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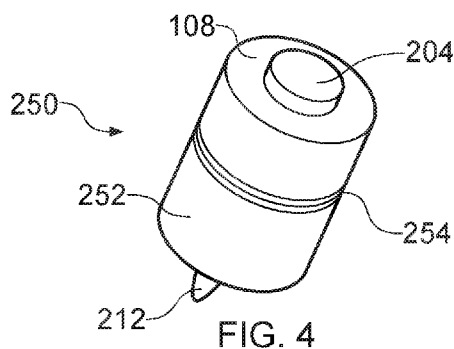
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(54) Title: PRESSURE RELEASE SYSTEM AND APPARATUS



(57) Abstract: This invention relates in particular to apparatus for automatic pressure relief (250) whereby a pressure relieving valve opens at a set pressure to relieve the pressure in a container (94), and automatically closes. It includes a pressure releasing apparatus (250) incorporated into a dispenser for dispensing a beverage from a pressurised container (94) such as a keg. The dispenser is coupled to the neck (95) of the container (94).

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PRESSURE RELEASE SYSTEM AND APPARATUS

Field of the Invention

This invention relates to an apparatus for use with pressurised containers for storing
5 and dispensing liquids. Typically, the liquid is a beverage.

This invention relates in particular to apparatus for automatic pressure relief whereby a pressure relieving valve opens at a set pressure to relieve the pressure in the pressurised container and automatically closes.

Background

10 Pressurised containers have been used for the storage and dispensing of a range of fluids, particularly the dispensing of carbonated beverages such as beers. Containers are constructed from a variety of materials: steel, plastic, composites and reusable or recyclable materials.

Commercial establishments have traditionally used pressurised kegs for dispensing
15 carbonated beverages, for example, beer. Pressurised beer dispensing kegs are typically constructed from a single stainless-steel shell, and more recently have been constructed by using multi-layered plastics or composite materials and may be of a reusable, or disposable form.

Most kegs are fitted with a dispensing spear structure comprising a long dispenser
20 tube through which to dispense beer from the bottom of the keg and a valve structure through which to supply pressurising gas into the keg so as to pressurise the contents and force the beer out through the dispensing tube into a dispenser line fitted with one or more downstream dispense fonts, taps or guns.

The internal pressure of a pressurised container can be affected by temperature: for
25 example, the internal pressure in a pressurised container increases when the container is stored in a hot or exposed environment. Even after dispensing the contents from a pressurised container, residual pressure can remain within the container, thus near empty or empty containers can also present a certain risk from

over pressurization, for example they may rupture when stored in environments of high temperatures. Similarly, pressure may fluctuate during transportation.

5 Disposable containers, such as beer kegs, may be punctured to release pressure: for example, a sharp instrument such as a screwdriver is used to force puncture the inner membrane of the keg. However, this can present a safety risk as kegs with sufficient internal pressure can explode on puncturing. Further, such practice is only appropriate for empty kegs: forced puncture is not a suitable means to relieve over-pressure in kegs which are full or partially full.

Prior Art

10 Kegs in a system are typically protected from over pressurisation when connected for dispensing by an inline pressure relief contraption that controls the pressure for the system including lines. The over pressurisation limit is typically set at a high pressure since many kegs are of steel construction and capable of operating at the high pressure. Kegs constructed of recyclable polymers may be unable to withstand the
15 high pressure. So, either the over pressurisation limit for the whole system must be lowered to accommodate the lower pressure limit of the minority of recyclable polymer kegs, or the recyclable polymer kegs cannot be incorporated into the system.

Pressure release devices for individual pressurised kegs comprise safety control valves, such as discs, that are designed to rupture at certain high pressures; or general
20 pressure release systems that are configured into a valve structure such that there is a controlled pressure release when the valve structure is removed from the pressurised keg. For example, there is disclosed in the publication of international application PCTAU2011001359 a pressurised keg which comprises a silicone moulded stopper. The higher the pressure in the keg, the more tightly the stopper seals. Once the
25 silicone moulded stopper is disturbed or destroyed, any internal pressure in the keg will escape. The keg is thereby depressurized, but it is also rendered inoperable for holding a pressurised liquid.

There is consequently a need to provide means for safe and controlled releasing of pressure from an individual pressurised keg so that it may be used and re-used in a
30 system of various kegs having different over pressurisation limits.

Summary of the Invention

According to one aspect of the present invention there is pressure releasing apparatus for releasing a gas and/or liquid under pressure in a container, the apparatus has a form to be mounted in a passageway from the interior to the exterior of the container
5 and comprises a valve biased to close itself acted upon by the gas and/or liquid to overcome the bias to open the valve above a selected pressure.

Preferably the gas and/or liquid under pressure in the container is released through the passageway when the valve is opened above the selected pressure.

The valve automatically opens above the first selected pressure and automatically
10 closes itself after the pressure in the container is lowered to a second selected pressure or below. The first selected pressure may be higher than or equal to the second selected pressure.

The pressure releasing apparatus releases the fluid in a safe and controlled manner. The fluid may be released as liquid and/or gas.

15 The pressure releasing apparatus may be configured to release fluid from the container, for example to release a liquid or gas or gas and liquid or a carbonated liquid for example beer from a beer keg.

The pressure releasing apparatus may be configured to couple to the container or to a dispenser of the pressurised fluid in the container. The pressure releasing apparatus
20 or a portion thereof may be incorporated into or integrally formed with the container or the dispenser. Preferably the pressure releasing apparatus may be removed, fitted to another dispenser or container or keg and reused.

The pressure releasing apparatus may be coupled to the container either directly or via the dispenser before the container is filled or partially filled with the fluid and
25 pressurised. The container can then be pressurised or filled and used to dispense fluids. When the container is empty, and the operator wishes to de-pressurise the container the pressure releasing apparatus may be manually opened.

The dispenser may comprise the pressure releasing apparatus for releasing a gas

and/or liquid under pressure in a container, the apparatus has a form to be mounted in a passageway from the interior to the exterior of the container and comprises a valve biased to close itself acted upon by the gas and/or liquid to overcome the bias to open the valve above a selected pressure; the dispenser may further comprises the
5 passageway and a means for supplying a pressurised second gas into the container to dispense the gas and/or liquid under pressure in the container.

The dispenser may include a housing which couples to a neck or opening of the container. The housing may include the passageway in which the pressure releasing apparatus is mounted.

10 The passageway cross section may be tubular, oval, cylindrical, triangular, square, polygonal or irregular. The pressure releasing apparatus may have a complementary cross section.

The housing has a body with an upper end for locating exteriorly of the container and a lower end for locating interiorly of the container.

15 The dispenser includes an outer dispenser part at least partially within the housing. The outer dispenser part comprises an upper end for locating exteriorly of the container, a lower end for locating interiorly of the container, and a body intermediate upper and lower ends. The body includes a conduit from the upper to the lower ends. The body may be in the form of a tube around the conduit. The outer dispenser part
20 may comprise only the dispenser tube including the upper and lower ends.

The outer dispenser part is moveable within the housing from the upper and lower ends.

The dispenser is actuated by displacement of the outer dispenser part in the direction from the upper end toward the lower end. Actuation of the dispenser enables
25 pressurising gas to pass into the container between the housing and the outer dispenser part. The fluid inside the container including the beverage passes out of the container via the conduit.

