

The invention relates to a closure for a metal barrel, with a tightening strap, termed "a fully openable closure". The invention relates more particularly to such a device making it possible to meet very strict requirements as regards safety in the field of the transportation of hazardous liquid substances.

Fully openable barrels are, in general, used for solid, powdered or granular substances. Their use is also required when it is necessary to pack liquids the viscosity of which is such that the use of a 70 mm bung is unsuitable, or also when it is necessary, before use, to mix the product transported or place it into suspension. Amongst these products, mention may especially be made of paints, lacquers, adhesives, etc.

Such products are often classified as hazardous or flammable in the legislations governing transportation. For barrels intended for the transportation of such substances which, typically, have a capacity greater than 100 litres, the requirements as regards impact resistance or sealing are particularly strict.

Many manufacturing methods or devices have already been tested out in an attempt to increase the robustness and safety of receptacles in this range, so as to reduce the possibilities of harmful effects as regards transportation and the environment.

In barrels with a tightening strap, the lid carries, at its periphery, a downwardly pointing groove equipped with a sealing gasket. The lid is placed on the body of the barrel so that the edge of the barrel, which is wound into a scroll, is inserted in the groove of the lid. The lid is held on the barrel by a tightening strap. This tightening strap consists of a split ring having an C-shaped cross-section, open towards the centre of the ring. It holds the lid and the edge of the wall of the barrel by clamping them against one another. The tightening strap may furthermore contribute, owing to its shape, to the rigidity of the assembly.

The contact of the tightening strap takes place essentially with the edge of the lid, on the one hand, and with the scroll-wound edge of the barrel, on the other hand. As a result, the position of the tightening strap is not rigid with respect to the wall of the barrel itself. The scroll is, in effect, an elastic and deformable member and, moreover, the position of the lid is itself determined by the state of compression of the seal, itself, by definition, being elastic and deformable.

With this type of closure, there is no possibility of the strap taking up part of the stresses which are exerted uncontrollably on the seal and the scroll of the barrel.

Thus, when the barrels are stacked, their successive weights are applied directly to their successive seals by means of their lids, at the risk of crushing them or ultimately, of damaging them.

Likewise, the application of too high an internal pressure in a barrel (as a result, for example, of storage at a high temperature), tends to cause the lid to rise with respect to the body, whence a high compression is applied, via the tightening strap, to the scroll which may then be deformed beyond its elastic limit.

The Utility Model Application DE-U-8616478 describes a receptacle equipped with a closure corresponding to the preamble of Claim 1, including a lid and a tightening strap, in which the lower rim of the strap is engaged in a groove making a turn of the sleeve. As soon as this strap is put in place in the bottom of the groove, these two components form a rigid assembly; it is therefore impossible to increase and to control the clamping of the seal. Moreover, if such a closure has to withstand an excess pressure, the edge of the lid, which is not supported laterally, easily deforms decompressing the seal, which then no longer provides the sealing of the assembly; what is more, the edge of the lid, stressed in tension can slip locally out of the tightening strap.

Patent GB-A-14581 A.D. 1910, describes a receptacle with an inversed scroll, made from tinplate, the lid of which is held by a ring. The

lower edge of this ring is elastically engaged in a groove making a turn of the sleeve. The profile of the strap determines, without the possibility for variation, the extent to which the seal is compressed; moreover, this type of closure cannot resist high stresses, the arrangement of the elements being such  
5 that each one is subjected independently to the loads tending to deform it.

The object of the present invention is to produce a closure device in which the sealing means are kept between clearly delimited compression values, regardless of the stresses exerted on the barrel, and in which these means themselves contribute more effectively to maintaining the sealing of the  
10 barrel.

Another object of the invention is to reinforce the assembly of barrels and their lids so that they meet these stricter quality standards as regards rigidity and drop strength.

Another object of the invention is to obtain barrels with a  
15 capacity greater than 100 litres, better resisting vertical stresses and therefore capable of being stacked without compromising the sealing of the closure.

Another object of the invention is to procure such barrels having better sealing and better resistance to the internal pressure.

Another object is to produce such a closure economically.

