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(54) **Air intake valve for containers containing liquid products**

(57) An air intake valve (10) for a container (12) for liquid products is described of the kind provided with an exit hole (14) for the liquid contained inside of it. The valve (10) comprises a first cylindrical element (16), externally provided with a threading (26) and internally with a through hole (18) for air and configured to be fixedly connected to one of the walls of the container (12), and a cylindrical covering capsule (20), closed by a bottom plate (22) at its upper end and provided, along its inner side surface, with a female screw (24) able to be operatively coupled with a threading (26). The valve (10) is configured so as to pass from a first closed position or resting position, in which the covering capsule (20) is in a lowered position and is completely screwed on to the first cylindrical element (16) to obstruct the through hole (18), and a second open position or working position, in which the covering capsule (20) is in a raised position and at least partially unscrewed from first cylindrical element (16). On the side surface of the covering capsule (20) at least one through slit (28) is made that allows air to be taken into the container (12), through the through hole (18) of the first cylindrical element (16), when the valve (10) is in the second open position and when the liquid contained in the container (12) is dispensed through the exit hole (14).

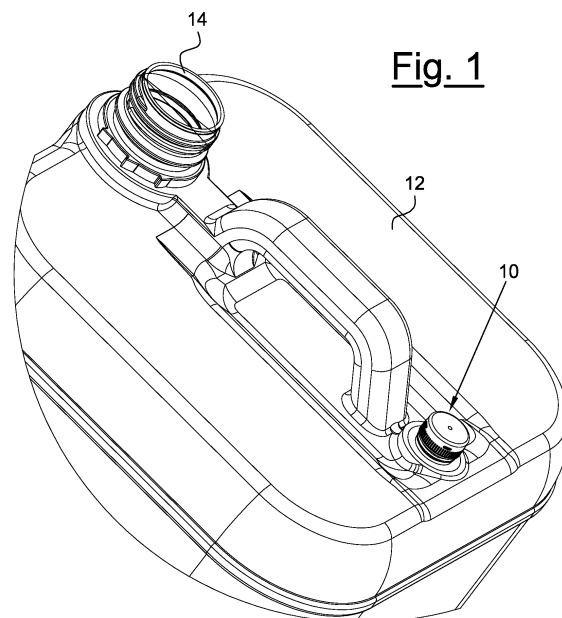


Fig. 1

Description

[0001] The present invention refers to an air intake valve for containers, in particular containers containing liquid products.

[0002] For packing and transportation of liquid products, possibly but not necessarily food products, containers in plastic, metal or other materials are known to be used, equipped with a sealed closing system which usually comprises a protection lid which can be reclosed over a base pouring element, fixedly connected to the container.

[0003] While dispensing the product, it is necessary that a certain amount of air flows inside the container in order to compensate for the decrease in volume of the liquid poured out from the container itself.

[0004] Normally, the compensation air enters the container from the same pouring element from which the liquid pours out. This usually determines irregular dispensing of the liquid, due to the simultaneous entry of air into the container through part of the passage section of the pouring element intended to allow the outlet of the liquid itself. This problem often determines the need to make one or more compensation or air intake holes on a portion of the upper wall of the container distinct from the one on which the pouring element is formed, so as to help the dispensing of the liquid through the pouring element itself.

[0005] The purpose of the present invention is therefore that of making an air intake valve for containers, in particular for containers containing liquid products, able to allow faster and more homogenous dispensing of the liquid through the pouring element or through the exit hole foreseen on the container, through the simultaneous access inside of the container itself of a controlled quantity of compensation air.

[0006] Another purpose of the invention is also that of making an air intake valve for containers able to make evident any possible tampering, and therefore a possible alteration of the content of the container.

[0007] Finally, yet another purpose of the invention is that of making an air intake valve for containers in which the small number of components and the simplicity of its use make the valve itself economically and functionally advantageous.

[0008] These purposes according to the present invention are accomplished by making an air intake valve for containers, in particular containers containing liquid products, as outlined in claim 1.

[0009] Further characteristics of the invention are highlighted in the following claims.

