

ANTI-FRAUD SEALING DEVICE

FIELD OF THE INVENTION

This invention relates to the field of sealing caps, and more particularly to that of anti-fraud sealing caps for the packaging of products of high value or of high reputation, typically in the field of alcohol, good keeping wine, liqueurs and spirits.

PRIOR ART

Caps which perform a function which prevents filling are already known, particularly from British Patents Nos. 2 057 390 A and 2 236 999 A.

These caps possess a non-return valve which prevents the receptacle which is provided with such a cap from being filled with a liquid which simulates the original contents with the aim of deceiving the final consumer.

OBJECT OF THE INVENTION

However, caps such as those described in the aforementioned British Patents do not constitute sufficient protection against fraud.

In fact, a fraud exists which is quite widespread, and which consists of recovering and recycling empty packaging, typically bottles which are specific to well known brands, of filling them with contents which are unrelated to the said brand, and of sealing them with the aid of caps which themselves are generally imitation caps.

The object of the invention is firstly to find means of reducing the possibilities of fraud by the recycling of empty packaging. It is subsequently to provide a clear indicator of first opening, such that in the event that empty packaging material is recycled, the packaging material bears the mark of fraud, or to prevent the reuse of an empty packaging unit.



DESCRIPTION OF THE INVENTION

The invention firstly relates to an anti-fraud sealing device for a receptacle with a neck, comprising the following elements:

- a) a headed stopper comprising a head and a cylindrical skirt,
- b) a rigid sleeve (or tube) comprising an upper flange, a cylindrical portion which is coaxial with said cylindrical skirt and which can interlock with the internal surface of said neck by means of fixation,
- c) a seal which is interlocked with said device before the first opening of said receptacle by virtue of retention means and which is separated from said device on the first opening of said receptacle by virtue of separation means, in such a way that said seal is free in said receptacle, said rigid sleeve having a contraction in area which prevents the extraction of said seal.

The device according to the invention is therefore firstly based on the presence of a rigid sleeve which cannot be separated from the neck of the receptacle, nor can it be deformed elastically, without destroying the receptacle, the receptacles generally being made of glass.

With this first means there is associated a second means which enables the absence of a first opening to be detected visually and/or audibly. The part which is termed a "seal" is in fact an indicator of the first opening: if it is situated at the level of the sealing cap formed by the said device, then the first opening must be accompanied by the descent of the said seal to the bottom of the receptacle. On the other hand, a capped receptacle in which the said seal appears at the bottom thereof would correspond to fraudulent production.

For this first subject to which the invention relates, the essential means of the invention indeed achieve the object of the invention, the said rigid sleeve being interlocked with said neck in a manner which is irreversible unless the receptacle itself is destroyed.

DESCRIPTION OF THE FIGURES

Figure 1 is an axial section through the device (1) according to the invention, showing, in the left-hand part of the Figure, the device before its complete engagement in a neck (3) of a receptacle (2), and in the right-hand part, the final position of the cap formed by the device (1).

In Figure 1, the rim of the neck (3) comprises an internal shoulder (16).

In this Figure, the fixation of the rigid sleeve (5) to the neck (3) is accomplished by the use of a flexible sleeve (6), the lower part (64) of which comprises an open metal ring (67) which functions as a spring and as a region of increased thickness, and is spread out axially against the internal surface of said neck by the insertion of said rigid sleeve (5) in said flexible sleeve (or tube) (6).

Figure 2 is similar to Figure 1, except that the rim (15) of the neck (4) does not comprise an upper shoulder.

Figure 3 is similar to Figure 1, except that the spreading out of the lower part (64) of said flexible sleeve (6) is accentuated by virtue of a region of increased thickness (9) comprising an incline (64), so as to press said flexible sleeve (6) against the internal surface of said neck (3) and to latch said rigid sleeve (5) in said flexible sleeve (6), and so as to reinforce the irreversible character of the fixation of said rigid (5) and flexible (6) sleeves to said neck (3).

Figure 4 is similar to Figure 1, except that instead of having an opening tongue (8) which is integral with the head (40) of the stopper (4), the opening tongue (82) is independent.

