant losses such that the pressure within the container will be substantially equal to the atmospheric pressure, so that the aerosol will not function. This would happen much more rarely when using liquefiable aerosols as the liquid phase will act as a reservoir for maintaining a higher pressure. However, in some cases there is a possibility for having a pressure reservoir while using a non liquefiable propellant. Indeed, some non liquefiable propellant have the property to dissolve in the product. This is often the case when using CO₂ or N₂O as a propellant. In this case, the dissolved part of the propellant will constitute a reservoir in case of pressure drop. Such a reservoir is not comparable to a liquid phase reservoir, but still has a significant effect in preventing pressure drop. However, in order to avoid wasting propellant in an undesired manner, discharge of propellant without product should be avoided.

[0004] The discharge of propellant without product may happen whenever the product is not placed between the propellant and the discharging opening of the pressurised container. Indeed, it has to be ensured that the propellant is obliged to pass through the product pushing at least part of the product out of the pressurised container. This undesirable positioning of the propellant with respect to the product and the discharging opening of the pressurised container may be reached when the pressurised container is allowed to discharge in an undesired direction.

[0005] For example, when the pressurised container comprises a dip tube connecting the discharging opening at the top of the container with the inside of the pressurised container, the undesired direction would be to invert the pressurised container, i.e. to turn it upside down. In this position the gaseous propellant in the head space is capable of escaping directly from the inside of the container through the dip tube without pushing the product through the dip tube. By contrast, when the pressurised container does not comprise any dip tube, the undesired direction would be when the container is not inverted, i.e. the container is held upright. This substantially upright position leads to the escape of gaseous propellant from the inside of the container, because the product is not positioned between the discharging opening and the propellant. In both cases this leads to the escape of propellant from the inside of the container without any corresponding expulsion of product, resulting in the corresponding drawbacks as discussed before.

[0006] It has been suggested in the industry making pressurised containers that there is a need to provide the pressurised containers with a blocking mechanism which prevents the opening of the pressurised container when the pressurised container is in a predetermined undesired orientation. This can be achieved by using releasable means for blocking the mechanism allowing cooperation between a nozzle and an actuator. Indeed, if such means for blocking are in use, co-operation

between the nozzle and the actuator will not be effective, thus preventing actuation, so that propellant cannot be expelled from the container and thereby lost.

[0007] The present invention concerns a nozzle for a pressurised container, the container having a longitudinal axis, the nozzle co-operating with an actuator and comprising releasable blocking means for blocking the co-operation with the actuator. Such a nozzle is known from the applicants' co-pending application PCT/US97/09797, filed on the 5th of June 1997.

[0008] Among the advantages of nozzles comprising blocking means is that their use can allow better controlled dispensing, in that dispensing can be prevented when desired by designing the nozzle appropriately. Further, use of such nozzles can advantageously replace use of blocking valves on pressurised containers.

[0009] While having these and other advantages, existing blocking nozzles have disadvantages. For example, design and manufacture of such nozzles is quite complex. Indeed, nozzles such as disclosed in PCT/US97/09797 require manufacture of complicated shapes for a recess and a barrier. This is similar in case of other blocking nozzles such as disclosed in WO 89/10881 published on the 16th of November 1989. In other cases, a magnet is required, as disclosed in FR-A-1 637 870.

[0010] The invention seeks to provide a nozzle of the above mentioned kind which can be easily designed and manufactured while being effective and used in a wide range of applications.

Summary of the invention

[0011] In accordance with the invention, this object is accomplished in a nozzle of the above kind in that the blocking means comprise a cam having a centre of gravity, the cam rotating around an axis, whereby the axis does not intersect the centre of gravity of the cam, the cam thereby having a principal direction, the principal direction being contained in a plane normal to the axis around which the cam rotates, the principal direction intersecting both the centre of gravity of the cam and the axis around which the cam rotates, the cam further comprising a projecting part, the projecting part reversibly interlocking with a locking piece depending on the angle between the principal direction of the cam and the longitudinal axis of the container.