The dispenser may include a piston which may be arranged to slide along the conduit. Displacement of the piston toward the lower end of the outer dispenser part assists

pressurising gas to displace the outer dispenser part to actuate the dispenser. The fluid inside the container including the beverage passes out of the container by flowing between the piston and wall of the conduit.

5 The dispenser may comprise the piston supported by the housing, the piston arranged to slide toward the interior of container to supply the pressurised second gas into the container.

10 The dispenser may comprise a piston arranged to slide toward the interior of container to dispense the gas and/or liquid in the container, the piston including the passageway in which the pressure releasing apparatus is mounted. The piston may also be arranged slide to supply the pressurised second gas into the container preferably as the gas and/or liquid is dispensed.

15 The dispenser may comprise the housing for coupling to a neck or opening of the container, and the piston arranged to slide in the housing. The piston may include the passageway. The piston may be slidable to dispense the gas and/or liquid in the container and/or to supply the pressurised second gas into the container to dispense the gas and/or liquid under pressure in the container.

20 The pressure releasing apparatus may be incorporated into a component of the dispenser for example the piston or the outer dispenser part or the housing. The dispenser may comprise the outer dispenser part movable within the housing. The dispenser may also comprise the piston arranged to slide in a conduit in the outer dispenser part. The conduit may be arranged so that the gas and/or liquid in the container is dispensed through the conduit. The outer dispenser part may be movable within the housing to supply the pressurised second gas into the container which forces the gas and/or liquid out through the conduit.

25 The outer dispenser may be moveable toward the interior of the container to supply the pressurised second gas into the container, the piston slides in a conduit in the outer dispenser through which the pressurised gas and/or liquid in container is dispensed. The piston may be coupled via a spring or other resilient device to the outer dispenser part. Thus, moving the piston may cause the outer dispenser part to move under
30 influence of pressure of the pressurised second gas.

Advantageously, when the pressure releasing device is incorporated into the piston of the dispenser, then liquid from the bottom of container may be discharged first through the pressure releasing device when it is opened. This is because the piston is located the conduit which lower end is located to take liquid from the bottom of the container in use. The container may be tipped upside down or onto its side to discharge gas in the container first.

Advantageously, when the pressure releasing device is incorporated into the housing of the dispenser, then gas from the upper end of the container may be discharged first through the pressure releasing device when it is opened. This is because the housing is coupled to the neck of the container which is above liquid inside the container. The container may be tipped upside down or onto its side to discharge liquid in the container first.

The pressure releasing apparatus is operable when the pressurised container is full, partially full and/or empty, when the container is being filled, during transportation and when the container is in storage.

After the pressure is reduced inside the container to the second selected pressure, the pressure releasing apparatus closes and the integrity of the container and its contents is retained.

Further, if the temperature of the container content changes, for example if the temperature of the liquid rises, and the internal pressure changes, for example, the pressure increases, the pressure releasing apparatus will automatically open to release pressure and reseal to contain the internal fluid under the set pressure.

The pressure releasing apparatus may be removed and reused in the same container or a different container.

The pressure releasing apparatus may be housed in a container which in size, form and materials complements the container contents and related ergonomic and economic nature of such advantages, including optimised stacking for transportation and storage.

Further, the pressure releasing apparatus may include a pressure indicator, for

example a visual indicator of over-pressure or an audible indicator.

The valve may comprise a surface or part displaced by the gas and/or fluid to open the valve. The part may be a plug and the surface may be a surface on the plug acted upon by the gas and/or fluid. The part may include an orifice having a surface acted upon by the gas and/or fluid. The gas and/or liquid may contact the surface or part so the pressure of the gas or fluid acts directly on the part.

The part or surface may be visible from the exterior of the pressure releasing apparatus to provide the visual indicator by visual evidence of displacement of the surface or part.

10 The pressure releasing apparatus may comprise a resilient means acting on a plug and barrel to bias the valve to close itself. The stiffness of the resilient means may be preselected for the gas and/or liquid to overcome the bias provided by the resilient means to open the valve above the selected pressure. The resilient means may be a spring and is preferably a coil spring.

15 The resilient means may be mounted within the valve itself, the dispenser housing, the outer dispenser, or dispenser piston and controls the first selected pressure at which the valve opens and preferably the second selected pressure at which the valve closes and may seal or reseal.

20 So, the first selected pressure to overcome the bias and open the valve may be set by a resilient means having a selected stiffness. The resilient means may be generally located in the centre of the valve. The resilient means is preferably concentric with the passageway or barrel opening. The resilient means is preferably concentric with the barrel of the dispenser.

25 The plug may be movable along a coaxial longitudinal axes of the plug and/or passageway/barrel opening and of the resilient means to open and close the valve. The resilient means may be internal to passageway.

Springs of differing stiffness values may be fitted to the pressuring releasing apparatus to suit the container content, integrity and dispensing parameters. For example, a less stiff spring, will aid dispense and fill rates and lower the first selected pressure. The

pressure releasing apparatus may be made suitable for various containers with different over pressurization limits by fitting springs of various stiffness values.

Once pressure is reduced to the second selected pressure, as determined by the spring, the pressure releasing apparatus will close and maintain pressurization of the container and the container contents of liquid and/or gas.

The pressure releasing apparatus may comprise a plug to close the valve. The plug may be guided in and/or through the passageway or a barrel opening.

The barrel may be an integral part of the dispenser or container. The dispenser or container may be arranged to receive and hold the barrel.

10 The plug may be urged by the spring so that the valve is biased to close itself.

The pressure releasing apparatus may be removable from the container or dispenser for re-use or for replacement of the plug.

15 The plug may comprise an elongate body with first and second ends. One of the ends may be the head of the plug. Either end may be shaped to comprise radial projections or be spherical, flanged, winged, skirted, cupped or a combination thereof.

Preferably the plug includes a head or butt to seat on a barrel or wall around the passageway, preferably the seal is at an entrance to the passageway or barrel opening.

20 The first and/or second ends of the plug may comprise elongate sections for use as a guide to facilitate insertion of the ends into a passageway or a barrel opening. The plug may have a form of a poppet. The plug may have a flat or mushroom shaped head and an elongate shank.

25 Preferably the plug or poppet may be removed from the pressure releasing apparatus to manually open it. The pressure releasing apparatus is thereby disabled and pressure inside and outside the container is equalised.

The head of the plug may act as a cap in the pressure releasing apparatus to close it. The underside of the head of the plug may comprise or be coated with a mouldable or

resilient material to form a seal for good integrity and reliability of the closure. The seal on the underside of the head or cap may co-moulded with the cap or head. Advantageously the valve reliability for closing and sealing itself is improved.

5 In another embodiment, at least a portion of the first end and/or second end of the plug is resiliently deformable, for example, the pressure release member will have a resiliently deformable element on the underside.

The head of the plug or poppet may be separated from the barrel, dispenser, and/or piston to manually open the pressure releasing apparatus.

10 The pressure releasing apparatus and/or the plug may be formed from a resiliently deformable polymeric material, for example, food grade material, which is safe for use with beverages. The polymeric material may comprise a single material, or a blend of two or more materials. The polymeric material may comprise one or more elastomers (i.e. recyclable elastomers). The elastomers may be thermoplastic or thermosetting. The polymeric material may be formed from one or more monomers,
15 comonomers or polymer blends.