20 The subject of the present invention is a barrel equipped with a closure device, the said barrel including a sleeve closed at one end, the edge of the other end of this sleeve being wound into a scroll towards the outside, the closure device including a lid and a tightening strap. The lid has, at its periphery, an edge forming an annular groove open downwards, capable of receiving  
25 the scroll-wound edge of the sleeve of the barrel, this edge including a cylindrical collar pointing upwards, the top of which is connected, through the use of an upper annular part pointing towards the outside of the lid, to a rim pointing downwards; the said annular groove is lined with an elastic sealing gasket. The tightening strap consists of a split ring having a C-shaped cross-  
30 section, the opening of this C being turned towards the centre of the ring, this tightening strap consisting of an upper strip, of a middle part, and of a lower

strip ending in a free edge, the upper strip and the lower strip of the tightening strap bearing respectively on the upper annular part of the edge of the lid and on the lower part of the scroll-wound edge of the sleeve of the barrel. The sleeve includes abutment means located under the scroll-wound edge of the sleeve, these abutment means determining an annular concavity turned towards the outside of the barrel. The dimensions of the tightening strap are such that when it is tightened into place, the free edge of its lower strip is engaged in the annular concavity, the diameter of this free edge being greater than the diameter of the bottom of this concavity, the width of the concavity being such that it allows an axial displacement of the strap with respect to the sleeve so that when the strap is displaced upwards or downwards under the effect of a vertical stress, the free edge comes into abutment against the abutment means, thus limiting the displacement of this strap with respect to the sleeve.

The said annular concavity is therefore delimited by upper abutment means and lower abutment means. The distance between the upper and lower abutment means is such that it allows an axial displacement of the strap with respect to the sleeve so that a stress with a vertical component tends to modify the extent to which the elastic sealing gasket is compressed, the free edge of the lower strip of the tightening strap comes into abutment against one or the other of these abutments means thereby keeping the variation of this extent of compression between predetermined and relatively narrow limits.

According to an advantageous embodiment of the invention, the said annular concavity consists of an annular groove formed in the sleeve by upsetting towards the inside of the sleeve.

According to a preferred embodiment, the height of the cylindrical collar of the lid is such that when the tightening strap is tightened into place, the base of this cylindrical collar bears on the annular bead formed by the reverse side of the said annular groove, projecting towards the inside of the sleeve.

The said annular concavity may also consist of the space between two neighbouring annular beads projecting towards the outside of the sleeve. In

this case, it may be advantageous for the sleeve furthermore to include an annular bead projecting towards the inside of the sleeve, this annular bead being located at a height such that when the tightening strap is tightened into place, the base of the cylindrical collar of the lid bears on this annular bead. It should be noted that, both the annular bead projecting towards the inside of the sleeve and the neighbouring annular beads projecting towards the outside of the sleeve may possibly not be continuous over the entire perimeter of the sleeve. They may, indeed, consist of a series of bosses of greater or lesser widths, and greater or lesser spacing located one after another.

10                   According to a particular embodiment, the upper annular part of the edge of the lid has an upwardly convex curved cross-section.

                  According to a preferred embodiment, the upper annular part of the edge of the lid has the shape of flat ring.

                  When the upper annular part of the edge of the lid has an upwardly convex curved cross-section, the middle part of the tightening strap has an outwardly convex curved cross-section, matched to the curved cross-section of the upper part of the edge of the lid, and may also bear against the downwardly pointing rim of the lid, when the tightening strap is tightened into place.

20                   According to a preferred embodiment, the upper strip of the tightening strap has the form of a flat ring, the middle part is of cylindrical shape, and the lower strip is inclined downwards into a frustoconical surface, the middle part bearing against the downwardly pointing rim of the lid when the tightening strap is tightened into place. It should be noted that this type of tightening strap may be used equally well with lids in which the upper annular part of the edge is curved and with lids in which the upper annular part has the shape of a flat ring.

                  When a tightening strap of the type described in the lattermost instance is used with a lid in which the upper annular part has the shape of a flat ring, it is generally advantageous for the downwardly pointing rim of the lid to have a height greater than two thirds of the height of the middle part of

the tightening strap.