Figure 5 is similar to Figure 1, except that instead of having a stopper (4) comprising an impact rod (42), the means of impact on the seal (7) is a movable part (546) provided with an impact rod (548) which can slide in a channel (547) formed by the internal surface of said rigid sleeve (5). A mounting part (549) enables said movable part to be fitted. As illustrated in Figure 4, this part (546) may form a non-return valve which

functions to prevent filling, and which allows the contents of the receptacle to pass by virtue of openings (5460) and of the inclined roof (5470) when the valve is in the "up" position (receptacle inverted in order to pour out the contents of the receptacle), whilst when the valve is in the "down" position the openings (5460) are closed by the seat (5490) of the valve (receptacle in a vertical or inclined position).

Figure 6 is an axial half-section through the device according to the invention, and illustrates another means of fixation of the rigid sleeve (5) to the neck (3).

In contrast to the means of fixation of the preceding Figures, the fixation of said rigid sleeve to said neck (3) is accomplished by an adhesive layer (10) placed on the rim (15) of the neck (3).

The seal (7), which has a diameter larger than the inside diameter of said rigid sleeve (6), is maintained temporarily integral with the cylindrical part (41) of the stopper (4) by an adhesive layer (11).

Figure 7 illustrates, as a partial axial section, another mode of connection between the seal (7) and the stopper (4), by the cooperation of male (12) and female (13) parts, the elasticity of these male and/or female parts being sufficient to interlock or separate the seal (7) and the stopper (4) by means of a minimal force.

Figures 8a to 8d illustrate, as a partial axial half-section, various possibilities for the contraction in area (54):

- in Figure 8a, the contraction in area is formed by a bore (541) of the rigid sleeve (5),
- in Figure 8b, the contraction in area is formed by a fold (543) of said rigid sleeve (5),
- in Figure 8c, the contraction in area is formed by an inserted annular part (542),
- in Figure 8d, the contraction in area is also formed by an inserted annular part (542), and in addition the flexible circular flange (141) which is integral with said flexible sleeve (6) in the preceding Figures has been replaced by an insert (143) with a flexible circular edge (141).

In these Figures, the thickness profile of said flexible sleeve (6) is such that its external surface is substantially cylindrical before the complete insertion of said rigid sleeve (6),

its internal surface becoming cylindrical after said insertion and its external surface then being pressed against said stopper.

Figure 9 illustrates, as a partial axial section, the lower part of the device according to the invention, and illustrates the situation where said seal (7) is a disc or a cylinder, instead of being a ball which is typically spherical as in the preceding Figures.

Figure 9a is a projection in a horizontal plane of the various diameters of the device which play a part in the invention:

- the diameter of circle A (D_A) corresponds to the inside diameter of the rigid sleeve (5) or to the outside diameter of the skirt (41) of the stopper (4),
- the diameter of circle B (D_B) corresponds to the diameter of the opening formed by the flexible circular flange (141),
- the diameter of circle C (D_C) corresponds to the diameter of the seal (7),
- the diameter of circle D (D_D) corresponds to the diameter of the lower part of the rigid sleeve (6) which is situated below the contraction in area (54),
- the diameter of circle E (D_E) corresponds to the outside diameter of said rigid sleeve (5).

The following obvious relationship exists: $D_E > D_D > D_C > D_B > D_A$.

Figures 10 and 11 are partial views from below, and illustrate the situations where said flexible lower support comprises 4 tongues (142) (Figure 10) or a strip (144) having a central breaking zone (145).

Figures 12 and 13 are perspective views of the stopper (4).

Figure 12 illustrates the situation where said stopper (4) and said first opening tongue (8) are integral and are joined by a line of weakness (81). The removal of the tongue (8) can be facilitated by the presence of a vertical line of weakness (81) having a tear-off leader part.

Figure 13 illustrates the situation where said stopper (4) and said tongue (8) are not integral parts. In this situation, removal of the tongue can be effected by virtue of the vertical line of weakness (81) having a tear-off leader part.

Figure 14 illustrates, as an axial section, another embodiment of the invention where a non-return valve (17) is fixed to said rigid and flexible sleeves.

The illustration of the valve (17) corresponds to the final position of the valve, after the fixation of said device on to said neck (3) (right-hand part of the Figure).

This Figure also illustrates detection means (18) placed in a cavity (19) between sleeves (5) and (6).

Figures 15a, 15b and 15c illustrate, as axial sections, another embodiment of the invention in which said rigid sleeve (5) is extended by a mounting part (549) which is designed to cause the spreading of a slatted ring (68) after the insertion of said rigid sleeve (5) - as illustrated in Figures 15 b and 15 c - and thus to effect the axial locking of said rigid and flexible sleeves.