The plug may be inserted within the dispenser or within a piston of the dispenser. The pressure releasing apparatus or the plug of it may be inserted into a pressure release passageway previously formed in a wall of a container.

20 The plug includes a resilient portion stretchable or compressible intermediate the head or butt and a distal portion of the plug urged against the passageway. So, a separate resilient means or spring is not required for the valve to bias itself closed below the first selected pressure and to close itself. The distal portion and the head or butt sustain equal and opposite forces applied by the resilient portion of the plug. The forces are exerted by the resilient stretchable or compressible portion of the plug.

25 The resilient portion stretchable or compressible intermediate the head or butt and a distal portion of the plug may form a shank of the plug.

The plug may comprise a surface acted upon by the gas and/or liquid under pressure in a container to overcome bias to open the valve above selected pressure. The surface may include a portion of the head or butt. Preferably a portion of the surface

is inside the passageway.

The valve of the pressure releasing apparatus may comprise a barrel of resilient material around an orifice through which the gas and/or liquid under pressure in the container is released when the valve is opened above the selected pressure. Thus,
5 the valve may comprise a single piece which is the barrel of resilient material.

Preferably the resilient material comprised in the barrel is biased in compression to bias the orifice to close itself. Alternatively, or in addition, the resilient material which the barrel comprises may include a resilient band in tension around the orifice to bias the orifice to close itself.

10 Exemplary embodiments of the present invention relate to the application and use in releasing pressure from a pressurised container for dispensing carbonated beverages, for example beer, although it will be appreciated that the invention may be applied to containers for dispensing other pressurised liquids and fluids.

The invention provides for a container, preferably a keg, comprising the pressure
15 releasing apparatus. The container may comprise the dispenser.

Further disclosure of the invention is included in the accompanying claims.

The invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Brief Description of the Figures

20 Figure 1 shows a partially sectioned view of a pressurised container in the form of a beer keg incorporating a liquid container to which a dispenser for dispensing a pressurised beverage is coupled to the neck;

Figure 2 shows a cross-section through the neck of the container the dispenser which incorporates a pressure releasing apparatus within the piston;

25 Figure 3 shows a cross-section through the neck of the container the dispenser which incorporates a pressure release apparatus within the housing of the dispenser;

Figure 4 shows an isometric view of a pressure release apparatus including a plug guided in a barrel;

Figure 5 shows a cross section through the barrel and plug of the pressure release apparatus shown in Figure 4 in which the apparatus is closed;

- 5 Figure 6 shows a cross section through the barrel and plug of the pressure release apparatus shown in Figure 4 in which the apparatus is open;

Figure 7 shows a cross section of the pressure release apparatus shown in Figures 4, 5 and 6 in situ in a wall of a container and exceptional from any dispenser;

- 10 Figure 8 shows a cross section through a barrel and plug of a pressure release apparatus in which the apparatus is closed by tension in a resilient portion of the plug intermediate a butt end and cone shaped end of the plug;

Figure 9 shows a cross section through the barrel and plug of the pressure release apparatus in Figure 8 in which the apparatus is opened by stretching of the resilient portion of the plug;

- 15 Figure 10 shows a cross section through a barrel and plug of a pressure release apparatus comprising an external biasing spring in which the apparatus is closed;

Figure 11 shows a cross section through the pressure release apparatus of Figure 10 in which the apparatus is open;

- 20 Figure 12 shows a cross section through a barrel of a pressure release comprising a barrel of resilient material around an orifice in which the apparatus is closed by the resilient material which has collapsed the orifice; and

Figure 13 shows a cross section through a barrel of a pressure release comprising a barrel of resilient material around an orifice in which the apparatus is opened by opening of the orifice.

- 25 Detailed Description of the Invention

Referring to the Figures, there are shown embodiments of the invention which relate to the application and use in releasing pressure from a pressurised container for dispensing a carbonated beverage, for example beer, although it will be appreciated that the invention may be applied to pressurised containers for dispensing other fluids including other liquids, such as carbonated beverages.

As shown in Figure 1 a conventional keg tap 138 is shown. The keg tap 138 is connected to the upper end 124 of a housing of a dispenser for dispensing a pressurised beverage from the container 94. The housing also has a lower end 126 which is interior to the container.

10 Cross sections of the dispenser are shown in Figures 2 and 3.

A central outlet pipe 138B is movable in the keg tap 138 by operation of a pivoting handle 138C.

When the handle 138C of the keg tap 138 is swung down the central outlet pipe 138B is forced downwardly to push the head 107 of the piston 106 down against the inner spring 142. A first gap is opened between head of the piston 106 and an annular seat 136 at the rim the exterior end of the tube 132 of the dispenser.

The head 107 of the piston is exposed and exterior to the container.

The inner spring 142 is compressed between a flange 92 on the piston and a flange 144 on inner surface of the tube 132 proximate the interior end 134 of the tube. The flange 92 provides the piston 106 with a sliding fit in the tube 132.

The downward force of the pipe 138B is transferred through the piston 106 and inner spring 142 to a tube 132 in which the piston 106 slides. The downward force is transferred from the tube 132 to the outer spring 130 around the tube.

The keg tap 138 comprises a gas inlet 138A to provide a pressurised fluid, typically pressurised gas applied to a first end 136 of a tube 132.

The keg tap 138 comprises a gas inlet 138A to provide a pressurised fluid, typically pressurised gas applied to a first end 136 of the tube 132. The total force of the pressurised fluid and the downward force of the pipe applied to the first end of tube

moves the tube downward to open a second gap between an annular seat 146 on the housing 122 and the gasket 148 on upper end 136 of tube 132.

The pressurised fluid flows into the container through the opened second gap and the beverage in the container flows up through the bottom end 134 of the tube 132 and
5 past the first gap between the opened first gap.

The piston 106 shown in Figure 2 comprises a pressure releasing apparatus comprising the piston itself, a plug 200 having a central shank 208 coaxial with the piston and a third spring 210 around the shank 208.

Figure 3 shows a cross section of the dispenser in which the pressure releasing
10 apparatus including plug 200 is shown located in a first part 123 of a dispenser housing.

The piston 106 shown in Figure 2 shows a pressure releasing apparatus for releasing a gas and/or liquid under pressure in a container 94. The pressure releasing apparatus has a form to be mounted in a passageway 112 from the interior to the exterior of the
15 container. The passageway 112 is defined by walls 104, 109 of a barrel formed by the piston 106. A valve is closed by a plug head 204 sealing an end of the barrel. The valve is biased to close itself by a resilient coil third spring 210. The valve is opened by the gas and/or liquid above a first selected pressure which overcomes the bias of the spring. The gas and/or liquid pressure acts on the surface of the plug
20 interior from the seal to the barrel end.

The plug moves axially in the barrel opening through the piston aligned with the central axis of the piston. The third spring 210 slides along the barrel wall. The shank 208 of the plug 200 slides inside the turns of the third spring 210.

At a first end, the plug 200 has a flat head 204 connected to the shank. The opposite
25 distal end 212 of the plug is cone shaped 212. The cone shaped end easily inserted through the barrel opening and the third spring to assemble the pressure release apparatus in the piston.