According to an advantageous embodiment, the upper strip of the tightening strap extends beyond the cylindrical surface defined by the upwardly pointing collar of the lid, in the direction of the axis of the barrel, when the tightening strap is tightened into place.

According to a particular embodiment, the upwardly pointing cylindrical collar of the lid has a height equal to at least 1.5 times (and, for example, equal to approximately 2 times) the distance which, when the barrel is closed with the tightening strap tightened into place, separates the upper annular part of the lid and the lower part of the scroll of the sleeve.

According to a preferred embodiment, the downwardly pointing rim of the lid has a height such that when the barrel is closed with the tightening strap tightened into place, its lower end extends downwards beyond a horizontal plane passing through the centre of the scroll of the sleeve.

According to an advantageous embodiment, the elastic sealing gasket has a cross-section including a central part which is matched to the shape of the bottom of the groove in the edge of the lid, this central part carrying two lips of unequal length which taper towards their end, the shorter lip bearing against the upwardly pointing collar of the lid, the longer lip bearing against the downwardly pointing rim of the lid. It may be particularly advantageous for the longer lip of the sealing gasket to extend beyond the groove in the edge of the lid so that it can be clamped between the downwardly pointing rim of the lid and the scroll of the sleeve.

According to another variant embodiment of the invention, the groove in the edge of the lid has a width such that the scroll-wound edge of the sleeve of the barrel can be frictionally engaged therein.

Among the advantages of the invention, mention may be made of the fact that the seal, independent of the stresses, is subjected to only a very limited variation in compression, and that the effect of ageing is therefore not very marked.

Another advantage is that the correct fitting of the lid to the

barrel is much easier to control because if it is incorrectly positioned, it is impossible to tighten the tightening strap the free edge of the lower strip of which would abut against the sleeve.

Another advantage lies in that, since the tightening strap remains  
5 movable with respect to the sleeve it is possible, with the aid of a dynamometric tool for example, to tighten the strap very accurately and therefore to use components having mechanical characteristics and dimensions exhibiting a certain tolerance, whilst maintaining a perfectly reproducible sealing capability.

10 Another advantage is that aside their own function, the abutment means also play a part in the rigidity of the closure device.

Other features and advantages of the invention will emerge from the description hereafter of particular embodiments, reference being made to the drawings, in which:

15 Fig. 1 is a partial sectional view of a barrel closure of the prior art.

Fig. 2 is a partial sectional view of a barrel closure according to the prior art when the barrel is subjected to compression.

20 Fig. 3 is a partial sectional view of a barrel closure according to the prior art when the barrel is subjected to an internal excess pressure.

Figs. 4 to 7 are partial sectional views of four different embodiments of the barrel equipped with the closure device according to the invention.

25 Fig. 1 is a partial sectional view of a barrel according to the prior art, closed by a lid 1 which is clamped in place by a tightening strap 2.

The sleeve 3 of the barrel is bordered by a scroll 4 wound towards the outside. The lid 1 includes a central disc 5 which is attached peripherally to the base of a collar 6. The top of this collar is extended by an upper annular part 7 of curved cross-section, the end of which is folded  
30 downwards so as to form an outer rim 8 substantially parallel to the collar 6. The collar 6, the curved part 7, and the outer rim 8 determine a groove 9 in

which a seal 10 is placed.

The tightening strap 2 consists of a split ring; its cross-section assumes the shape of a C, the opening of this C being turned towards the centre of the ring.

5 This tightening strap 2 consists of an upper strip 11 which has the form of a flat ring, of a middle part 12 which is of cylindrical shape and of a lower strip 13 which is inclined downwards into a frustoconical surface.

10 The tightening strap 2, once put in place and tightened by tightening means (which are not represented) such as a bolt-type or lever-type closure, holds the lid 1 hermetically in place on the barrel.

This relative immobilization is obtained by the clamping of the upper part 7 of the lid 1, of the seal 10 and of the scroll 4 between the flat ring 11 and the frustoconical strip 13, and by the contact of the cylindrical middle part 12 of the strap 2 against the rim 8 of the lid 1.

