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(54) **Method for assembling a closing device for container and related closing device**

(57) Closing device (1) of the type constrainable to a container (2) for pourable products at a pierceable portion thereof, said closing device comprising a collar (4) associable with said pierceable portion, a cap (20) associable with the outer surface (21) of said collar (4), and a cutting element (5) movable, when the device has been assembled, inside said collar (4), in a manner constrained by guide means (6) interposed between said cutting element (5) and said collar (4), said cutting element (5) having a plurality of teeth (7) to sever said pierceable portion, characterized in that said cutting element (5) is moulded in one piece with said collar (4), to form a preassembled body (8), wherein said plurality of teeth (7) is oriented in the direction of at least one base (12, 13) of said collar (4), said cutting element (5) and said collar (4) being joined, in said preassembled body, through breakable connection means (10).

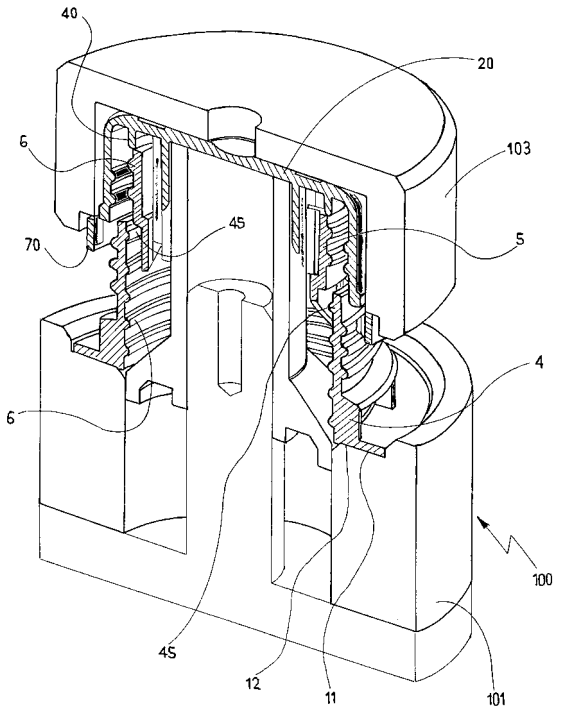

Fig. 7

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Description

[0001] The present invention relates to a method for assembling a closing device for a container suitable to contain pourable products, and relative closing device. In particular, the method of the present invention relates to the assembly of a closing device for a container, for example of the multilayer type, which comprises a collar associable with a pierceable portion of said container, a cap associable with the outer surface of the collar and a cutting element movable, when the device is assembled, inside the collar, along a guide, for example of the helical type. The cutting element is also provided with a plurality of teeth to sever said pierceable portion of the container, when it is operated.

[0002] Closing devices of this type are known in the art. For example EP 1088764 B1 by the applicant Tetra Laval describes a closing device of the type discussed above, wherein the cutting element is produced in one piece with the collar, to form a preassembled body. In particular, the cutting element is disposed with said plurality of teeth in the opposite direction to one of the two bases of the collar, and connected thereto through several breakable connections disposed between the upper surface of the cutting element and the lower surface of the collar. In this way, at the end of the moulding operations of said pre-assembled body, the upper surface of the cutting element is flush with the lower base of this collar. This configuration is advantageous as it allows the collar and the cutting element to be suitably oriented with respect to each other before their assembly, which takes place through a slight reciprocal thrust exerted between collar and cutting element.

[0003] However, this thrust cannot be exerted directly on the teeth, as this would obviously compromise their operation, but only between teeth on suitable supporting portions provided specifically to allow this operation. Obviously, this has the drawback that both the number and the shape of the teeth is closely related to the position of the aforesaid supporting portions for applying thrust. In particular, the small number of teeth, with respect to those obtainable in a cutting element of the same dimensions in which it is possible to occupy the whole of the surface on which said plurality of teeth is disposed, implies a larger rotation angle of the cutting element. Therefore, to obtain the same results as a same cutting element with identical dimensions, but provided with a larger number of teeth, it would be necessary to increase the overall height of the closing device, as well as the shape of the teeth, with a considerable, but not insignificant, increase in the material used to produce each closing device, and consequently in the manufacturing costs and times.

[0004] Moreover, the closing device described in EP 1088764 B1 comprises operating means for said cutting element used during opening of the container. These operating elements comprise four ribs projecting internally from said cap and engageable between the seats defined by the same number of ribs positioned on the cutting element. In practice, therefore, during assembly of the cap to the preassembled body it is absolutely essential not only to dispose said preassembled body and said cap in a position for reciprocal coupling, but also to orient the cap and the preassembled body appropriately, in order to guarantee that the closing device will effectively function once mounted on the container. In fact, it must be mentioned that when the cutting element is operated by the cap through the aforesaid operating means, it can perform a rotation ranging from a minimum of 270° to a maximum of 300° to ensure, respectively, that the severed portion of the container is sufficient for pouring of the pourable product and that the severed portion still has a portion connected to the container in order to prevent it from dropping inside. For this reason, the error that can be made in orientating the cap with respect to the cutting element during the assembly operation cannot exceed 60°. Therefore, the use of the four ribs of the closing device described in EP1088764 alone would cause an error of 90° in orienting cap and cutting element with respect to each other, a value well above the threshold value cited above. As explained previously, this means that the two components must be oriented with respect to each other so that there is no free rotation of the cap with respect to the cutting element, when operated for the first time, that would either make pouring of the pourable product from the container difficult or cause the breakable portion to drop inside this container.

[0005] Moreover, it must be added that the thrust operations that take place during assembly of the closing device, besides the one mentioned previously between collar and cutting element, comprise a second thrust operation that takes place only after cap and preassembled body have been suitably oriented, and which is performed to connect the cap to the collar, inside which the cutting element is already present.

[0006] As is apparent from the description above, therefore, overall assembly of a closing device of this type is not simple to perform. In fact, all the assembly operations are somewhat complicated and require extreme precision, not only to orient the components of the closing device with respect to one another, but also to calibrate the forces of the two thrusts, to connect the cutting element to the collar and the cap to the collar respectively.