[0012] A nozzle according to the invention has a number of advantages. Since it has means for blocking the co-operation with the actuator, it allows savings of propellant. Furthermore, the simplicity of the mechanical assembly of the blocking means allows easy manufacture of such a nozzle.

Detailed description of the invention

[0013] The invention will now be described by way of

example and with reference to the accompanying drawings in which:

Figure 1 is a longitudinal cross-sectional view illustrating a nozzle according to the invention, whereby the co-operation with the actuator is blocked.

Figure 2 is a longitudinal cross-sectional view illustrating a nozzle according to the invention, whereby the co-operation with the actuator is not blocked.

[0014] The invention relates to a nozzle 1 co-operating with an actuator. Co-operation is typically achieved by mechanical means allowing to have an action on the actuator. Preferably, such means are allowing to have a lever effect onto the actuator. The lever effect is preferably obtained by use of a first 11 and second 12 part, the second part 12 being mobile in relation to the first part 11, the first and second parts being attached by a hinge 10. Such first 11 and second 12 parts can advantageously be obtained by moulding of a nozzle 1 in a flexible and resilient material, whereby the first part 11 of the nozzle 1 consists in a skirt for co-operating with the pressurised container, whereas the rest of the nozzle is hinged to the skirt.

[0015] The actuator is a device allowing to actuate a pressurised container. Normally, actuators are valves having an opened and a closed position, whereby the valve can be actuated from the opened to the closed position by displacement of a stem. In such a case, the means for co-operating with the actuator could consist in a preferably rigid tube 6 affixed to the second part 12 of the nozzle 1, a first extremity 61 of the tube corresponding to an outlet for the nozzle 1 while the second extremity 62 is corresponding or being fixed onto the stem, so that displacement of the tube 6 induces displacement of the stem, whereby the product contained in the pressurised container can travel along this tube 6 when the stem is displaced appropriately, i.e. when the valve is being opened. In such a case, a lever effect may be obtained by means of an indentation 7 allowing to place a finger for example, whereby the application of a force 8 onto the indentation 7 could allow displacement of the tube 6. In a preferred embodiment, this is obtained by means of hinge 10, whereby the nozzle 1 comprises hinged first 11 and second 12 parts, the application of a force 8 onto the indentation 7 allowing to rotate the second part 12 of the nozzle 1 around the axis of the hinge 10, the tube 6 being preferably affixed to the second part 12 and the tube 6 being preferably located between the indentation 7 and the hinge 10, so that a lever effect is produced, the indentation 7 being preferably comprised on the second part 12 of the nozzle 1. In this manner, application of a force 8 onto the indentation 7 will displace the hinged part 10, the tube 6, and therefore the stem, in relation to the rest of the pressurised container, so that actuation occurs if the motion between the first 11 and second 12 parts is not

blocked. In such an embodiment, the tube 6 is preferably fixed to the second part 12 with its extremity 61 corresponding to an outlet of the nozzle 1. Such a hinge 10 is preferably on the side of the nozzle 1 opposite to the side comprising the indentation 7. Indeed, in a preferred embodiment according to the invention, the means for co-operating with the actuator are indeed comprising a hinge 10 made from a flexible and resilient material. Such flexible and resilient materials includes thermoplastics such as polypropylene, polyethylene or a blend of these or of other polyolefins, whereby such materials can be thermoformed.