15 According to known practice, the rigidity of the assembly is enhanced by giving the collar 6 of the lid 1 an increased height (here, almost twice the distance which separates the upper annular part 7 of the lid 1 and the lower part of the scroll 4).

20 As emerges from Fig. 1, the tightening strap 2 according to the prior art does not come into contact with the lateral wall of the barrel, the scroll 4 being a member offering elastic support to the frustoconical strip 13.

Fig. 2 illustrates the effects on a barrel provided with a closure according to the prior art, of a force 14, 15 pointing downwards, applied to the lid 1 or to the strap 2 (for example following stacking).

25 The tightening strap 2 is subjected to a downward translation. The lid 1 tends to cave further into the body of the barrel. The scroll 4 caves into the groove 9 and crushes the seal 10 at the bottom of this groove 9.

30 Beyond a certain limit, the seal 10 can no longer resume its initial shape after the stresses 14, 15 disappear. The scroll 4 is incapable of compensating for the loss in elasticity of the seal 10, and as a result the closure loses sealing capability.

Fig. 3 illustrates the effect of a reverse stress on the lid 1, due to an internal excess pressure 16 in the barrel according to the prior art. Under the effect of the excess pressure 16, the lid 1 pushes the tightening strap 2 upwards, which reduces the compression on the seal 10. The frustoconical strip 13 of the tightening strap 2 forces the scroll 4 to tighten up. When the internal pressure 16 stops stressing the lid 1 upwards, the latter tends to resume its initial position. However, since the configuration of the scroll 4 has changed, the seal 10 is no longer compressed in the same way, which may also impair the sealing of the closure.

It is moreover noted that if the pressure 16 becomes sufficiently high for the central disc 5 to start to dome (giving rise to the collar 6 folding back), the sealing of the barrel is completely compromised because the seal 10 at that moment is decompressed and it can no longer prevent the contents from passing between the deployed groove 9 and the scroll 4.

Fig. 4 is a partial sectional view of a barrel equipped with a closure device according to the invention.

In the embodiment shown in this figure, the upper annular part of the lid 1 has the shape of a flat ring 17. The tightening strap 18 is of a similar shape to the one shown in Figs. 1 to 3, but the frustoconical lower strip 19 is wider and its free edge 20 is engaged in an annular groove 21 formed in the sleeve 3 under the scroll 4. It will, however, be noted that the free edge 20 does not touch the bottom of the groove 21. In effect, when the tightening strap 18 is tightened into place, the diameter of this free edge 20 is less than the diameter of the cylindrical part of the sleeve 3, but greater than the diameter of the bottom of the annular groove 21 which is formed therein.

It may also be noted that the height of the collar 6 of the lid 1 is such that its base bears on the annular bead 22 which is the reverse side of the annular groove 21.

In the absence of stress, the free edge 20 of the frustoconical strip 19 is engaged without notable contact in the annular groove 21 over its entire perimeter. If a load 15 is applied from the top downwards onto the

tightening strap 18, the strap 18 overall is displaced downwards, the free edge 20 coming into abutment against the lower flank of the annular groove 21; the load 15 is transmitted via the frustoconical lower strip 19 directly to the sleeve 3 of the barrel, without affecting the geometry of the closure and practically without impairing the extent to which the seal 23 is compressed.

If a load 14 is applied downwards, directly to the lid 1, the corner formed by the central disc 5 and the collar 6 of the lid 1 comes into abutment against the annular bead 22 formed on the internal side of the sleeve 3 by the reverse side of the annular groove 21, without the seal 23 being affected by it.

In this case, as in the preceding one, the integrity of the seal 23 is maintained, it is not mistreated and retains its elastic properties.

If the lid 1 is subjected to a thrust 16 upwards, due for example to an excess pressure in the barrel, this thrust 16 is transmitted via the collar 6 and the flat ring 17 towards the tightening strap 18. The displacement of the latter upwards is, however, limited because it is retained by the free edge 20 of the frustoconical strip 19 which comes into abutment against the upper flank of the annular groove 21; the diameter of this free edge 20 effectively prevents it from coming back out of the annular groove 21. Neither damageable deformation of the scroll 4 nor decompression of the seal 23 can take place, and the barrel therefore retains its sealing.