[0007] The object of the present invention is to provide a method for assembling a closing device, wherein the reciprocal thrust between the two components of the cutting device has a strength and a point at which the thrust acts separate from the number or the arrangement of the teeth of the plurality of teeth present on the cutting element.

[0008] A further object of the present invention is to provide a method for assembling a closing device which is simple to implement, and which allows the number of thrust operations required to be reduced.

[0009] Another object of the present invention is to provide a method for assembling a device that allows elim-

ination of the step to orient the cap and the cutting element with respect to each other.

[0010] Yet another object of the present invention is to provide a closing device which makes it possible to implement the above method.

[0011] These and other objects are achieved by the closing device of the type constrainable to a container for pourable products at a pierceable portion thereof, said closing device comprising a collar associable with said pierceable portion, a cap associable with the outer surface of said collar, and a cutting element movable, when the device has been assembled, inside said collar, in a manner constrained by guide means interposed between said cutting element and said collar, said cutting element having a plurality of teeth to sever said pierceable portion, characterized in that said cutting element is moulded in one piece with said collar, to form a preassembled body, wherein said plurality of teeth is oriented in the direction of at least one base of said collar, said cutting element and said collar being joined, in said preassembled body, through breakable connection means.

[0012] This configuration of the cutting element, i.e. disposed with said plurality of teeth oriented in the direction of at least one of the bases of the collar, makes it possible to exert a reciprocal thrust between cutting element and collar without having to take into account either the point at which the force (thrust) is applied or the intensity (strength) of the force to apply. In fact, said plurality of teeth is located between the two end surfaces of the preassembled body and cannot be subjected to any thrust force. According to a preferred embodiment of the invention said plurality of teeth projects in said preassembled body, at least partly inside said collar.

[0013] The closing device can also comprise operating means for said cutting element. Said operating means, for example of the helical type, are provided with at least two parts, reciprocally engageable, and respectively integral with said cap and with said cutting element, which engage with each other, at least during the opening step of the device, when the cap is opened,

[0014] Advantageously, these operating means are structured to limit relative free rotation between said cap and said cutting element.

[0015] In this way, during assembly of the cap to the preassembled body it is no longer necessary to orient the cap in relation to the preassembled body, and vice versa. In fact, these operating means prevent free rotation between cap and cutting element from exceeding a predefined rotation interval of between 0° and 60°, preferably between 0° and 45°.

[0016] The operating means comprise at least one rib, angularly limited and projecting internally from said cap, and which is engageable in at least one corresponding seat defined on the cutting element, or vice versa.

[0017] More specifically, said operating means comprise at least six ribs projecting internally from said cap, which are disposed in symmetrical radial positions and which are engageable with seats defined by the same number of ribs placed on said cutting element.

[0018] By virtue of this, as already mentioned above, the interval of free rotation is without doubt below 60°, as each rib has non negligible transverse dimensions. Moreover, by increasing the transverse dimensions of the ribs and/or increasing the number thereof, for example up to eight ribs, it is possible to further reduce free rotation between cap and cutting element, taking the interval of free rotation to below 45°.

[0019] Furthermore, the cap can comprises thrust means which, during assembly of the closing device, thrust the cutting element evenly against the collar to sever the breakable connection means.

[0020] These thrust means can also comprise an inner cylindrical ring, preferably provided with a groove for coupling with said cutting element on the opposite side to said plurality of teeth. In this way the thrust between cap and cutting element takes place evenly and so that the cutting element and the cap are centred with each other for the entire thrusting step.

[0021] Moreover, the thrust means are couplable laterally with a seal element disposed on the inner surface of said collar, so that, once the container has been opened and the cap associated with the collar, its content remains substantially fluidly separated from the outside environment.

[0022] The method for assembling a closing device, of the type described above, comprises the steps of:

a) disposing said preassembled body and said cap in a reciprocally coupled position;
b) causing the separation of said cutting element from said collar;
c) inserting said cutting element inside said collar;
d) causing reciprocal engagement of said cutting element with said collar through said guide means.

[0023] Advantageously, said steps from b) to c) are implemented with a single operation to thrust said cutting element against said collar, or vice versa.

[0024] The assembly method for a closing device comprises the step e) of stably associating said cap with said collar, said step e) being preceded by, or simultaneous with, said steps from b) to d), during which said cap reciprocally thrusts said cutting element against said collar. In substance, the thrust, exerted by the cap against the preassembled body alone allows breakage of the breakable connections, insertion of the cutting element inside the collar, engaging of the cutting element with said collar through the aforesaid guide means, and coupling of the cap with the collar. In practice, with respect to prior art assembly methods, two thrusts are no longer applied for assembly, i.e. one to break the breakable connections and one to connect the cap to the collar, but only one thrust capable alone, without requiring modifications to the number or the shape of the plurality of teeth, of allowing assembly of this closing device 1.

[0025] Moreover, thanks to the fact that said device

comprises means to limit free rotation between said cap and said cutting element, as a result during said step a) said preassembled body and said cap are already reciprocally positioned in an angularly disengaged (i.e. angularly free) manner with respect to each other. In this way the step of orienting first the cap and then the preassembled body normally performed in prior art closing devices, is no longer necessary, with a consequent reduction in the production times of this device.

[0026] Some specific embodiments of the present invention will now be described purely by way of a non-limiting example, with reference to the accompanying figures, wherein:

Figure 1 is a perspective view of the preassembled body of the closing device according to the invention;
Figure 2 is a perspective bottom view of the cap of the closing device;
Figure 3 is a bottom view of the closing device, at the end of assembly;
Figure 4 is a perspective view of the cutting element of the closing device;
Figure 5 is a sectional view of a closing device during the assembly step;
Figure 6 is a longitudinal sectional view of a closing device at the end of the assembly step;
Figure 7 is a perspective view of an assembly device according to the invention;
Figure 8 is a perspective view of a closing device associated with a generic container for pourable products.

[0027] With particular reference to these figures the generic closing device according to the invention is indicated with 1.

[0028] The closing device 1, constrainable to a container 2 for pourable products at a pierceable portion 3 thereof, comprises a collar 4 associable with said pierceable portion 3 by means of a flange 11 disposed on the lower base surface 12, a cap 20 associable with the collar 4 on the outer surface 21 thereof, and a cutting element 5, disposed inside said collar 4 and constrained thereto through guide means 6 interposed between said cutting element 5 and said collar 4.