The barrel wall has a portion 104 with a constricted diameter proximate the side of piston which is exterior of the container. The portion 104 with constricted diameter

guides the shank 208 by a slip fit.

The portion 104 with a constricted diameter also provides for a seat on the piston for a soft material covering 206 on the underside of the flat head 204 of the plug 200. The soft material conforms with the seat 98 countersunk into the head to of the piston 106
5 to form a fluid proof seal. So, the pressure releasing apparatus is sealed closed when the head 204 is pressed against the piston.

The barrel portion 104 with a constricted diameter provides a ledge in the barrel for an end of the third spring 210 to react against. The other end of the third spring 210 reacts against a rim at the base of the cone shaped distal end 212 of the plug 200.
10 The third spring 210 thereby biases the head 204 of the plug against the piston to urge the pressure releasing apparatus to close.

The plug 200 has a surface acted upon by the fluid under pressure inside the container. When the pressure acting the surface exceeds a selected pressure the bias of the spring is overcome to lift the head 204 of the plug off the seat and open the
15 pressure releasing mechanism. The surface acted on by the fluid in the container includes the shank 208 and cone shaped distal end 212. The effective area of the surface is the cross-section area of the barrel where the barrel portion 104 with constricted diameter is located.

A dispenser is coupled to the neck 95 of the containers shown in Figures 2 and 3. The
20 dispenser comprises the passageway formed by the walls 104 and 109 of the barrel through the piston 106. The dispenser includes an outer dispenser part include tube 132 with a gasket 148 over the exterior end which is movable toward the interior of the container for supplying a pressurised second gas into the container to dispense the gas and/or liquid in the container up through the interior of the tube 132.

25 The first part 123 of the dispenser housing guides the tube 132 and supports the outer spring 130. A flange 128 at the interior side of the first part 123 provides the sliding fit with the tube 132. The flange 128 is also the support for the outer spring 130. The outer spring 130 is compressed between the flange 128 and an outer lip on the tube.

30 The gap between the gasket 148 and the annular seat 146 is biased closed by force provided by the compressed outer spring 130.

The first part 123 of the dispenser housing is exposed to the pressurised fluid in the interior of the container. A second part 122 of the dispenser housing is connected to the first part 123 by screw threads. The second part 122 of the dispenser housing is also connected by screw threads to the neck 95 of the container 94. The second part
5 122 of the dispenser is exterior the container and is upper relative to the lower first part 123 of the dispenser.

In the embodiment shown in Figure 3, pressurised fluid in the container above the first selected pressure overcome the bias of the third spring 210 to lift the plug head 204 of a seat on the housing. A gap is thereby opened between the plug 200 and the
10 housing 126 for the pressurised fluid to escape the container through the housing.

Figure 4 shows an isometric view a pressure releasing apparatus 250 for releasing a fluid under pressure in a container. In Figure 4, the container is not shown.

The pressure releasing apparatus 250 in Figure 4 comprises a plug guided in a barrel 252. The plug has a flat head 204 which closes the barrel opening to close the
15 pressure releasing apparatus 250. The plug also has a distal cone shaped end 212 which may be seen protruding from the distal end of the barrel. The barrel has exterior threads 254 for holding barrel in position. The side of the barrel where the flat head 204 is located is exterior to the container interior in use. The side of the plug where the distal cone shaped end is located is interior to the container in use.

20 The barrel shown in Figure 4 is suitable for fitting the pressure releasing apparatus into a piston of a beverage dispenser in a container as shown in Figure 2.

The barrel shown in Figure 4 is also suitable for fitting the pressure releasing apparatus into a housing of a beverage dispenser in a container as shown in Figure 3.

The barrel shown in Figure 4 is also suitable for fitting the pressure releasing apparatus
25 through a wall of a container as shown in Figure 7.

Figure 5 shows a cross section through the pressure releasing apparatus 250 of Figure 4 when the apparatus is closed, and Figure 6 shows the cross section when the apparatus is open.

The barrel 252 of the pressure releasing apparatus 250 has a side 108 which is exterior to the container when the pressure releasing apparatus is in situ. The flat head 204 of the plug is biased by the third spring 210 to seal to the side 108 and thereby close the pressure releasing apparatus.

5 The barrel opening of the pressure releasing apparatus 250 has a portion 104 with a constricted diameter proximate the exterior side 108 of the barrel. This minimum diameter portion guides the shank 208 of the plug. The constricted diameter portion 104 also provides a brace on the inside of the barrel for the third spring 210. The opposite end of the third spring is braced against the plug cone end 212. This enables
10 the third spring 210 to urge the flat head 204 of the plug against the exterior side 108 to bias the pressure releasing apparatus closed.

The barrel opening of the pressure releasing apparatus 250 has a portion with 109 with a diameter larger than the minimum. At this portion 109 the diameter of the barrel opening is sufficient to receive the shank 208 of the plug surrounded by the third spring
15 210 so that the plug may slide along the barrel to open and close the pressure releasing apparatus.

As shown in Figures 5 and 6 there is a clearance space between the plug shank 208 and the wall of the barrel opening at the location of the portion 104 with the minimum diameter. There is also a clearance space between the shank 208 the third spring
20 210 and the portion of the barrel opening with a larger diameter 108. These clearance space allow the pressurized fluid inside the container to escape through the pressure releasing apparatus when it is open. These clearance spaces also cause the pressurised fluid to make a whistling sound, thereby providing an audible warning that the selected pressure in the container for opening the pressure releasing apparatus
25 has been exceeded.

Figure 8 shows an alternative embodiment of the pressure releasing apparatus 270 closed and Figure 9 shows the same embodiment open. This pressure releasing apparatus 270 is suitable for fitting into the piston 106 of the dispenser shown in Figure 2 or into the housing of the dispenser as shown in Figure 3 or into the wall of a
30 container as shown in Figure 7.

In the pressure releasing apparatus 270, the plug has a conical butt 205 at a first end which seals to a complementary conical portion 105 of the barrel opening at the exterior side of pressure releasing apparatus when it is closed as shown in Figure 8. The exterior side 108 of the barrel is flush with the end of conical butt 205.

- 5 The flush surface facilitates use of the pressure releasing apparatus 270 shown in Figures 8 and 9 in a piston to replace the piston 106 in the dispenser shown in Figures 2 and 3.

When the pressure releasing apparatus 270 is open, a gap is opened between the conical butt 205 of the plug and the conical portion 105 of the barrel opening.

- 10 A third spring 210 will operate effectively to close a plug with a conical butt in a conical portion of the barrel opening as shown in Figures 2, 3, 4, 5, 6 and 7.

- As shown in Figures 8 and 9 the pressure releasing apparatus does not require third spring to operate. In the embodiment shown in Figures 8 and 9 there is a resilient portion of the plug 209 which is intermediate the conical butt 205 and the cone shaped distal end 212. The resilient portion 209 of the shank is stretched to bias the conical butt of the plug against the conical opening of the barrel to close the pressure releasing apparatus.

- 20 There is a tunnel 214 through the cone shaped distal end of the plug 212. The tunnel allows the pressurised fluid to enter the barrel opening from the container. The gap shown in Figure 9 is opened between the butt end 205 and barrel opening conical end 105 when the pressure is at or above the first selected pressure and stretches the resilient portion 209 of the shank.