In this embodiment, which comprises the separation of a ball (7) when the first opening takes place (as illustrated in Figure 15c), an additional first opening and integrity indicator is illustrated as a hemispherical cap (146) joined to the end of said flexible sleeve (6) by a tongue (147).

Figures 16a and 16b relate to the slatted stainless steel ring (68) of Figures 15a to 15c. Figure 16a is a view from above of the ring (68) which is provided with 6 slats (69) of width 4 mm, the profile of which slats is shown in Figure 16b.

DETAILED DESCRIPTION OF THE INVENTION

According to a first embodiment of the invention, said means of fixation comprises a flexible sleeve (6) coaxial with portion (51) of said rigid sleeve (5), having an upper flange (60) and provided on its lower part (64) furthest from the opening of said neck (3) with means of latching with said neck (3), and permitting an axial locking of said rigid sleeve (5) by the cooperation of locking means of said flexible sleeve (6) and of said rigid sleeve (5).

As illustrated in Figure 1, said rigid sleeve (5) has circular reverse-locking catches (53) on its external surface, which are designed to cooperate with reverse-locking hollows (65) on the internal surface of said flexible sleeve (6). Taking into account the taper of

the internal surface of the neck, it becomes impossible to extract said rigid sleeve (5) without endangering the integrity of the neck itself. Said flexible sleeve may also have reverse-locking catches (66) on its external surface in contact with the neck. However, taking into account the difference in rigidity of the materials constituting said rigid sleeve (5) and said flexible sleeve (6), the latter may simply have a roughened surface without the presence of reverse-locking catches (66) or hollows (65).

According to this first embodiment, said means of latching comprises a radial spreading of said lower part (64), by virtue of its profile, on the introduction of said rigid sleeve (5), by axial displacement inside said flexible sleeve (6). This spreading results in an increase in the diameter of said lower part (64) and in the impossibility of withdrawing said device (1) from said neck (3) taking into account the flaring of the latter, and wherein said axial locking means may comprise the cooperation of reverse-locking catches (53) of the rigid sleeve (5) with those (65) of said flexible sleeve (6).

It is thus possible to obtain a set of rigid (5) and flexible (6) sleeves which are completely pressed against the internal surface of the neck, with the rigid sleeve compressing the flexible sleeve very strongly against the neck, particularly by virtue of the ring (67) or also by virtue of the region of increased thickness (9) shown in Figure 3.

According to another embodiment which is possible in accordance with the invention, said means of fixation comprises an adhesive layer (10) which permits the fixation of said rigid sleeve (5) to said neck (3), as shown in Figure 6.

The first embodiment of the invention, which calls for a rigid sleeve (6), is preferred, since it is based solely on mechanical means and does not call for any specific means in order to be put into effect at the packaging works, except for a simple axial displacement, as is clearly shown below. In contrast, the use of an adhesive may generally necessitate some specific means of use and may involve constraints which are more difficult to satisfy, such as the adhesive being fit for human consumption and compatible with the contents of said receptacle.

According to the invention, the rigid sleeve (5) comprises a contraction in area (54) so as to make it impossible to remove said seal (7), whether this removal be attempted before or after the first opening of the receptacle.

As illustrated in Figures 8a to 8d, said contraction in area (54) may be formed by an internal bore (541) of said rigid sleeve (5) which is smaller than the dimensions of said seal (7), or by an internal fold (543) of said rigid sleeve (5), or by the lower edge (544) of said rigid sleeve (5), or by an inserted annular part which is interlocked with said rigid sleeve (5) or with said flexible sleeve (6), and which has an internal opening of limited cross-section such that said seal cannot be extracted from said device or from said receptacle.

Said inserted annular part may be a fixed part (542) inside said rigid sleeve (5), as illustrated in Figures 8c and 8d, or may optionally be a movable part (546) having an axial course limited by the height of an internal channel (547) on the internal surface of said rigid sleeve (5), as illustrated in Figure 5.

According to the invention, said seal (7) may be separated automatically from said device when the first opening takes place, in two ways, either by pulling on the stopper (4) or by pressing on the stopper (4).