It will be noted that in the closure device shown in Fig. 4, the flat ring 11 and the cylindrical middle part 12 of the tightening strap 18 bear respectively against the flat ring 17 and the cylindrical rim 8 in the edge of the lid 1.

All of these measures and also the annular groove 21 give rise to a stiffening of the structure of the upper part of the barrel and of the closure device, despite the fact that the collar 6 of the lid 1 is not as tall as for the lid shown in Fig. 1 (which, furthermore, allows a saving in metal).

The increase in rigidity offered by this type of closure to the overall barrel is sufficiently significant (especially for the strength of the barrel

in the event of it being dropped), so that for equal performance a thinner metal sheet can be used for the barrel and/or for the lid 1.

As can be seen by comparing a closure as shown in Fig. 4 with the one according to the prior art, the scroll 4 is only slightly engaged in the groove 9. Excellent sealing is nevertheless obtained owing to the constancy of the pressure exerted on the seal 23 and to the very shape of this seal 23. In the closure according to the invention, this seal 23, which fills practically all the space lying between the scroll 4, the groove 9 and the tightening strap 18 in fact has an asymmetric cross-section which, in conjunction with the abutment means, significantly contributes to the sealing of the closure. When it is in the uncompressed state, the seal 23 has a cross-section including a central part which is matched to the shape of the bottom of the groove 6 in the lid 1 and which is associated with two asymmetric lips 24, 25. The lip 25 placed towards the outside of the groove is longer and has a thicker cross-section. This outer lip 25 is wedged between the scroll 4 and the end of the outer rim 8. Under normal conditions, the two lips 24, 25 have the effect of obtaining a substantially uniform extent of compression over the entire width of the zone lying between the groove 9 and the scroll 4. However, the more the lid 1 is stressed by an internal pressure 16, the more the outer lip 25 is compressed, by a lever effect. The more the tightening strap 18 is retained at the base in the annular groove 21, the greater this effect, and this effect continues to act even if the pressure becomes sufficient to cause the central disc 5 to dome. In effect, the fulcrum offered by the annular groove 21 prevents a relative pivoting of the tightening strap 18 so that the rim 8 of the lid cannot escape, whilst the outer lip 25 of the seal 23 continues to provide the closure with sufficient sealing.

Fig. 5 shows another embodiment of the barrel closure according to the invention, with a tightening strap 26 of different cross-section.

This tightening strap 26 comprises an upper strip 27 in the form of a flat ring, a middle part 28 of curved outwardly convex cross-section, and a lower strip 29 in the form of a flat ring.

The upper annular part 7 of the edge of the lid 1 has an upwardly

convex curved cross-section. The middle part 28 of the tightening strap bears against the upper annular part 7 and against the rim 8 of the lid 1. The free edge 30 of the lower strip 29 of the tightening strap 26 is engaged in an annular groove 21 formed in the sleeve 3.

5                    Fig. 6 shows another embodiment of the invention, in which the movements of the tightening strap 2 are limited, no longer by an annular groove, but by annular beads 31, 32 projecting from the perimeter of the sleeve 3. The gap between these two beads 31, 32 delimits an annular concavity 33 in which the free end 34 of the lower strip 13 of the strap 2 is engaged, without  
10                    contact.

                    It will be noted that the peripheral beads 31, 32 may perfectly well be produced in discontinuous form and have the form of spaced segments projecting from the perimeter of the sleeve 3 or even that of two raised dotted lines.

15                    With the bottom of the annular concavity 33 corresponding to the initial diameter of the sleeve 3, the base of the collar 6 here bears on a bead 35 which is the reverse side of an annular groove 36 formed for this purpose, which makes it possible to use lids 1 provided with a taller collar 6.

                    Fig. 7 shows that it is perfectly possible to combine the two  
20                    embodiments, namely an annular groove 37 formed between two peripheral beads 31, 32 which, all things being equal, makes it possible to obtain a deeper annular concavity (and therefore more effectively to limit the movements of the tightening strap 2) and to hamper the downward movements of the lid 1 by virtue of the annular bead 38 which is the reverse side of the annular groove  
25                    37.