[0029] These guide means 6 can for example be of the screw/nut thread or similar type, to perform, when operated, a helical movement between the cutting element 5 and the collar 4. This cutting element 5 is provided with a plurality of teeth 7 to sever said pierceable portion 3.

[0030] According to the invention, the cutting element 5 is moulded in one piece with said collar 4, to form a preassembled body 8, wherein said plurality of teeth 7 is oriented in the direction of the lower base 12 of said collar 4, and wherein said cutting element 5 and said collar 4 are joined, in said preassembled body 8, through breakable connection means 10. Figure 1 shows the position of the cutting element 5 with respect to the collar 4 at the end of moulding of the two components in a single preassembled body 8. In substance, the cutting element 5 is positioned on the upper base surface 13 of the collar 4, opposite the flange 11, and is connected through connection means 10, such as bridges, which are flush with the upper surface 13 of the collar 4. In this configuration the teeth 27 of the plurality of teeth 7 of the cutting element are inside the preassembled body 8 and oriented in the direction of the lower base 12, projecting in said preassembled body 8, inside said collar 4. It must be observed that although in the above there has been described a closing device 1 wherein the plurality of teeth 7 is oriented only towards the lower base 12, an embodiment wherein the plurality of teeth 7 is oriented towards both the base surfaces 12 and 13 of the collar 4 is nonetheless still included in the scope of protection of the present invention. In this latter case (not shown) the teeth are outside the collar 4, but inside the preassembled body 8 and oriented towards the two bases 12 and 13 of this collar 4.

[0031] The position of the plurality of teeth 7 of the cutting element 5 with respect to the collar 4 allows a reciprocal thrust to be applied between the cutting element 5 and the collar 4 without requiring to take into account either the point in which the thrust force is applied or the intensity of the force. In fact, said plurality of teeth 7 is not directly subject to any thrust force, as it is always inside the preassembled body 8.

[0032] The closing device 1 can also comprise operating means 30 for said cutting element 5. Said operating means 30 of the helical type, are provided with two parts 32 and 34, reciprocally engageable, and respective integral with said cap 20 and with said cutting element 5, which engage with each other, at least during the opening step of the device, when the cap 20 is opened.

[0033] Advantageously, these operating means 30 are structured to limit the relative free rotation between said cap 20 and said cutting element 5. In this way, during assembly of the cap 20 to the preassembled body 8 it is no longer necessary to orient the cap 20 in relation to the preassembled body 8, and vice versa. In fact, these operating means 30 prevent free rotation between cap 20 and cutting element 5 from exceeding a predefined interval of rotation ranging from 0° to 60°, preferable from 0° to 45°. In this way whatever the position between cap 20 and cutting element 5 their reciprocal orientation remains guaranteed without doubt, with a maximum rotation error of 60°, or of 45°.

[0034] The operating means 30 comprise six ribs 32 projecting internally from said cap 20, and disposed in symmetrical radial positions. These ribs 32 are engageable with seats 33 defined by the same number of ribs 34 positioned on said cutting element 5, on the inner surface 50 thereof.

[0035] By virtue of the above, the interval of free rotation between cap 20 and cutting element 5 is without doubt below 60°, as each rib 32 has non negligible transverse dimensions. Moreover, by increasing the transverse dimensions of the ribs 32 and/or increasing the number thereof, for example up to eight ribs 32, it is pos-

sible to further reduce free rotation between the cap 20 and the cutting element 5, taking the interval of free rotation to below 45°.

[0036] Furthermore, the cap 20 can comprise thrust means 40 which, during assembly of the closing device 1, thrust the cutting element 5 directly against the collar 4 to sever the breakable connection means 10.

[0037] These thrust means 40 comprise an inner cylindrical ring provided with a groove 42 for coupling with said cutting element 5 on the opposite side 43 to the one on which said plurality of teeth 7 is disposed. In this way the thrust between cap 4 and cutting element 5 takes place evenly and so that the cutting element 5 and the cap 20 are centred with each other for the entire thrust step. In order to facilitate insertion of the cutting element 5 inside the collar 4, once severed the breakable connection means 10 remain integral with the cutting element 5 and facilitate centring of the cutting element with respect to the collar 4 for the entire insertion step of the former inside the latter. Moreover, the breakable connection means 10 are advantageously engaged as means to block the position of the cutting element 5 with respect to the collar 4, when the cutting element 5, forced by the cap 4 to travel a helical trajectory along said guide means 6, ends its stroke. These connection means 10 engage with a click in a suitable seat (not shown here), disposed in the inner surface of the collar 4, and suitable to stop any travel of the cutting element 5 in the opposite direction each time the cap is rotated to close the container 2.

[0038] Moreover, the thrust means 40, after completing their thrust function, are couplable laterally with a seal element 45, disposed on the inner surface of said collar 4, so that the connection between cap 20 and collar 4, once the container 2 has been opened, and maintaining the cap in the closed position, is substantially sealed to fluidly separate the inside of the container 2 from the outside environment.

[0039] Moreover, it must be added that the ribs 32 of said operating means 30 are moulded together with a core 35 tapered to guarantee higher inertia at the inner base 200 of the cap 20 and lower inertia at the free end 201 of the core 35. In this way, when the cap is opened for the second time, the rib 32 is slightly deformed against the seat 38, opposite the aforesaid seat 33, thus allowing the cap 20 to disengage from the cutting element 5 preventing this from being drawn upwards. It must also be added that the cap 20 is provided with an annular safety tab 70 disposed at the lower base 71 thereof and moulded together with the cap 20 in one piece. Connection between the tab 70 and the cap 20 is obtained through second breakable connection means 72, of the bridge type, which are broken when the cap 20 is opened for the first time. Following opening of the cap 20, the safety tab 70 remains constrained to the collar 4, to show that the container 2 has been used. Also in this case the closing device 1 comprises second operating means which comprise a plurality of second ribs 81 projecting internally from said tab 70, and disposed in symmetrical radial positions. These second ribs 81 are engageable with seats 82 defined by the same number of ribs 83 positioned on said collar 4, on the outside surface 21 thereof. The number of these second operating means 80 is the same as or greater than the number of ribs 32 on the cap 20, to prevent the tab 70 from rotating freely with respect to the collar 4 by a greater angle of rotation than the one through which the cap 20 rotates with respect to the cutting element 5. This measure allows elimination of the operation to orient the cap 20 in relation to the collar 4.