- 25 In the pressure releasing apparatus 270 there is also a second tunnel 215 which has entrances on the side 110 of the barrel which is interior the container and into the barrel opening. The tunnel allows pressurised fluid to enter the barrel opening and open the apparatus to allow the pressurised fluid out of container.

It is not essential for the pressure releasing apparatus 270 to have both first tunnel 214 and second tunnel 215. Either tunnel would be sufficient.

Figures 10 and 11 show open and closed states of a pressure releasing apparatus 280 suitable for use in a piston 106 as in Figure 2 and for use in a dispenser housing as in Figure 3 and for use in a container wall as in Figure 7.

5 The pressure releasing apparatus 280 comprises a third spring 211 outside the barrel to bias closed a plug having a conical butt 205 which is complementary to a barrel opening conical end 105.

Figures 12 and 13 show open and closed states of an alternative embodiment of a pressure releasing apparatus 290 suitable for use in a piston 106 as in Figure 2 and for use in a dispenser housing as in Figure 3 and for use in a container wall as in Figure 7.

10 The pressure releasing apparatus 290 comprises a barrel of resilient material 251 around an orifice 262. The resilient material 260 is biased in compression to bias the orifice to close itself. A shell 253 around the resilient material is not necessary but assists to compress the resilient material 260 to close the orifice 262. The shell 253 also provides structural material suitable for external threads 254
 15 to hold the pressure releasing apparatus in position in the piston 106 or dispenser housing first part 123 or the container wall 94. Lips 256 at the end of the shell hold the resilient material 251 in place against the pressure of the pressurised fluid.

The pressurised fluid inside the container acts on the interior side 111 of barrel resilient material 251 which is inside the container when the pressure releasing apparatus in
 20 situ. Above the selected pressure the pressurised fluid opens the orifice. A concave taper of the side 111 assists the orifice 262 to open more precisely at the selected pressure.

List of Integers mentioned Detailed Description and shown in Figures

	92	flange on piston
25	94	container
	95	neck of container
	98	counter sunk seat in piston at end of barrel
	104	wall of barrel opening portion with constricted diameter
	105	barrel opening conical end
30	106	piston
	107	piston head

- 108 exterior to container side of barrel
- 109 wall of barrel opening portion with larger diameter
- 110 interior to container side of barrel
- 111 tapered or conical internal side of barrel
- 5 112 passageway
- 122 housing second part
- 123 housing first part
- 124 upper and exterior end of housing
- 126 lower and interior end of housing
- 10 130 outer spring
- 132 tube
- 134 bottom and interior end of tube
- 136 annular seat
- 138 keg tap
- 15 138A keg tap gas inlet
- 138B keg tap central outlet pipe
- 138C keg tap handle
- 142 inner spring
- 144 flange in inner wall tube
- 20 146 annular seat
- 148 gasket
- 200 plug
- 204 plug head
- 205 conical butt
- 25 206 covering on underside of plug head
- 208 plug shank
- 209 plug shank which is resilient
- 210 third spring inside barrel opening
- 211 third spring outside barrel opening
- 30 212 plug distal end
- 214 first tunnel
- 215 second tunnel
- 250 pressure releasing apparatus embodiment in Figure 4, 5 and 6
- 251 barrel of resilient material
- 35 252 barrel
- 253 shell
- 254 external threads on barrel
- 256 lip on shell
- 262 orifice
- 40 270 pressure releasing apparatus embodiment in Figures 8 and 9
- 280 pressure releasing apparatus embodiment in Figures 10 and 11

290 pressure releasing apparatus embodiment in Figures 12 and 13

The invention has been described by way of examples only. Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since
5 numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the claims.

Claims:

1. A pressure releasing apparatus for releasing a gas and/or liquid under pressure in a container, the apparatus has a form to be mounted in a passageway from the interior to the exterior of the container and comprises a valve with a bias to close itself
5 characterised in that the valve is opened by the gas and/or liquid above a first selected pressure which overcomes the bias.
2. A dispenser comprising the pressure releasing apparatus according to claim 1, comprising: the passageway and means for supplying pressurised second gas into the container to dispense the gas and/or liquid under pressure in the container.
- 10 3. The dispenser according to claim 2 comprising a housing for coupling to a neck or opening of the container, the housing including the passageway in which the pressure releasing apparatus is mounted.
4. The dispenser according to claim 3 comprising a piston supported by the housing, the piston arranged to slide toward the interior of container to supply the
15 pressurised second gas into the container.
5. The dispenser according to claim 2 comprising a housing for coupling to a neck or opening of the container and a piston arranged to slide in the housing to dispense the gas and/or liquid in the container, the piston including the passageway.
6. The dispenser according to claim 5 comprising an outer dispenser part
20 movable within the housing to supply the pressurised second gas into the container, and the piston which slides in a conduit in the outer dispenser through which the pressurised gas and/or liquid in container is dispensed.
7. The dispenser according to any preceding claim wherein the gas and/or liquid under pressure in the container is released through the passageway when the valve is
25 opened above the selected pressure.
8. The dispenser according to any one of claims 2 to 7 wherein the valve comprises a plug guided in the passageway.
9. The dispenser according to claim 8 wherein the plug includes a head or butt to

seat on a barrel around the passageway.

10. The dispenser according to claim 8 or 9 comprising a resilient means acting on the plug and barrel to bias the valve to close itself.

11. The dispenser according to claim 10 wherein the stiffness of the resilient
5 means is preselected for the gas and/or liquid to overcome the bias provided by the resilient means to open the valve above the selected pressure.

12. The dispenser according to claim 10 or 11 wherein the resilient means includes a coil spring.

13. The dispenser according to claim 10, 11 or 12 wherein the plug is movable
10 along coaxial longitudinal axes of the plug and resilient means to open and close the valve.

14. The dispenser according to claim 10, 11, 12 or 13 wherein the resilient means is internal to passageway.

15. The dispenser according claim 9 wherein the plug includes a resilient portion
15 stretchable or compressible intermediate the head or butt and a distal portion of the plug urged against the passageway.

16. The dispenser according to claim 15 wherein the distal portion and the head or butt sustain equal and opposite forces applied by the resilient portion of the plug.

17. The dispenser according to any one of claims 8 to 16 wherein the plug
20 comprises a surface acted upon by the gas and/or liquid under pressure in a container to overcome bias to open the valve above selected pressure.

18. The dispenser according to claim 17 when dependent on claim 9 wherein the surface includes a portion of the head or butt.

19. The dispenser according to claim 18 wherein a portion of the surface is inside
25 the passageway.

20. The dispenser according to any one of claims 2 to 6 wherein the valve

comprises a barrel of resilient material around an orifice through which the gas and/or liquid under pressure in the container is released when the valve is opened above the selected pressure.

5 21. The dispenser according to claim 20 wherein the resilient material comprised in the barrel is biased in compression to bias the orifice to close itself.

22. The dispenser according to claim 21 wherein the resilient material which the barrel comprises includes a resilient band in tension around the orifice to bias the orifice to close itself.

23 A keg comprising the pressure releasing apparatus according to claim 1.

10 24. The keg according to claim 23 comprising the dispenser according to any one of claims 2 to 22.