[0010] The characteristics and the advantages of an air intake valve for containers, in particular for containers containing liquid products, according to the present invention shall become clearer from the following description, given as an example and not for limiting purposes, referring to the attached schematic drawings in which:

Figure 1 is a perspective view that shows a generic container for liquid products provided with an air intake valve according to the present invention;

Figure 2 is a side elevation view of a portion of the air intake valve of figure 1;

Figure 3 is a side elevation view of the air intake valve of figure 1, shown in its closed configuration;

Figure 4 is a side elevation view of the air intake valve of figure 1, shown in its open configuration;

Figure 5 is a vertical section view of the portion of air intake valve shown in figure 2;

Figure 6 is a vertical section view of the air intake valve of figure 1, shown in its closed configuration;

Figure 7 is a vertical section view of the air intake valve of figure 1, shown in its open configuration,

Figure 8 is a side elevation view that shows a first embodiment of an air intake valve according to the present invention;

Figure 9 is a vertical section view of the air intake valve of figure 8;

Figure 10 is a perspective view from below of the air intake valve of figure 8;

Figure 11 is a side elevation view that shows a second embodiment of an air intake valve according to the present invention;

Figure 12 is a vertical section view of the air intake valve of figure 11; and

Figures 13 and 14 are perspective views, respectively from above and below, of the air intake valve of figure 11.

[0011] With reference to the figures, an air intake valve according to the present invention is shown, wholly indicated with reference numeral 10. The intake valve 10 is configured to be applied on to a generic container 12 for liquid products (figure 1), of the type made for example from plastic material and provided, on its upper wall, with an exit hole 14 for the liquid contained inside of it.

[0012] The intake valve 10 comprises a first cylindrical element 16 shaped like a sleeve (figures 2 and 5), externally threaded and provided internally with a through hole 18 for air, configured so as to be fixedly connected to one of the walls of the container 12, preferably and advantageously the upper one.

[0013] In the example illustrated, the sleeve 16 is made from plastic material and is formed in a single piece with the upper wall of the container 12. Preferably, the sleeve 16 is arranged at a corner of the upper wall of the container 12, in a diametrically opposite position to that in which the exit hole 14 for the liquid is located, so as to effectively take in the compensation air through its through hole 18 when the container 12 is inclined in order to dispense its content.

[0014] The air intake valve 10 also comprises a second cylindrical element 20, or covering capsule, closed by a bottom plate 22 at its upper end. Along the inner side surface of the covering capsule 20 a female screw 24 is formed, preferably but not exclusively triple threaded and

with pitch of 6 mm, able to be operatively coupled with the threading 26, also preferably but not exclusively triple threaded and with a pitch of 6 mm, formed on the outer side surface of the sleeve 16.

[0015] The air intake valve 10 is therefore configured to pass from a first closed position or resting position (figures 3 and 6), in which the covering capsule 20 is in a lowered position and is completely screwed on to the sleeve 16 to obstruct the through hole 18, to a second open position or working position (figures 4 and 7), in which the covering capsule 20 is in a raised position and at least partially unscrewed from the sleeve 16.

[0016] According to the invention, on the side surface of the covering capsule 20 a plurality of through slits 28 are made that allow the intake of air inside the container 12, through the through hole 18 of the sleeve 16, when the intake valve 10 is in its open position, that is to say with the covering capsule 20 raised, and when the container 12 itself is inclined to allow the dispensing of the liquid contained inside of it out of the exit hole 14.

[0017] To obtain a suitable flow of air inside the container 12, the through slits 28 of the covering capsule 20 are formed in its upper part, that is to say in its portion of side wall comprised between the bottom plate 22 and the female screw 24, so that, even with the covering capsule 20 only partially unscrewed from its respective sleeve 16, a suitable exchange of air is possible between the surrounding environment and the inner chamber of the container 12.