[0040] The method for assembling a closing device 1 comprises the steps of:

a) disposing said preassembled body 8 and the cap 20 to be reciprocally coupled;
b) causing separation of the cutting element 5 from said collar 4;
c) inserting said cutting element 5 into said collar 4;
d) causing reciprocal engagement of said cutting element 5 with said collar through said guide means 6.

[0041] Advantageously, said steps from b) to c) are implemented in a single operation to thrust said cutting element 5 against said collar 4, or vice versa.

[0042] The method for assembly of a closing device 1 also comprises the step e) of stably associating said cap 20 with said collar 4. This step is simultaneous to said steps from b) to d), during which said cap 20 reciprocally thrusts said cutting element 5 against said collar 4. In substance, the thrust applied by the cap 20 against the preassembled body 8 alone allows breakage of the breakable connections 10, insertion of the cutting element 5 inside the collar 4, engaging of the cutting element 5 with said collar 4, through the aforesaid guide means 6, and coupling of the cap 20 with the collar 4. Therefore, with respect to prior art assembly methods, two thrusts are no longer applied to assemble the closing device, i.e. one to break the breakable connections 10 and the other to connect the cap 20 to the collar 4, but only one thrust capable alone, without requiring modifications to the number or the shape of the plurality of teeth, of allowing assembly of this closing device 1.

[0043] Moreover, due to the fact that said device 1 comprises operating means 30 suitable to limit free rotation between said cap 20 and said cutting element 5, during said step a) said preassembled body 8 and said cap 20 are already reciprocally positioned in an angularly disengaged manner with respect to each other. In this way the step of orienting first the cap 20 and then the preassembled body 8 is no longer necessary, with a great reduction in the production times of the closing device 1 and considerably simplification of the assembly systems.

[0044] Figure 7 shows a device 100 for assembly of the closing device 1 according to the invention. This device comprises a supporting base 101, structured to house the preassembled body 8 at the flange 11, and a pusher 103 structured to couple with the cap 20 so as to thrust it downward to obtain assembly of the closing de-

vice 1. In practice, this assembly device comprises means for reciprocal translation only, without any need to allow reciprocal rotation movements.

Claims

1. Closing device (1) of the type that can be constrained to a container (2) for pourable products at a pierceable portion thereof, said closing device comprising a collar (4) associable with said pierceable portion, a cap (20) associable with the outer surface (21) of said collar (4), and a cutting element (5) movable, when the device has been assembled, inside said collar (4) in a manner constrained by guide means (6) interposed between said cutting element (5) and said collar (4), said cutting element (5) having a plurality of teeth (7) to sever said pierceable portion, **characterized in that** said cutting element (5) is moulded in one piece with said collar (4), to form a preassembled body (8), wherein said plurality of teeth (7) is oriented in the direction of at least one base (12, 13) of said collar (4), said cutting element (5) and said collar (4) being joined, in said preassembled body, through breakable connection means (10).

2. Device as claimed in claim 1, **characterized in that** it comprises operating means for said cutting element, provided with at least two parts, reciprocally engageable, and respectively integral with said cap and with said cutting element, said operating means also being structured to limit relative free rotation between said cap and said cutting element.

3. Device as claimed in claim 2, **characterized in that** said operating means comprise at least one rib engageable inside at least one corresponding seat, angularly limited, said at least one rib projecting internally from said cap and said at least one seat being defined on said cutting element, or vice versa.

4. Device as claimed in claim 3, wherein said operating means comprise at least six ribs projecting internally from said cap and engageable between seats defined by the same number of ribs placed on said cutting element, said ribs being disposed in symmetrical radial positions.

5. Device as claimed in any one of the previous claims, **characterized in that** said guide means are of the helical type.

6. Device as claimed in claim 5, **characterized in that** said guide means are of the screw and nut thread type.

7. Device as claimed in any one of the previous claims, **characterized in that** said cap comprises thrust means for said cutting element at least during the assembly steps of said closing device.

8. Device as claimed in claim 7, **characterized in that** said thrust means comprise an inner cylindrical ring.

9. Device as claimed in claim 7 or 8, **characterized in that** said thrust means comprise a groove for coupling with said cutting element on the opposite side to said plurality of teeth thereof.

10. Device as claimed in any one of claims 7 to 9, **characterized in that** said thrust means are couplable laterally with a seal element disposed on the inner surface of said collar.

11. Device as claimed in any one of the previous claims, wherein said plurality of teeth of said cutting element projects, in said preassembled body, at least partly inside said collar.

12. Method for assembling a closing device as claimed in any one of the previous claims, in the preassembled configuration thereof, comprising the steps of:

    a) disposing said preassembled body and said cap to be reciprocally coupled;
    b) causing the separation of said cutting element from said collar;
    c) inserting said cutting element inside said collar;
    d) causing reciprocal engagement of said cutting element with said collar through said guide means:

    characterized in that said steps from b) to d) are implemented with a single operation to thrust said cutting element against said collar, or vice versa.

13. Method as claimed in claim 12, **characterized in that** it comprises the step e) of stably associating said cap with said collar, said step e) being preceded by, or simultaneous with, said steps from b) to d), said cap reciprocally thrusting said cutting element against said collar.