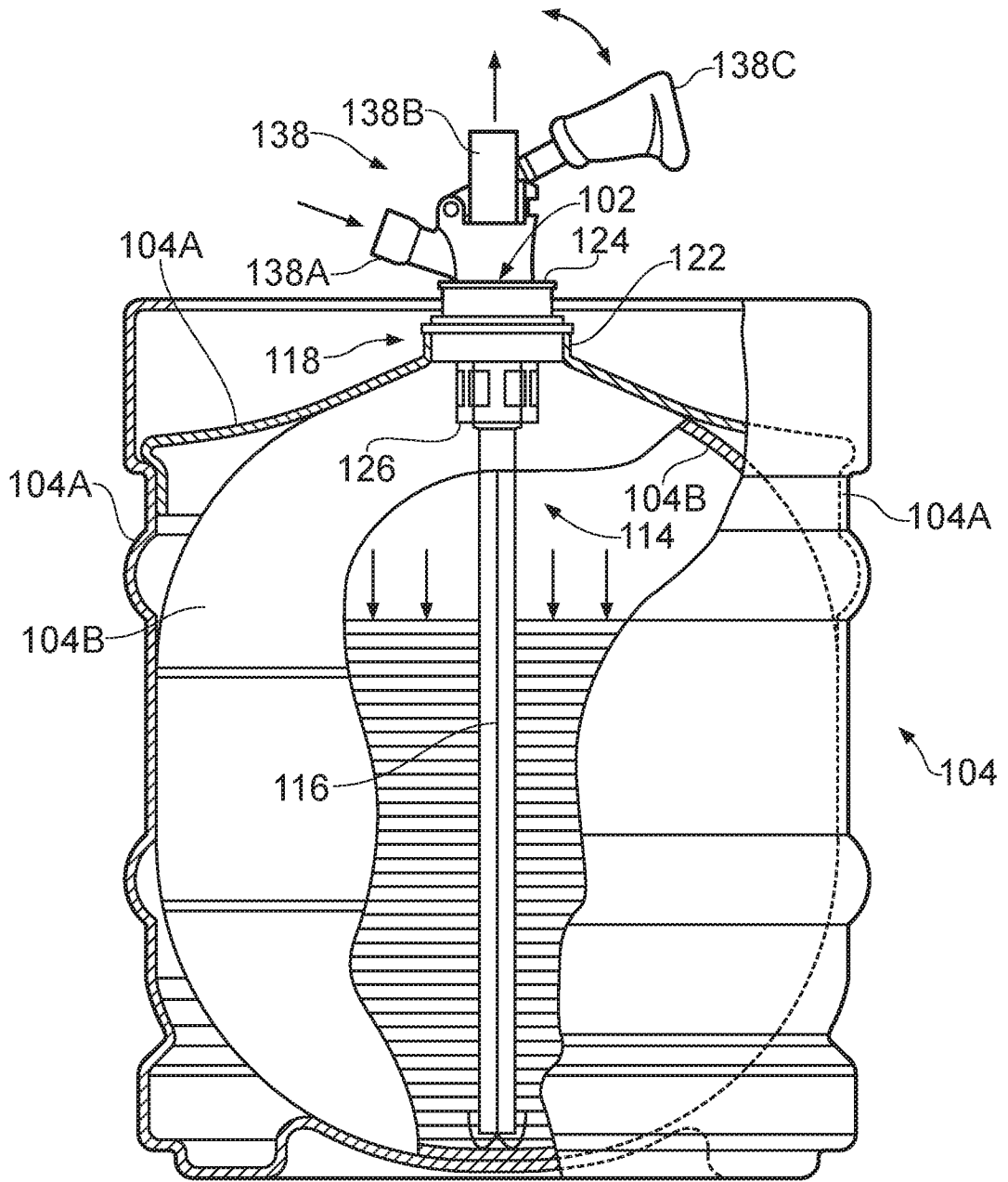


FIG. 1

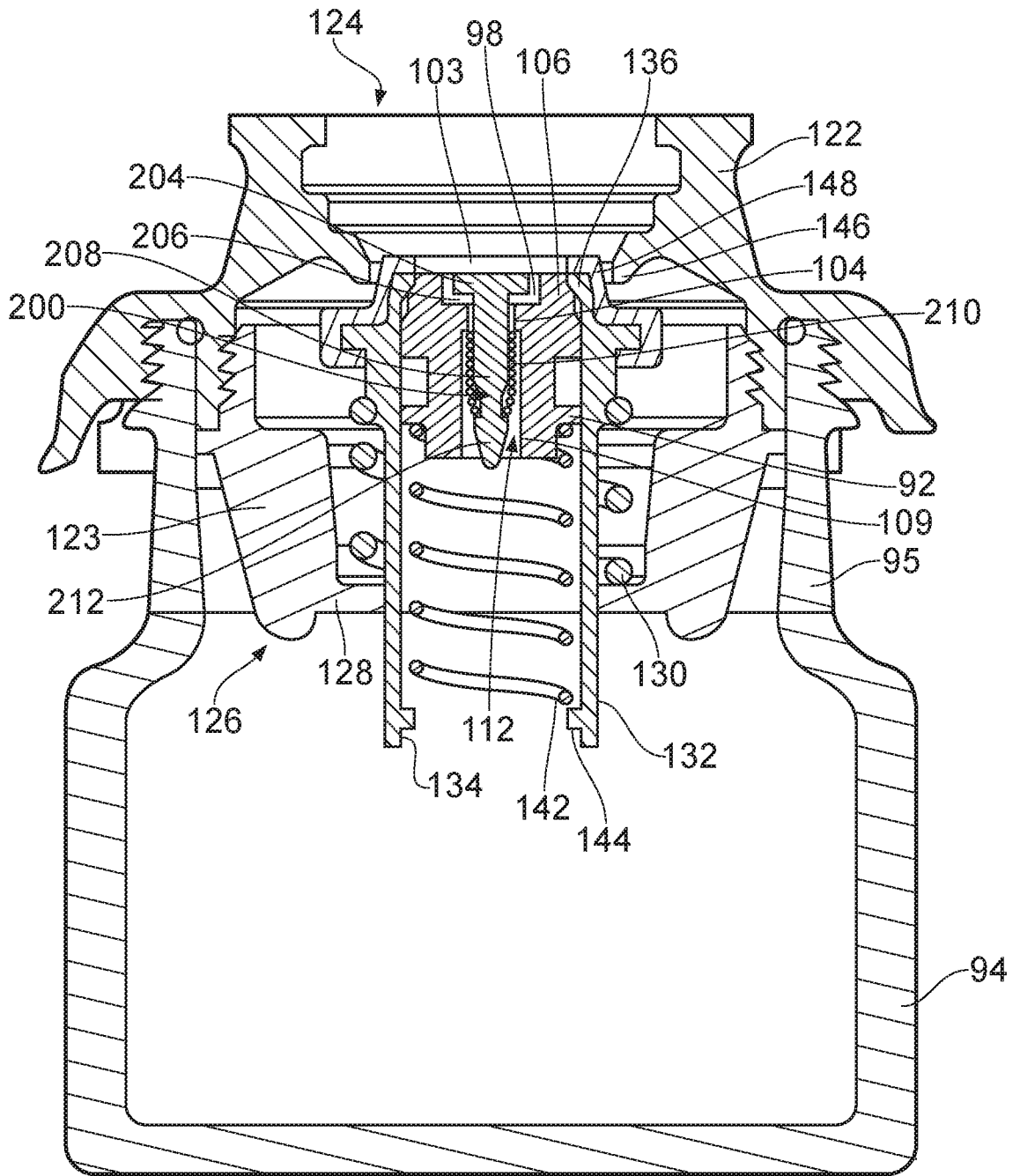


FIG. 2

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