[0018] To avoid that the covering capsule 20 accidentally decouples from its corresponding sleeve 16, such a sleeve 16 is provided at the top, on its outer side surface, with an annular projection 30 that can engage with a corresponding annular projection 32 foreseen on the inner annular surface of the covering capsule 20. In this way, even when the covering capsule 20 is in a completely raised position, since there is no longer any engagement between its female screw 24 and the outer threading 26 of the sleeve 16, the inner annular projection 32 of the covering capsule 20 goes into abutment against the corresponding outer annular projection 30 of the sleeve 16, thus preventing the detachment of the two elements 16 and 20 that make up the intake valve 10. The covering capsule 20, in the working position of the intake valve 10, is therefore able to rotate freely around the sleeve 16, but cannot be removed from it, thus avoiding its accidental loss.

[0019] The covering capsule 20 can also be provided, under the bottom plate 22, with a disc or a O-ring 34 (figure 6), of a preferred thickness of about 1 mm, which forms a gasket to avoid the passage of air through the through hole 18 when the intake valve 10 is in its closed position, thus preventing any kind of contamination or alteration of the content of the container 12. The sealing disk 34 is irremovably inserted in an annular undercut 36 formed on the inner wall of the covering capsule 20, under the bottom plate 22, and stably sticks onto the upper part of the sleeve 16, when the valve 10 is in its closed posi-

tion, to block air from passing through the through hole 18.

[0020] Just like the lid (not shown) that seals closed the exit hole 14 of liquid from the container 12, the air intake valve 10 according to the invention can also be provided with means able to make evident any attempts of tampering with the valve 10 itself, and consequently, with the container 12.

[0021] Based on a first embodiment of the intake valve 10, shown in figures 8 to 10, the covering capsule 20 can indeed be connected, at its lower edge, to an annular security band 38 through a plurality of breakable bridge elements 40. The first opening of the intake valve 10 shall therefore be marked by the breaking of the bridge elements 40, caused by the rotation and the lifting of the covering capsule 20, and by the consequent detachment of such a covering capsule 20 from the annular security band 38 below, held by a protruding lip 42 formed at the bottom on the outer surface of the sleeve 16 (figures 4 and 7).

[0022] Alternatively, as shown in figures 11 to 14, which illustrate a second embodiment of the intake valve 10 according to the invention, the annular security band 38 can be fixed to the lower edge of the covering capsule 20 through a weakening line 44, formed in a continuous or discontinuous way. In this case, the detachment between the covering capsule 20 and the relative annular security band 38 must happen manually, by acting upon a suitable tab 46 foreseen on the annular security band 38 itself to remove it from the covering capsule 20 through tearing along the weakening line 44. Only at this point can the rotation of the covering capsule 20 be carried out to lift it and consequently bring the intake valve 10 into the working position or of taking in compensation air into the container 12.

[0023] For both embodiments, on the inner surface of the annular security band 38 one or more wedge shaped elements 48 can finally be foreseen, preferably uniformly distributed along the circumference of said annular security band 38, which project radially inwards towards the sleeve 16. The function of the wedge shaped elements 48 is to allow the engagement of the annular security band 38 with the protruding lip 42 foreseen on the outer surface of the sleeve 16, so as to limit the axial movements of such an annular band 38 with respect to the covering capsule 20 when it is screwed on to the sleeve 16 itself and the intake valve 10 is still sealed. It has thus been seen that the air intake valve for containers, in particular for containers containing liquid products, according to the present invention achieves the aforementioned purposes, operating effectively and in an extremely simple way as a compensation valve, guaranteeing a suitable sealed closure of the container when not in use and possibly indicating any tampering with the container itself before its first use.

[0024] The air intake valve for containers, in particular for containers containing liquid products, of the present invention thus conceived can in any case undergo nu-

merous modifications and variants all covered by the same inventive concept.

[0025] Furthermore, all the details can be replaced with technically equivalent elements. In practice, the materials as well as their sizes and components can be any according to the technical needs.