[0016] A nozzle 1 according to the invention also comprises releasable blocking means for blocking the means for co-operating. Such means allow to control or prevent undesired actuation. In the present invention, such blocking means comprise a cam 3 having a centre of gravity 30, the cam 3 rotating around an axis 31, whereby the axis 31 does not intersect the centre of gravity 30. As the axis 31 does not intersect the centre of gravity 30 of the cam 3, the cam 3 comprises a principal direction 32 defined as being contained in a plane normal to the axis 31 around which the cam 3 rotates, the principal direction 32 intersecting both the centre of gravity 30 of the cam and the axis 31 around which the cam 3 rotates. Such a principal direction 32 is unique. Indeed, as the axis 31 around which the cam 3 rotates does not intersect the centre of gravity 30 of the cam 3, there is a plane which is normal to the axis 31 around which the cam 3 rotates and which is containing the centre of gravity 30 of the cam. The principal direction 32 of the cam 3 is thereafter the direction comprised in this plane and intersecting the unique point of the plane comprised in the axis 31 around which the cam 3 rotates and the centre of gravity 30 of the cam 3. This means that the rotation of the cam 3 in relation to the pressurised container will be dependant on the position of the principal direction 32 compared to the direction of gravity. Indeed, in order to minimise its potential energy, the cam 3 will rotate around the axis 31 so that the angle between the direction of gravity and the principal direction 32 is minimised, the gravity vector preferably pointing along the principal direction 32 from the intersection with the axis 31 around which the cam 3 rotates towards the centre of gravity 30 of the cam 3. This minimisation of the angle between the principal direction 32 and the direction of the gravity is also depending on mechanical constraints applied to the cam 3. Indeed, the cam 3 may not be free to rotate so that the angle to minimise may not always be zero depending on the position of the container in relation to gravity. However, when the cam 3 is free to rotate, the principal direction 32 is normally aligned with the direction of gravity when the axis 31 around which the cam 3 rotates is in a plane normal to gravity. It should be noted that the position of the centre of gravity 30 of the cam 3 can be a function of the shape of the cam or of the density of the materials composing the cam or of both of these factors.

[0017] The cam 3 of the nozzle 1 according to the invention comprises a projecting part 33, the projecting part 33 reversibly interlocking with a locking piece 4 depending on the angle of rotation 5 of the cam 3 defined as the angle 5 between the principal direction 32 of the cam 3 and the longitudinal axis 2 of the container. By a projecting part 33 it should be understood that the cam 3 has at least a section normal to the axis of rotation 31 whereby the points composing the contour of this section are not equidistant from the centre of rotation of this section, and whereby the part of the section where the distance between the points of the contour and the centre of rotation is largest is normally the projecting part 33. In a preferred embodiment, the projecting part 33 is an extension of the cam 3 which results from the junction of a convex and of a concave part of the cam 3, the concavity and the convexity being preferably in a plane perpendicular to the axis 31 around which the cam 3 is rotating. Such projecting part 33 can for example be obtained by moulding the cam 3 appropriately. Indeed, the cam 3 is preferably made of a thermoplastic resins or of a blend of these, although it may also be made from other materials, such as metals. The position of the projecting part 33 in relation to the container depends on the angle of rotation 5 of the cam 3, the angle of rotation 5 of the cam 3 mainly depending on the position of the container in relation to gravity. As the relative position of a propellant and of a product inside of the container also depends on the position of the container in relation to gravity, the cam 3 can be designed in such a manner that the projecting part 33 interlocks with a locking piece 4 when the relative position of a propellant and of a product contained in the container is such that actuation of a valve is not desired because propellant would be wasted. Indeed, the projecting part 33 reversibly interlocks with a locking piece 4 depending on the angle 5 of rotation of the cam 3 around the axis 31. It should be noted that such a relation between the angle of rotation 5 of the cam 3 and the position of the container in relation to gravity can also be influenced or acted upon by using other means such as magnetic force for example. Indeed, a magnet can be used to influence the rotation of the cam 3, whereby at least two parts have to be made of magnetic materials, at least one of them and sometime both being made from hard magnetic materials having a non zero magnetic remanence. The locking piece 4 may simply correspond to a shape reverted compared to the projecting part 33. Preferably, such a locking piece 4 will be part of a part of the nozzle 1 which is mobile in relation to the part of the nozzle 1 comprising the axis 31 around which the cam 3 rotates. This means that if for example the nozzle 1 comprises a skirt as a first part 11 and a hinged second part 12, the axis 31 around which the cam 3 rotates being fixed to the hinged part 12, the locking piece 4 is preferably part of the skirt 11. Indeed, in such a manner, the interlocking of the projecting part 33 and of the locking piece 4 forms a junction between the