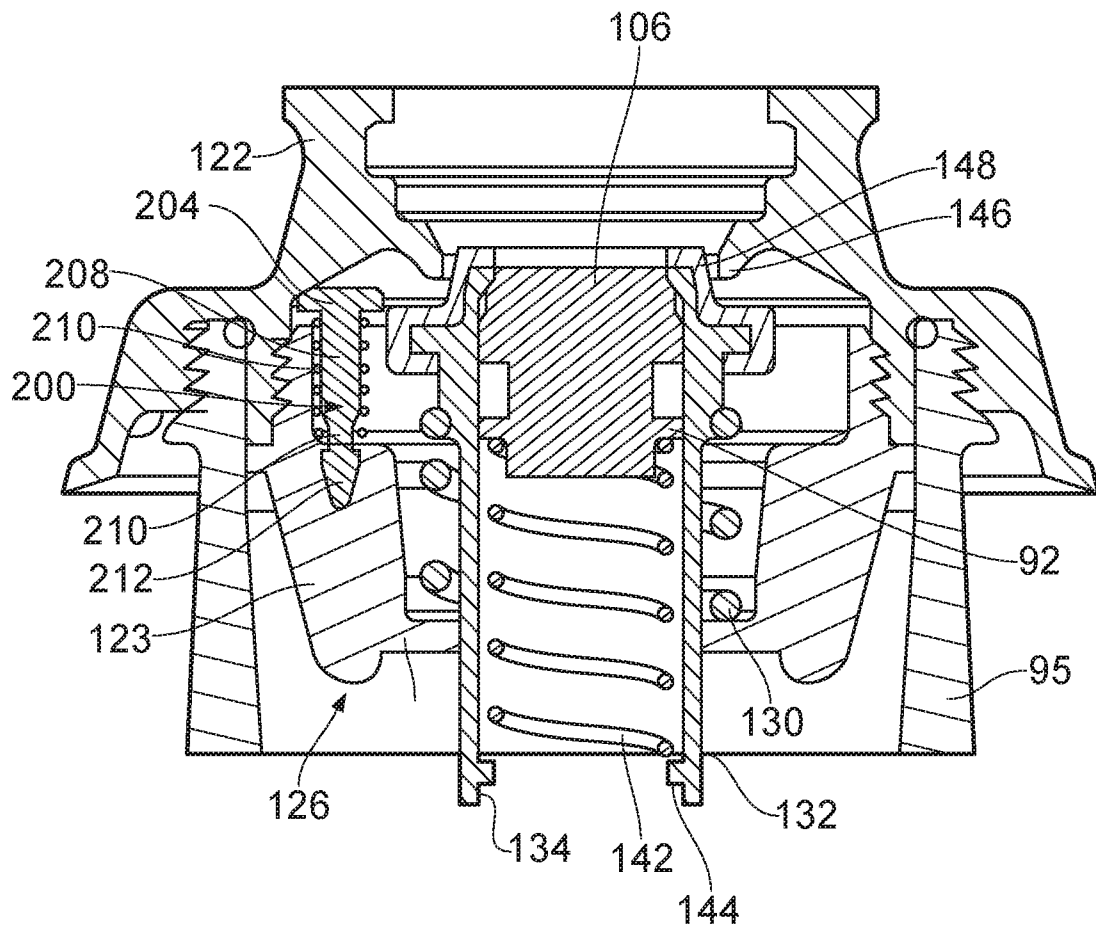


FIG. 3

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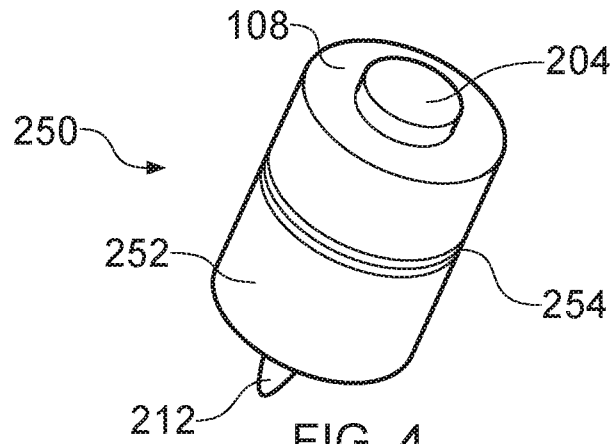