Claims

1. Air intake valve (10) for a container (12) for liquid products of the type provided with an exit hole (14) for the liquid contained therein, said valve (10) comprising a first cylindrical element (16), provided externally with a threading (26) and internally with a through hole (18) for air and configured to be fixedly connected to one of the walls of said container (12), and a cylindrical covering capsule (20), closed by a bottom plate (22) at its upper end and provided, along its internal side surface, with a female screw (24) able to be operatively coupled with said threading (26), said valve (10) being configured to pass from a first closed position or resting position, in which said covering capsule (20) is in a lowered position and is completely screwed on to said first cylindrical element (16) to obstruct said through hole (18), to a second open position or working position, in which said covering capsule (20) is in a raised position and is at least partially unscrewed from said first cylindrical element (16), **characterized in that** on the side surface of said covering capsule (20) at least one through slit (28) is made which allows the intake of air inside of said container (12) through said through hole (18) of said first cylindrical element (16), when said valve (10) is in said second open position and the liquid contained in said container (12) is dispensed through said exit hole (14).
2. Valve (10) according to claim 1, **characterized in that** said first cylindrical element (16) is provided at the top, on its outer side surface, with an annular projection (30) that can engage with a corresponding annular projection (32) foreseen on the inner annular surface of said covering capsule (20) to avoid that said covering capsule (20) accidentally unscrews from said first cylindrical element (16).
3. Valve (10) according to any one of claims 1 or 2, **characterized in that** said covering capsule (20) is provided, under said bottom plate (22), with at least one sealing element (34) that forms a gasket to avoid the flow of air through said through hole (18) when said valve (10) is in said first closed position.
4. Valve (10) according to claim 3, **characterized in that** said sealing element (34) is non removably inserted in an annular undercut (36) formed on the inner wall of said covering capsule (20), under said

bottom plate (22), and stably sticks to the upper part of said first cylindrical element (16), when said valve (10) is in said first closed position, to obstruct said through hole (18).

5. Valve (10) according to claim 4, **characterized in that** said sealing element (34) is made in the form of a disc with a thickness of 1 mm.
6. Valve (10) according to claim 4, **characterized in that** said sealing element (34) is made in the form of a ring with a thickness of 1 mm.
7. Valve (10) according to any of the previous claims, **characterized in that** said covering capsule (20) is connected, at its lower edge, to a annular security band (38) able to make evident any attempts of tampering with said valve (10) and, consequently, of said container (12).
8. Valve (10) according to claim 7, **characterized in that** said annular security band (38) is connected to said covering capsule (20) through a plurality of breakable bridge elements (40).
9. Valve (10) according to claim 7, **characterized in that** said annular security band (38) is connected to said covering capsule (20) through a weakening line (44) made in a continuous or discontinuous way.
10. Valve (10) according to claim 9, **characterized in that** said annular security band (38) is provided with a small tab (46) for manually removing said annular security band (38) from said covering capsule (20) by tearing along said weakening line (44).
11. Valve (10) according to claim 7, **characterized in that** said annular security band (38) is provided, on its inner surface, with one or more wedge shaped elements (48) that project radially inwards towards said first cylindrical element (16), said wedge shaped elements (48) allowing the engagement of said annular security band (38) with a protruding lip (42) foreseen on the outer surface of said first cylindrical element (16).
12. Valve (10) according to claim 1, **characterized in that** said at least one through slit (28) is formed in the upper part of said covering capsule (20), in its portion of side wall comprised between said bottom plate (22) and said female screw (24).
13. Valve (10) according to claim 1, **characterized in that** said first cylindrical element (16) is made from plastic material and is formed in a single piece with the upper wall of said container (12).
14. Valve (10) according to claim 13, **characterized in**

that said first cylindrical element (16) is positioned at a corner of the upper wall of said container (12) in a diametrically opposite position compared to that in which said exit hole (14) is located.

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15. Valve (10) according to claim 1, **characterized in that** said female screw (24) and said threading (26) are of the triple threaded kind with a pitch of 6 mm.