14. Method as claimed in claim 12 or 13, **characterized in that**, in said position of reciprocal coupling of said preassembled body and of said cap according to said step a), said preassembled body and said cap are reciprocally positionable in an angularly disengaged manner with respect to each other

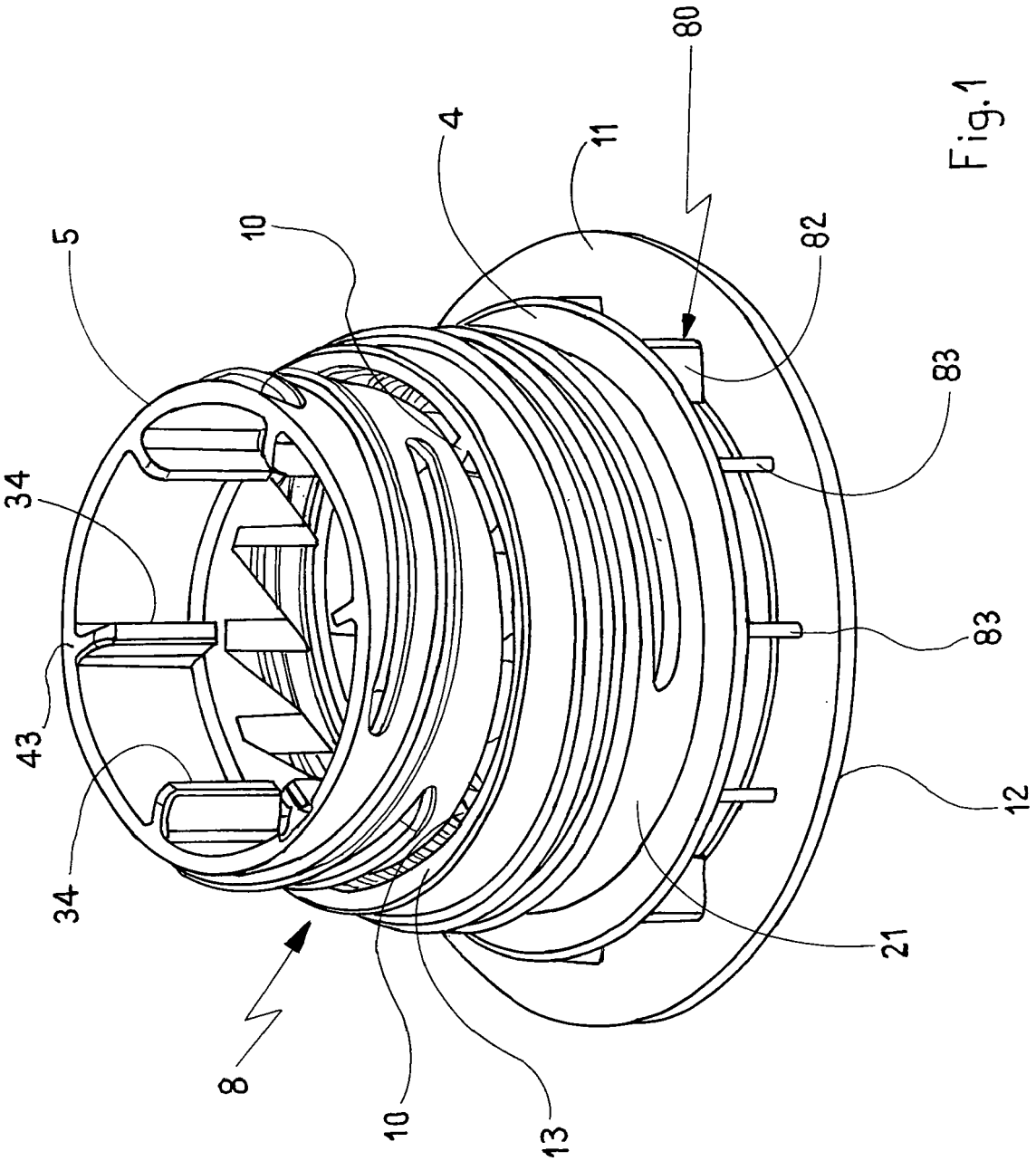

Fig.1

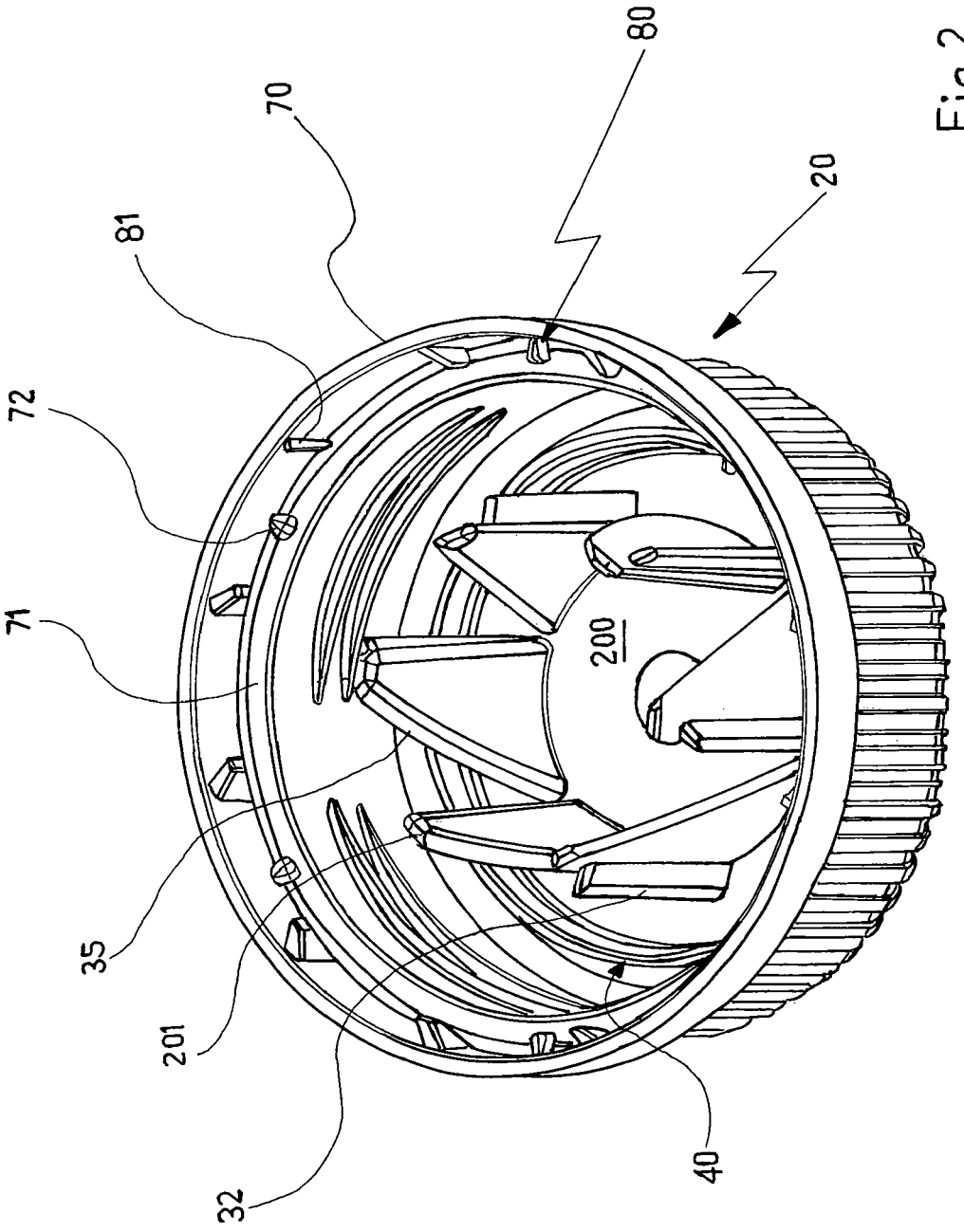

Fig.2

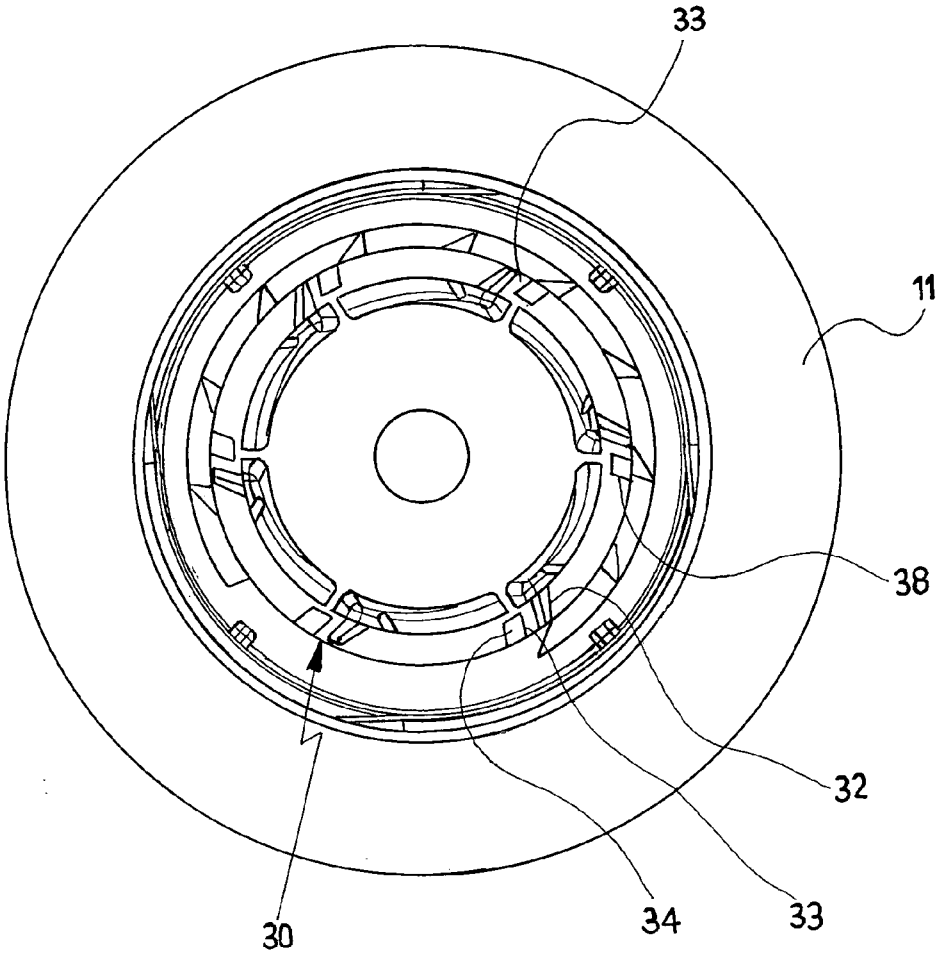

Fig.3

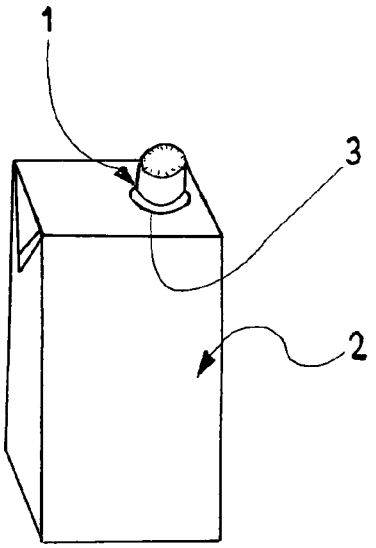

Fig.8

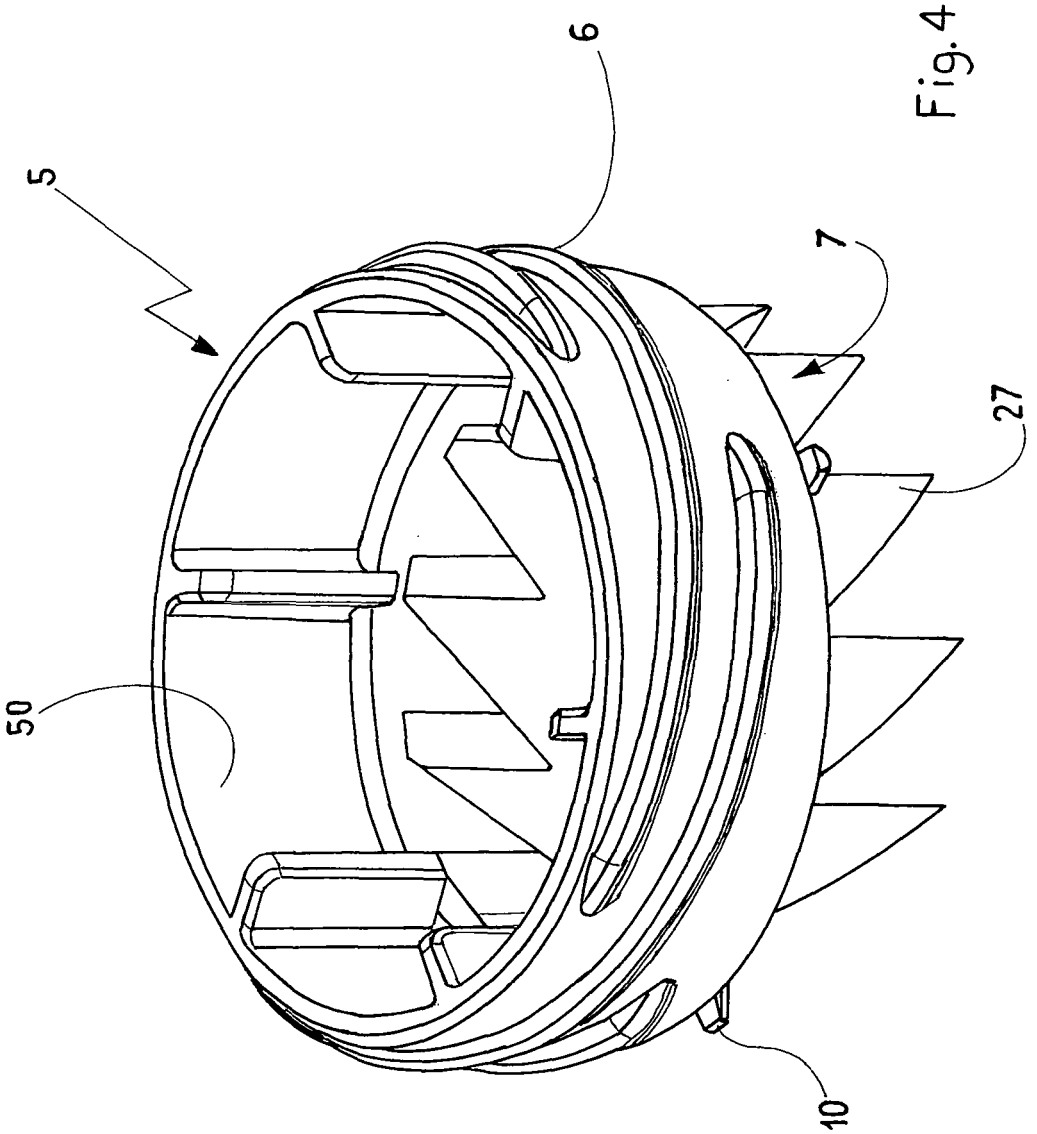

Fig. 4

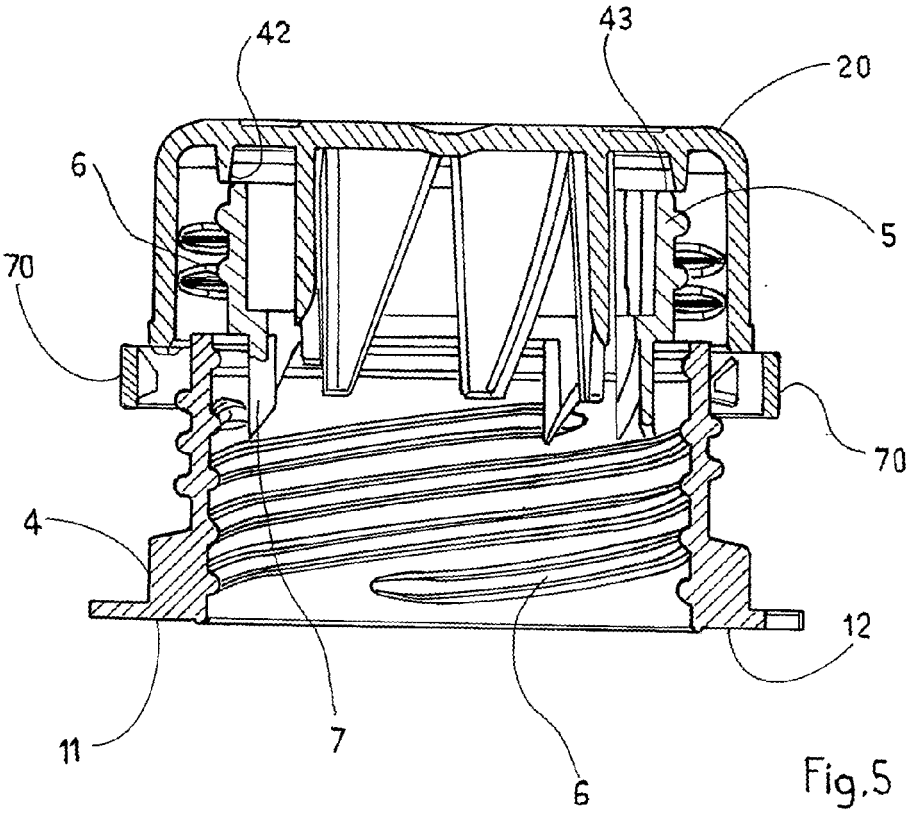

Fig.5

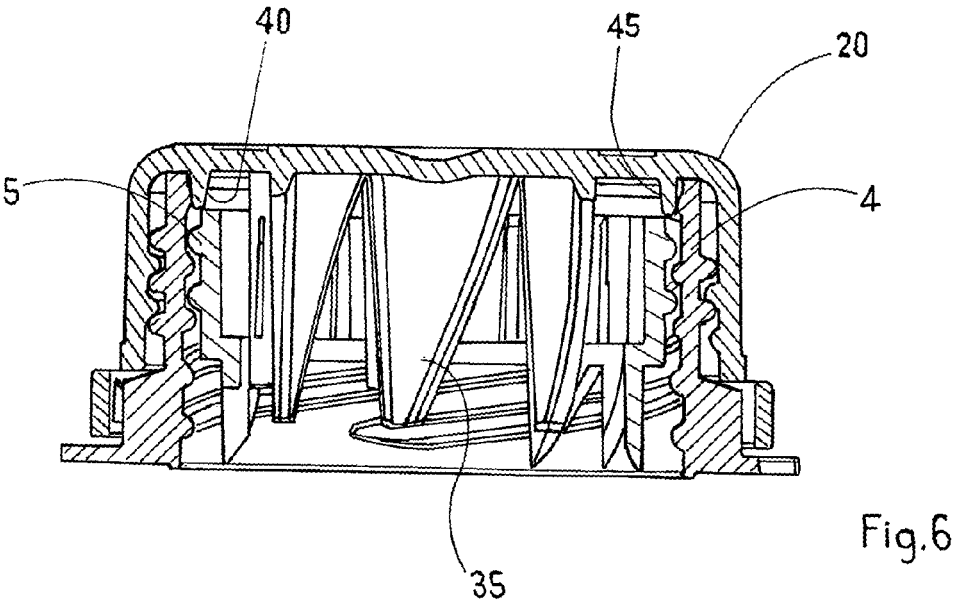

Fig.6