two parts 11, 12 of the nozzle 1 which are normally mobile the one in relation to the other, so that these two parts 11, 12 may be prevented to move the one in relation to the other. In such a case, if for example the actuation is due to a displacement of a part of the nozzle in relation to another part of the nozzle, such displacement can be prevented, and therefore the actuation, by locking these two part together by means of the interlocking of the projecting part 33 with the locking piece 4. This more particularly applies when the means for co-operating with the actuator are comprising an hinge 10 made from a flexible and resilient material, whereby the hinged part 12 is blocked by the projecting part 33 when the projecting part 33 is interlocked with the locking piece 4, and whereby the hinged part 12 is free to move when the projecting part 33 is not interlocked with the locking piece 4. Indeed, in such a case, if the hinged part 12 comprises means 7 for applying a force 8, such as an indentation 7 for example, the application of the force 8 is opening the actuator only if the second hinged part 12 is free to move, i.e. when it is not blocked.

[0018] In a preferred embodiment according to the invention, the locking piece 4 is comprising a cut out 41 in which the projecting part 33 is inserted when interlocked. This can advantageously be combined with another preferred configuration whereby the projecting part 33 is visible from the outside of the nozzle 1, and thereby by a potential user, when it is interlocked with the locking piece 4. In this manner, the user is made aware of the fact that the means for co-operating is blocked, so that the user may not make an attempt to actuate the actuator of the pressurised container. An advantage of such a system is to avoid the application of forces 8 on a blocked nozzle, thus reducing undesired mechanical wear and stress of the parts of which it is composed.

[0019] It should be noted that the axis 31 around which the cam 3 rotates can be an integral part of the cam 3, an integral part of sides of the nozzle or a separate part. Furthermore, it may not go all the way through the cam 3 but may comprise for example two parts, each supporting the cam 3 on one point, thus forming an axis 31 for rotation.

[0020] Figure 1 illustrates a nozzle 1 according to the invention, whereby the nozzle 1 is comprising means for co-operating with an actuator, whereby such means are in the form of a tube 6 having an opening on an extremity 62 which can co-operate with a stem for a valve for example, while the other extremity 61 is an outlet for the nozzle. It further comprises releasable blocking means for blocking the means for co-operating, whereby such means comprise a cam 3 having a centre of gravity 30, the cam 3 rotating around an axis 31, whereby the axis 31 does not intersect the centre of gravity 30 of the cam 3, the cam 3 therefore having a principal direction 32, the cam 3 comprising a projecting part 33, whereby the projecting part 33 is formed from the junction of a convex and of a concave part of the cam 3, the projecting

part 33 reversibly interlocking with a locking piece 4, whereby the locking piece 4 simply is a cut out 41 in a wall of the nozzle 1. In this embodiment, the nozzle 1 comprises a skirt as a first part 11, a second part 12 of the nozzle being mobile by means of a hinge 10 in relation to the skirt 11, whereby the locking piece 4 is part of the skirt, the skirt also serving as means to place and retain the nozzle 1 onto a pressurised container. In this example, the locking piece 4 is a cut out 41 in the skirt, so that a potential user can see the projecting part 33 going through the cut out 41, therefore being kept aware that the nozzle 1 is blocked. Indeed, in the Figure 1 the nozzle 1 is in the upright position, and is designed so that in this particular position the cam 3 has an angle 5 between its principal direction 32 and the longitudinal axis 2 of the container such that the projecting part 33 is interlocked with the locking piece 4. It should be noted that in another preferred embodiment, the projecting part 33 does not engage all the way in the cut out 41, so that, even if the projecting part 33 is visible, the user cannot intervene in its functioning by pushing it for example. The nozzle 1 further comprises an indentation 7 allowing to apply a force 8 onto the hinged second part 12, whereby the application of such a force 8 does not have the effect of moving the second part 12 when the nozzle 1 is in this position or orientation with the projecting part 33 interlocked with the locking piece 4. Indeed, a force 8 applied onto the indentation 7 will simply result in the creation of a mechanical stress between the projecting part 33 and the locking piece 4, so that the tube 6, which is attached to the second part 12, cannot be displaced, so that actuation cannot occur.