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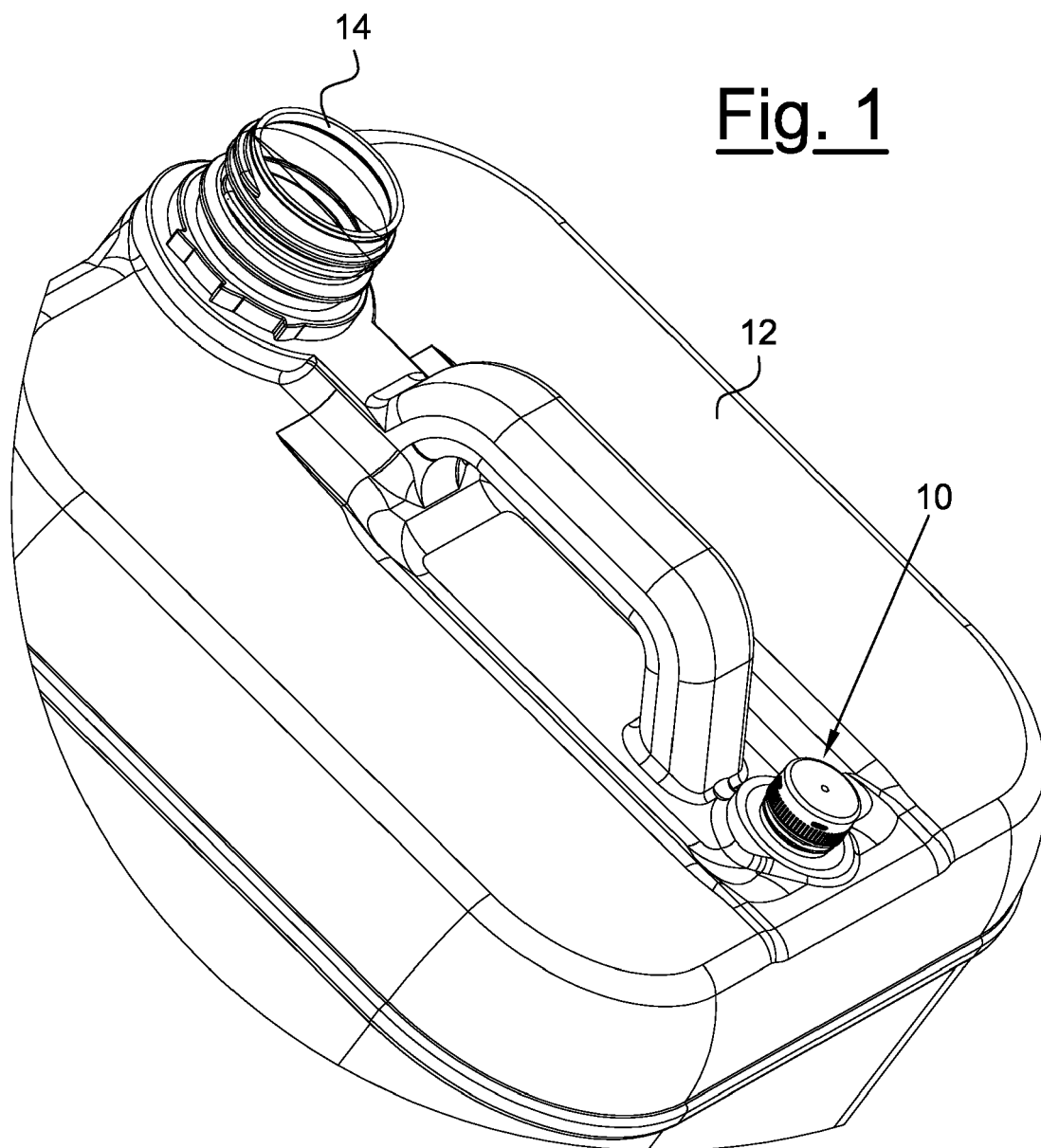
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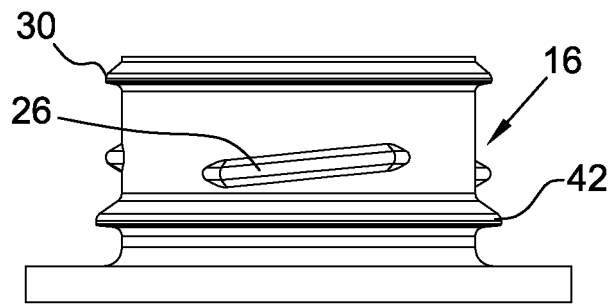