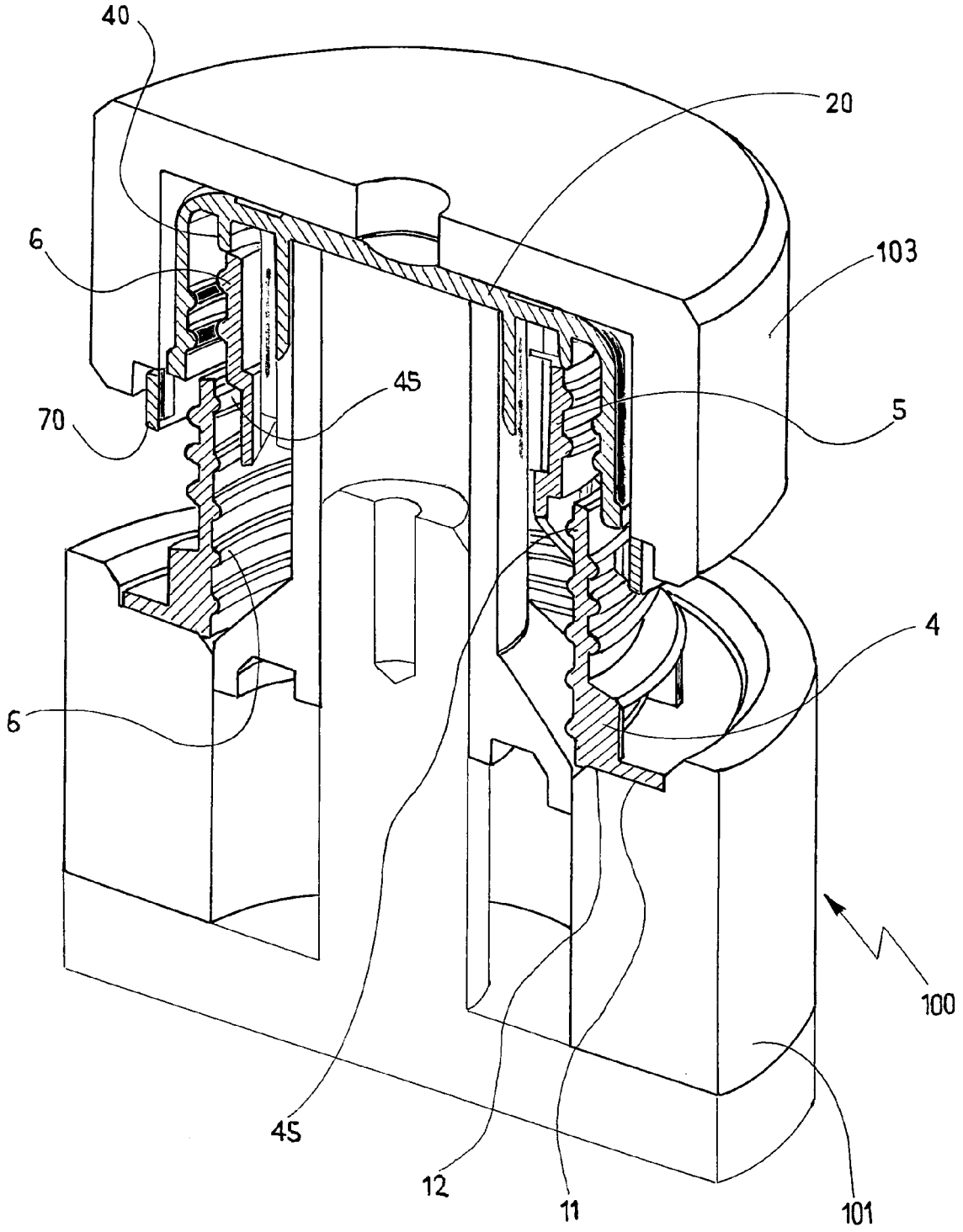

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5314

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2007/051328 A (DUBACH WERNER FRITZ [CH]) 10 May 2007 (2007-05-10) * page 7, line 12 - page 8, line 2 * * page 8, line 25 - page 12, line 18; claims 1,3,7; figures 1-3 *	1-4,11	INV. B65D5/74 B65D41/04
X	EP 1 415 926 A (TETRA LAVAL HOLDINGS & FINANCE [CH]) 6 May 2004 (2004-05-06) * paragraph [0022] - paragraph [0024] * * paragraph [0031] - paragraph [0033]; claims 1-4; figures 1-6 *	1,2,11	
X	EP 1 396 435 A (TETRA LAVAL HOLDINGS & FINANCE [CH]) 10 March 2004 (2004-03-10) * paragraph [0030] - paragraph [0039] * * paragraph [0046] - paragraph [0047]; claims 1,10,11; figures 1-5 *	1-4	

TECHNICAL FIELDS SEARCHED (IPC)

B65D

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
Munich	8 November 2007	Janosch, Joachim

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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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

3

EPO FORM 1503 03.82 (P04C01)

European Patent Office

Application Number
EP 07 42 5314

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-4,11

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 07 42 5314

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-4, 11

Closing device comprising operating means integral with a cap and a cutting element with at least two parts also to limit free rotation between cap and cutting element.

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2. claims: 1, 5, 6

Closing device with guide means of helical type.

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3. claims: 1, 7-10, 12-14

Closing device comprising a cap with thrust means for a cutting element.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 42 5314

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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08-11-2007

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- EP 1088764 A **[0004]**