[0021] Figure 2 illustrates the same nozzle 1 as in Figure 1, whereby the orientation is changed, so that the nozzle 1 is not upright but upside down. Therefore, the position of the cam 3 in relation to the pressurised container corresponding to the angle 5 between the principal direction 31 of the cam 3 and the longitudinal axis 2 of the container has changed. It should be noted that the cam 3 is not free to rotate, as it cannot in this particular example make a full turn around the axis 31 around which it rotates and as it is mechanically blocked because it is in contact with the side of the nozzle 1. In the particular position as illustrated on Figure 2, the nozzle 1 is in such an orientation in relation to gravity that the cam 3 is rotated in such a manner that the projecting part 33 is kept away from the cut out 41 in the skirt, so that it does not interlock with the locking piece 4, so that the application of a force 8 on the indentation 7 can compensate the resiliency of the hinge 10, which is not blocked, so that the means for co-operating with the actuator, i.e. the tube 6, can be displaced. In this particular example, the nozzle 1 is blocked unless it is held upside down, so that such a nozzle 1 is particularly useful when actuation of a pressurised container comprising this nozzle 1 should not take place when the pressurised container itself is not upside down.

Claims

1. A nozzle (1) for a pressurised container, the container having a longitudinal axis (2), the nozzle (1) cooperating with an actuator and comprising releasable blocking means for blocking the co-operation with the actuator, characterised in that the blocking means comprise a cam (3) having a centre of gravity (30), the cam (3) rotating around an axis (31), whereby the axis (31) does not intersect the centre of gravity (30) of the cam (3), the cam (3) thereby having a principal direction (32), the principal direction (32) being contained in a plane normal to the axis (31) around which the cam (3) rotates, the principal direction (32) intersecting both the centre of gravity (30) of the cam and the axis (31) around which the cam (3) rotates, the cam (3) further comprising a projecting part (33), the projecting part (33) reversibly interlocking with a locking piece (4) depending on the angle (5) between the principal direction (32) of the cam and the longitudinal axis (2) of the container.

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2. The nozzle (1) according to claim 1, whereby the nozzle (1) further comprises a first (11) and a second (12) part, the second part (12) being mobile in relation to the first part (11), the first (11) and second (12) parts being attached by a hinge (10).

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3. The nozzle (1) according to claim 2, whereby motion between the first (11) and second (12) parts is blocked by the projecting part (33) when the projecting part (33) is interlocked with the locking piece (4), and whereby motion between the first (11) and second (12) parts is not blocked when the projecting part (33) is not interlocked with the locking piece (4).

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4. The nozzle (1) according to claim 3, whereby the second part (12) comprises a tube (6), the tube (6) having a first (61) and a second (62) extremity, the first extremity (61) corresponding to an outlet for the nozzle (1), the second extremity (62) corresponding to an outlet for the actuator.