Fig. 2

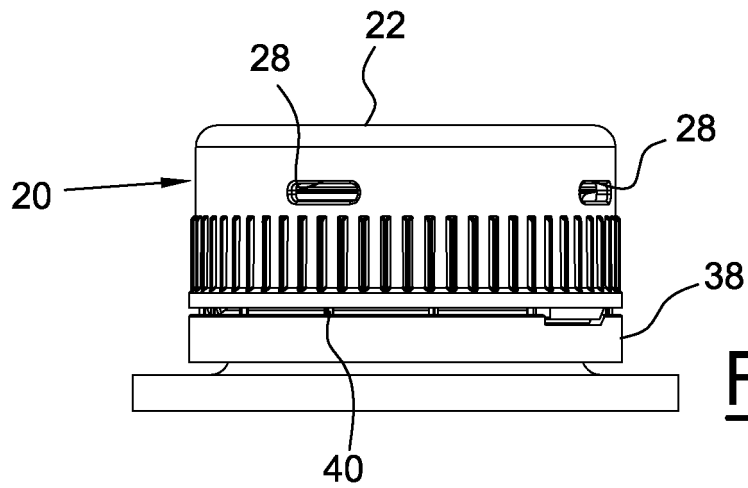


Fig. 3

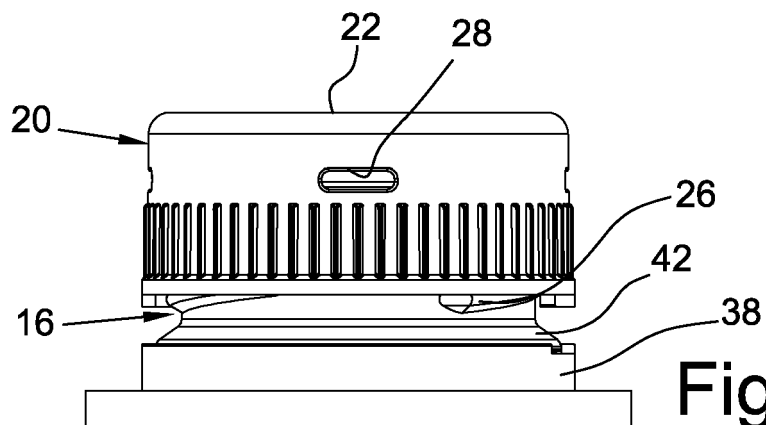


Fig. 4

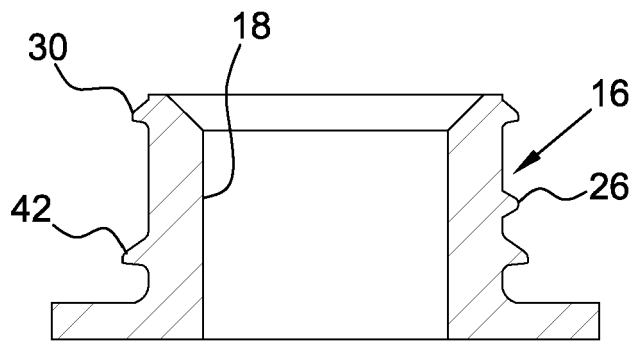


Fig. 5

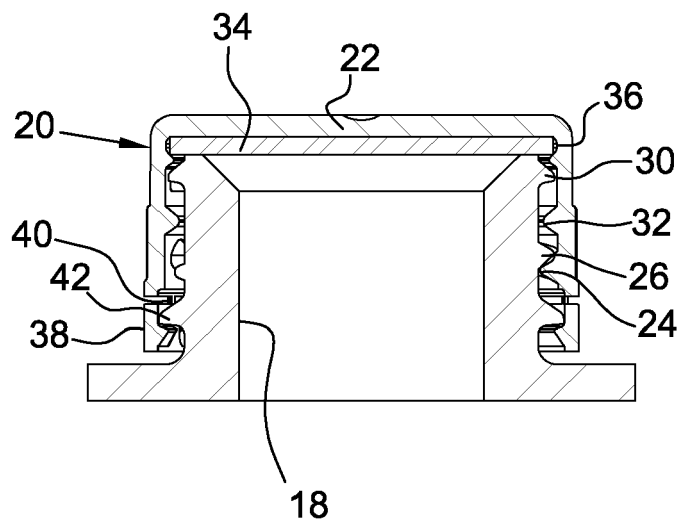


Fig. 6

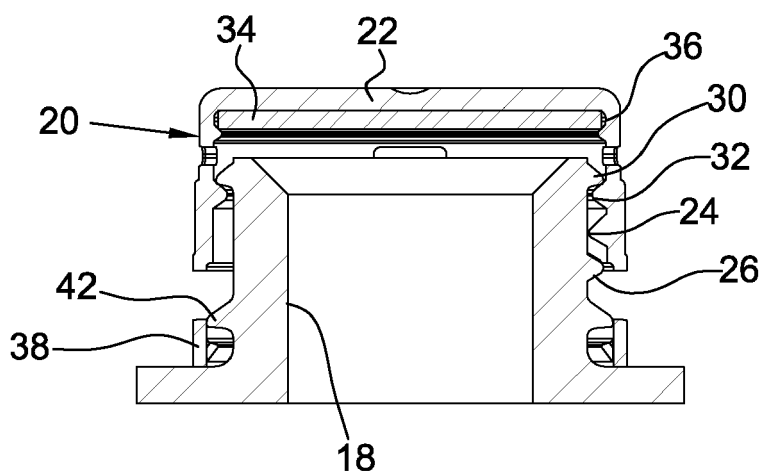


Fig. 7

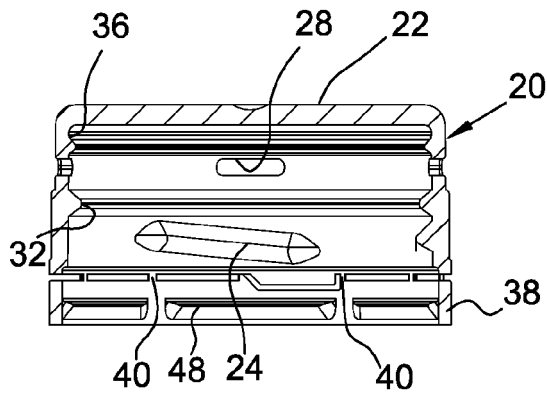


Fig. 9