                    The width of the concavity determines the permitted "excursion" for the free edge 34, which excursion corresponds to the variations in dimensions tolerated for the seal 23 once the strap 2 is in place.

                    In the embodiment of the invention shown in Fig. 7 it will be  
30                    noted, furthermore, that the upper strip 11 of the tightening strap 2 extends, via its inner side 39, beyond the cylindrical surface defined by the collar 6 of

the lid 1, which gives increased rigidity to the tightening strap 2. Furthermore, the lower end of the rim 8 of the lid 1 extends, downwards, beyond a horizontal plane passing through the centre of the scroll 4.

The shape, mutual arrangement and respective dimensions of the constituent parts of the edge of the sleeve 3, of the edge of the lid 1, and of the tightening strap 2 are such that these various parts shelter behind one another and form a compact assembly with very good mechanical strength, as shown by numerous tests in which filled and closed barrels were subjected to impacts or drops. Even when, under the effect of these impacts or drops, the upper edge of the barrel sometimes deforms, the lid 9 is held in place and sealing remains ensured.

It will immediately be clear to the person skilled in the art that a "contactless engagement" of the free edge 34 in the annular concavity in no way precludes partial contact, or contact limited to one sector (which may arise owing to a slight distortion of the tightening strap), insofar as relative mobility of the lid 1 is not affected thereby and as it remains possible to adjust the tension in the strap, which can be done, for example, using dynamometric tools.



### CLAIMS

1. Barrel equipped with a closure device, the said barrel including a sleeve (3) closed at one end, the edge of the other end of this sleeve (3) being wound into a scroll (4) towards the outside, the closure device including a lid  
5 (1) and a tightening strap (2, 18, 26),

- the lid (1) having, at its periphery, an edge forming an annular groove (9) open downwards, capable of receiving the scroll-wound edge (4) of the sleeve (3) of the barrel, this edge including a cylindrical collar (6) pointing upwards, the top of which is connected, through the use of an upper annular  
10 part (7, 17) pointing towards the outside of the lid (1), to a rim (8) pointing downwards, the said annular groove (9) being lined with an elastic sealing gasket (23)

- the tightening strap (2, 18, 26) consisting of a split ring having a C-shaped cross-section, the opening of this C being turned towards the centre  
15 of the ring, this tightening strap (2, 18, 26) consisting of an upper strip (11, 27), of a middle part (12, 28), and of a lower strip (13, 19, 29) ending in a free edge (20, 30, 34), the upper strip (11, 27) and the lower strip (13, 19, 29) of the tightening strap (2, 18, 26) bearing respectively on the upper annular part (7, 17) of the edge of the lid (1) and on the lower part of the scroll-wound  
20 edge (4) of the sleeve (3) of the barrel,

- the sleeve (3) including abutment means located under the scroll-wound edge (4) of the sleeve (3), these abutment means determining an annular concavity (21, 33, 37) turned towards the outside of the barrel,

- characterized in that the dimensions of the tightening strap (2,  
25 18, 26) are such that when it is tightened into place, the free edge (20, 30, 34) of its lower strip (13, 19) is engaged in the annular concavity (21, 33, 37), the diameter of this free edge (20, 30, 34) being greater than the diameter of the bottom of this concavity (21, 33, 37), the width of the concavity (21, 33, 37) being such that it allows an axial displacement of the strap with respect to the  
30 sleeve (3) so that when the strap (2, 18, 26) is displaced upwards or downwards under the effect of a vertical stress, the free edge (20, 30, 34)



comes into abutment against the abutment means, thus limiting the displacement of this strap (2, 18, 26) with respect to the sleeve.

2. Barrel according to Claim 1, characterized in that the said annular concavity consists of an annular groove (21, 37) formed in the sleeve  
5 (3) by upsetting towards the inside of the sleeve.