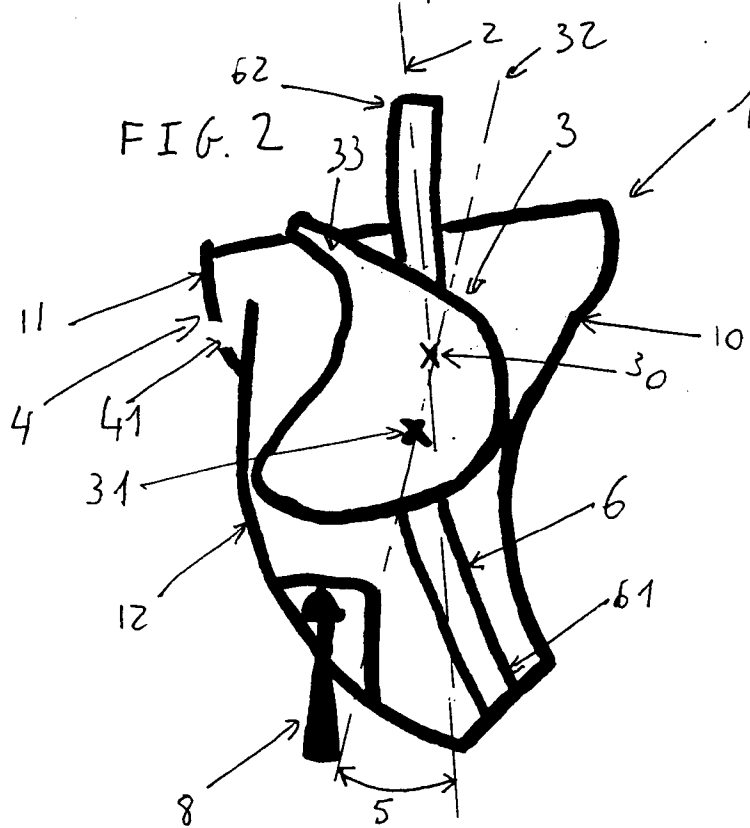
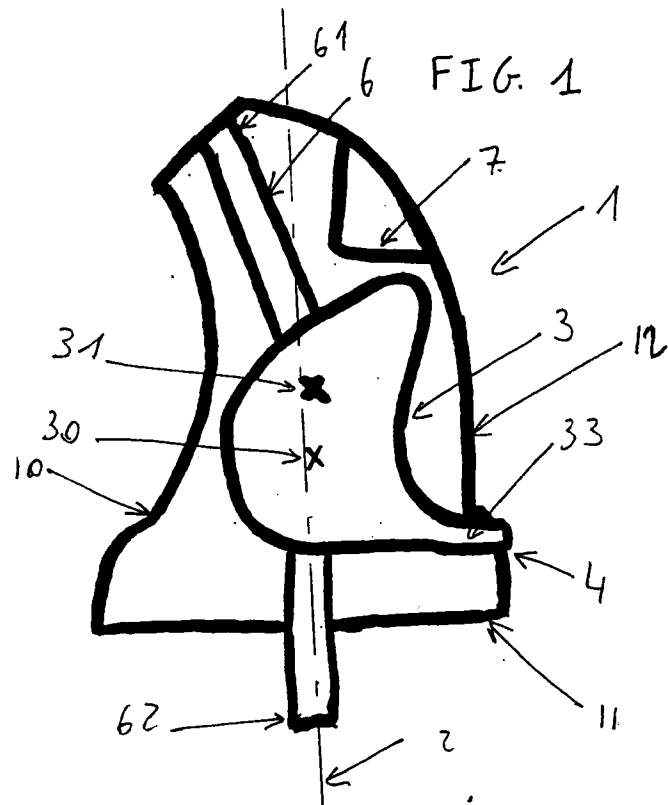
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5. The nozzle (1) according to claim 1 or 4, whereby the actuator is a valve comprising a stem, the valve opening when the stem is displaced.
6. The nozzle according to claims 4 and 5, whereby the stem is the outlet for the actuator, the tube (6) being substantially rigid, so that a displacement of the tube (6) induces a displacement of the stem.

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7. The nozzle (1) according to claim 3, whereby the second part (12) comprises means (7) for applying a force (8), whereby application of the force (8) is resulting in the opening of the actuator only if the

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8. The nozzle (1) according to claim 1, whereby the principal direction (32) of the cam (3) is aligned with the direction of gravity when the axis (31) around which the cam (3) rotates is in a plane normal to gravity and when the cam (3) is free to rotate around this axis (31).
9. The nozzle (1) according to claim 1, whereby the locking piece (4) is comprising a cut out (41) in which the projecting part (33) is inserted when interlocked.
10. The nozzle (1) according to claims 1 or 9, whereby the projecting part (33) is visible from the outside of the nozzle (1) when interlocked with the locking piece (4).

motion between the first (11) and second (12) parts is not blocked.





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EUROPEAN SEARCH REPORT

Application Number
EP 98 20 0245

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.6)
X	FR 2 152 479 A (L'ORÉAL) 27 April 1973 * page 4, line 16 - page 5, line 36; figure 1 *	1-3,5,7, 8,10	B65D83/22
A	EP 0 693 438 A (COSTER TECHNOLOGIE SPECIALI) 24 January 1996 * column 3, line 13 - line 23; figure 2 *	4,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12 June 1998	Examiner Bridault, A
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