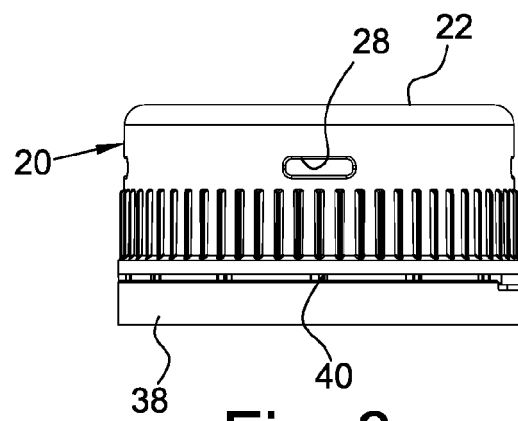


Fig. 8

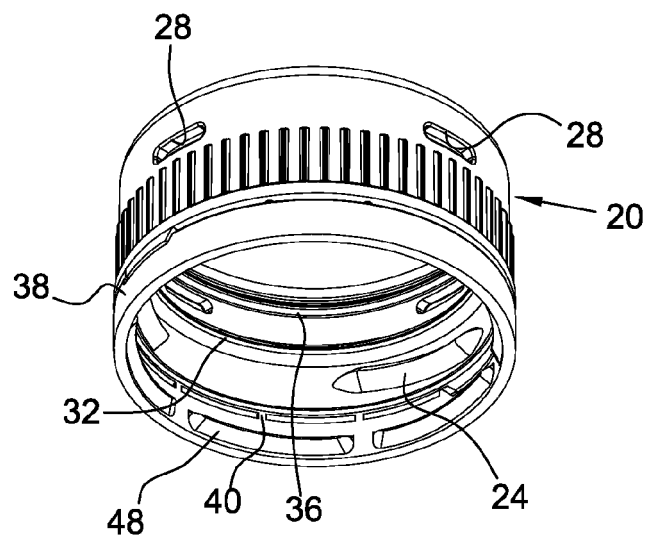


Fig. 10

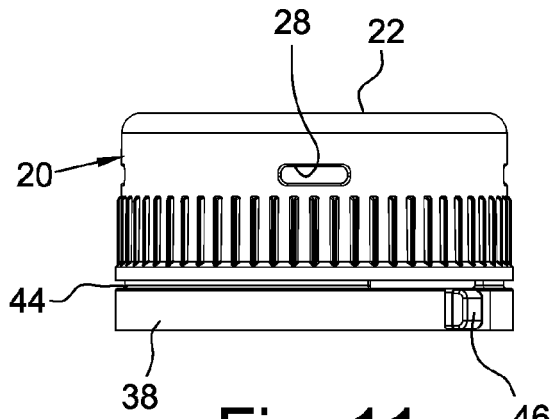


Fig. 11

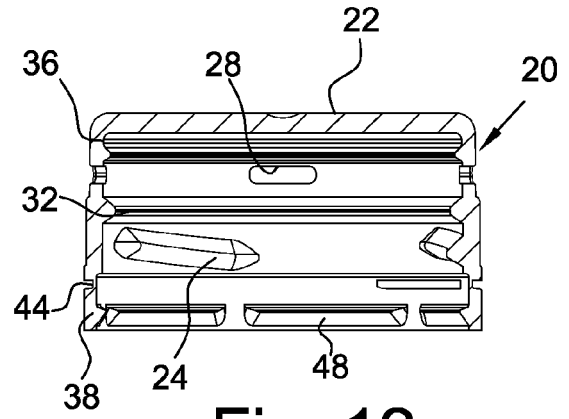


Fig. 12

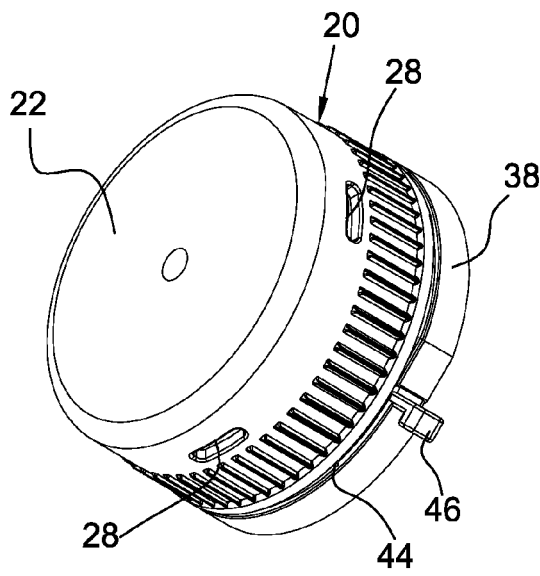


Fig. 13

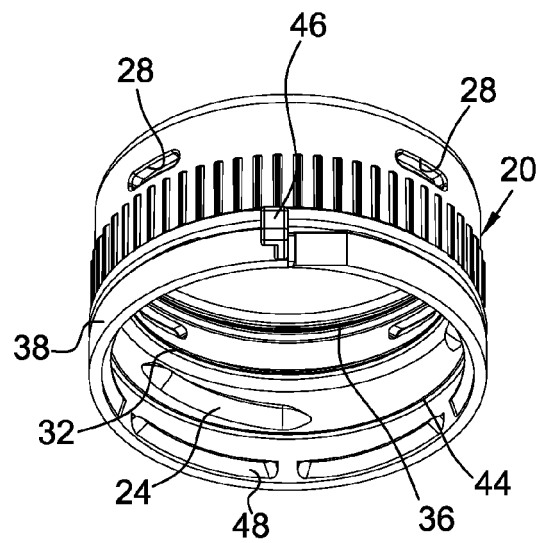


Fig. 14



EUROPEAN SEARCH REPORT

Application Number
EP 09 15 0856

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Y	* figure 4B *	2,6,10	
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 June 2009	Examiner Jervelund, Niels
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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