3. Barrel according to Claim 2, characterized in that the height of the cylindrical collar (6) of the lid (1) is such that when the tightening strap (2, 18, 26) is tightened into place, the base of this cylindrical collar (6) bears on the annular bead (22, 38) formed by the reverse side of the said annular groove  
10 (21, 37), projecting towards the inside of the sleeve (3).

4. Barrel according to Claim 1, characterized in that the said annular concavity (33) consists of the space between two neighbouring annular beads (31, 32) projecting towards the outside of the sleeve (3).

5. Barrel according to Claim 4, characterized in that the sleeve (3)  
15 includes an annular bead (35) projecting towards the inside of the sleeve (3), this annular bead (35) being located at a height such that when the tightening strap (2) is tightened into place, the base of the cylindrical collar (6) of the lid (1) bears on this annular bead (35).

6. Barrel according to any one of the preceding claims,  
20 characterized in that the upper annular part (7) of the edge of the lid (1) has an upwardly convex curved cross-section.

7. Barrel according to Claim 6, characterized in that the middle part (23) of the tightening strap (26) has an outwardly convex curved cross-section, matched to the curved cross-section of the upper part (7) of the edge of the lid  
25 (1), and also bearing against the downwardly pointing rim (8) of the lid (1), when the tightening strap (26) is tightened into place.

8. Barrel according to Claim 6, characterized in that the upper strip (17) of the tightening strap (2, 18) has the form of a flat ring, the middle part (12) is of cylindrical shape, and the lower strip (13, 19) is inclined downwards  
30 into a frustoconical surface, the middle part (12) bearing against the downwardly pointing rim (8) of the lid (1) when the tightening strap (2, 18) is



tightened into place.

9. Barrel according to any one of Claims 1 to 5, characterized in that the upper annular part (17) of the edge of the lid (1) has the shape of flat ring.

5 10. Barrel according to Claim 9, characterized in that the upper strip (17) of the tightening strap (2, 18) has the form of a flat ring, the middle part (12) is of cylindrical shape, and the lower strip (13, 19) is inclined downwards into a frustoconical surface, the middle part (12) bearing against the downwardly pointing rim (8) of the lid (1) when the tightening strap (2, 18) is  
10 tightened into place.

11. Barrel according to Claim 10, characterized in that the downwardly pointing rim (8) of the lid (1) has a height which is greater than two thirds of the height of the middle part (12) of the tightening strap (2, 18).

12. Barrel according to any one of the preceding claims,  
15 characterized in that when the tightening strap (2, 18, 26) is tightened into place, its upper strip (11, 27) extends beyond the cylindrical surface defined by the collar (6) of the lid (1), in the direction of the axis of the barrel.

13. Barrel according to any one of the preceding claims, characterized in that the upwardly pointing cylindrical collar (6) of the lid (1)  
20 has a height equal to at least 1.5 times the distance which, when the barrel is closed with the tightening strap (2) tightened into place, separates the upper annular part (17) of the lid (1) and the lower part of the scroll (4) of the sleeve (3).

14. Barrel according to any one of the preceding claims,  
25 characterized in that the downwardly pointing rim (8) of the lid (1) has a height such that when the barrel is closed with the tightening strap (2) tightened into place, its lower end extends downwards beyond a horizontal plane passing through the centre of the scroll (4) of the sleeve (3).

15. Barrel according to any one of the preceding claims,  
30 characterized in that the elastic sealing gasket (23) has a cross-section including a central part which is matched to the shape of the bottom of the groove (9) in



the edge of the lid (1), this central part carrying two lips (24, 25) of unequal length which taper towards their end, the shorter lip (24) bearing against the upwardly pointing collar (6) of the lid (1), the longer lip (25) bearing against the downwardly pointing rim (8) of the lid (1).

- 5 16. Barrel according to Claim 15, characterized in that the longer lip (25) of the elastic sealing gasket (23) extends beyond the said groove (9) so that it can be clamped between the downwardly pointing rim (8) of the lid (1) and the scroll (4) of the sleeve (3).

- 10 17. Barrel according to any one of Claims 1 to 15, characterized in that the groove (9) in the edge of the lid (1) has a width such that the scroll-wound edge (4) of the sleeve (3) can be frictionally engaged therein.