FIG. 4

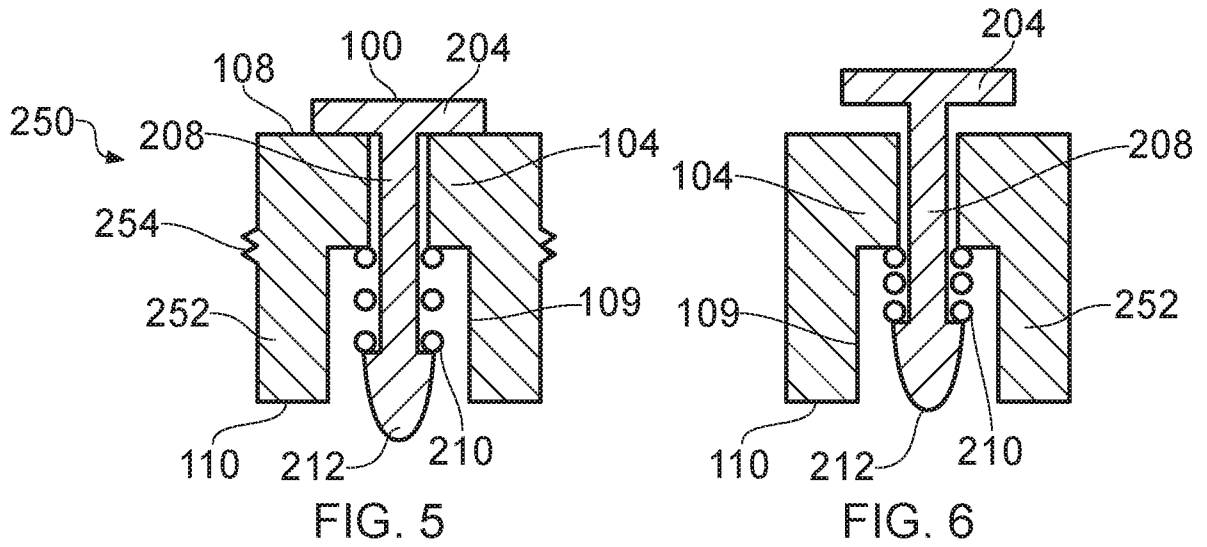


FIG. 5

FIG. 6

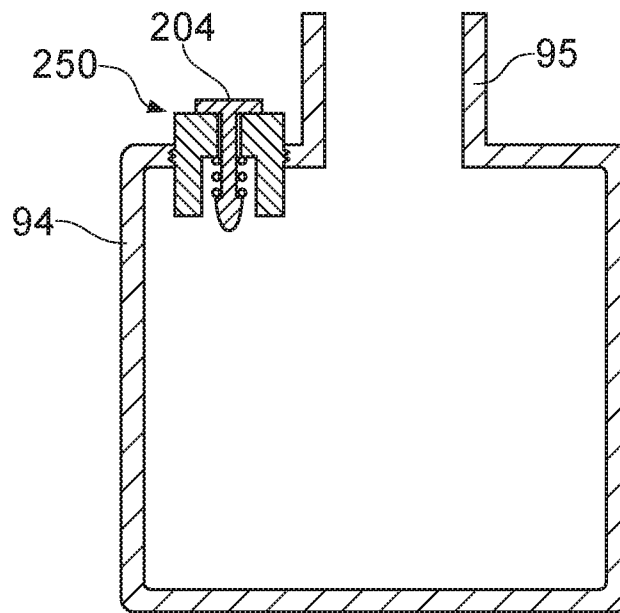


FIG. 7

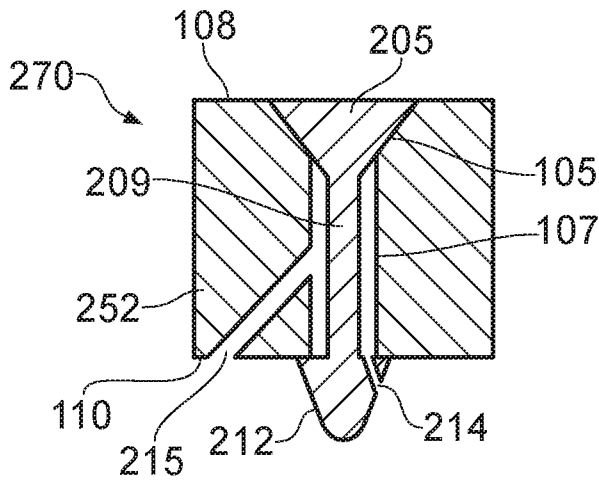


FIG. 8

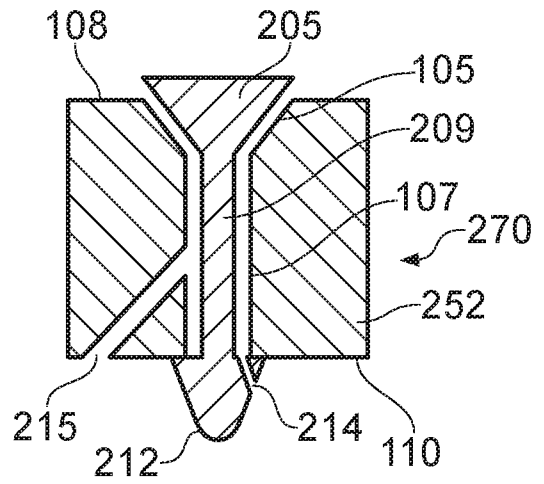


FIG. 9

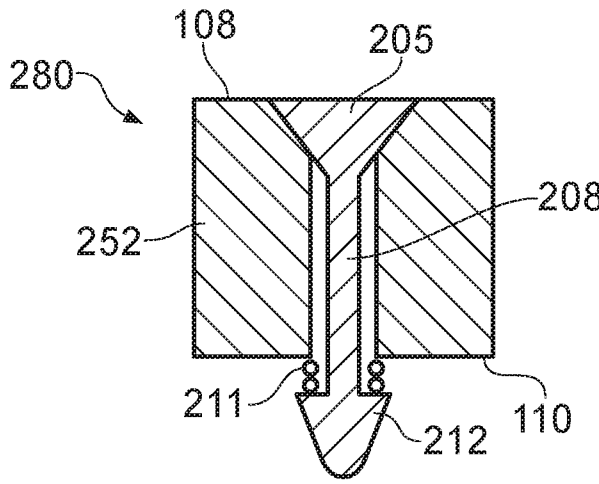


FIG. 10

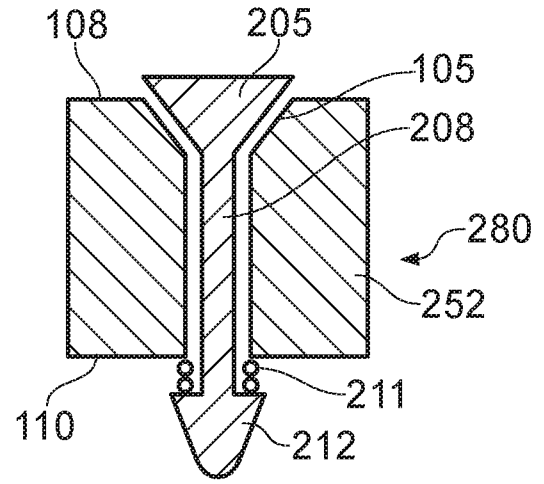


FIG. 11

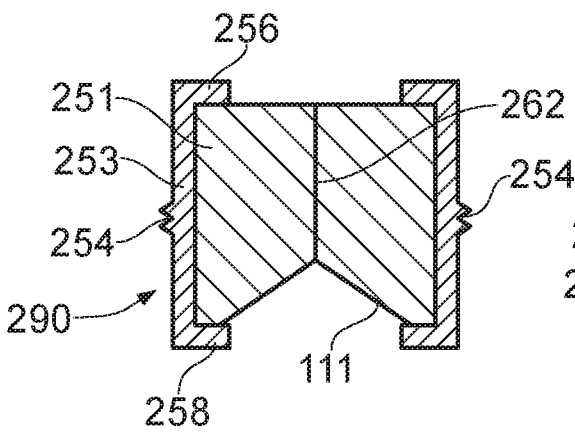


FIG. 12

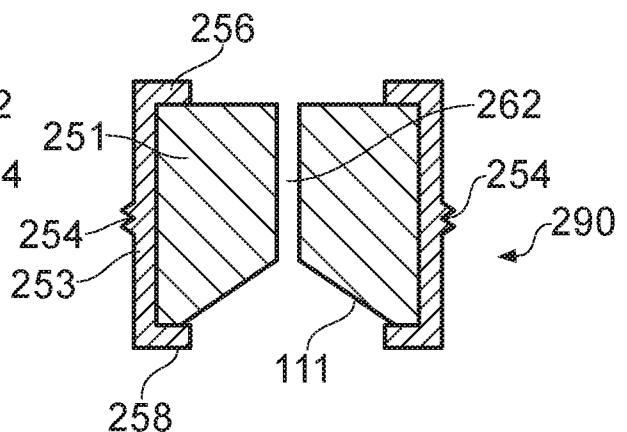


FIG. 13

INTERNATIONAL SEARCH REPORT

International application No PCT/IB2018/055162
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A. CLASSIFICATION OF SUBJECT MATTER INV. B67D1/08 B67D1/12 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) B67D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2012/149612 A1 (DISPACK PROJECTS NV [BE]; WAUTERS ALBERT MARIE [BE]) 8 November 2012 (2012-11-08) page 6, line 13 - line 15 page 6, line 31 - page 9, line 4 page 12, line 17 - line 30 page 17, line 27 - page 23, line 3 figures 2A, 2B, 2C, 13-21, 22A, 22B -----	1-14, 17-24
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
Date of the actual completion of the international search	Date of mailing of the international search report	
4 October 2018	15/10/2018	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Schultz, Tom	

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