In the first case, as illustrated in Figures 6 and 7, said retention means comprise an adhesive layer (11), or the cooperation of male (12) and female (13) parts, or any other known means which makes said seal temporarily integral with said headed stopper (4) before the first opening of said receptacle. In this situation, said separation means which enable said seal (7) to be separated from said headed stopper (4) comprise said contraction in area (54), so that when withdrawing said headed stopper (4) upwards on the first opening the force of opening is sufficient for said seal (7) to come up against said contraction in area (54) and to be irreversibly separated from said headed stopper (4), and to fall into said receptacle.

In the second case, as is typically illustrated in Figure 1, said device comprises a first opening tongue (8) which performs a chocking function for said head (40) in such a way

that it only permits a downward axial displacement of said stopper (4) after the removal of said tongue (8) on said first opening. In this device, said seal (7), which is surrounded laterally by the peripheral wall formed by said rigid sleeve (5) and/or said flexible sleeve (6), is confined in a cage formed at the top by said contraction in area (54) and at the bottom by a lower flexible support (14) which constitutes said retention means; said separation means comprises said stopper or an extension thereof which acts as a means of impact (42) on said seal (7) in such a way as to ensure the irreversible ejection of said seal (7) on the downward axial displacement of the stopper (4) on the first opening. In this case, said lower support (14) may comprise a flexible circular flange (141) and/or at least one flexible tongue (142), said lower support (14) either being part of an insert (143) or optionally also the thinned end, in the shape of a tongue, of said rigid sleeve (5), said flanges or flexible tongues having a flexibility which is sufficient for them to be able to spread and allow said seal (7) to pass when there is impact on said seal (7) due to the downward axial displacement of the stopper (4) when the first opening takes place.

Said flexible lower support may also be formed by two opposing tongues which are joined so as to form a strip (144) having a central breaking zone (145), as illustrated in Figures 10 and 11.

Said stopper may comprise a means of impact (42) which, unlike said skirt (41), passes through the central opening of said contraction in area (54). This means may be a rod which is an extension of the skirt (41) of said stopper.

According to one particular embodiment of the invention, which is illustrated in Figure 5, said means of impact (42) is replaced by said movable part (546), which may comprise an impact rod (548), and which can function as a valve which prevents filling, by virtue of a profiled channel (547) which is level (5490) at its bottom part and inclined (5470) at its top part, the peripheral part of said movable part which faces said channel (547) being pierced, by means of openings (5460), solely in order to permit the passage of the contents of said receptacle.

The invention is applicable to standard receptacles with a typical rim (15) as illustrated in Figure 2. However, in order to enhance the inviolability of the device according to the invention still further, it is preferable to employ a receptacle in which the rim of the neck is modified as illustrated in Figure 1, in such a way that said upper flange (50) of said rigid sleeve (5) and optionally said upper flange (60) of said flexible sleeve (6) abut against an internal shoulder (16) so that the edge of these flanges (50,60) is protected, by the higher, external circular portion of the rim (160), from any attempt to destroy said device which would leave the neck (3) intact.

With regard to the stopper (4), and as illustrated in Figures 12 and 13, said first opening tongue (8) is either integral with said head (40) by way of a circular line of weakness (80) or is a separate part with an axial line of weakness (81).

According to the invention, the material forming said rigid sleeve (5) is a metal or metal alloy, a ceramic, or a plastic material having a high modulus of elasticity which is at least equal to $2 \cdot 10^3$ MPa.

The material is preferably stainless steel.

The material forming said flexible sleeve (6) is a plastic material having a modulus of elasticity less than that of the material forming the rigid sleeve (5), and which is preferably less by a factor of two.

This material is preferably a polyolefine, HDPE or PP.

However, it is possible to select a relatively rigid material for the material of said sleeve, provided that it is pre-heated at the time when the cap is fitted at the packaging works.

With regard to the stopper (4), this may be made of any material which can be employed for this use, but is preferably made of plastic material or of cork.

Said seal (7) is made of a material which is preferably rigid and which is inert to the contents of said receptacle, and is preferably made of glass, and has a shape which is preferably spherical or cylindrical. By its shape, its colour, or by any other physical or

physico-chemical characteristic, this seal may either contribute to the image conveyed by said receptacle and the associated brand, or may constitute a support for an identification or marking which can be employed to guarantee the authenticity of the product which is marketed.

According to one embodiment of the invention as illustrated in Figure 1, said upper flange (50) of said rigid sleeve (5) may comprise a raised circular rib (55) designed to cooperate with a hollow channel (43) of said head (40) of the stopper, the function of which, apart from assisting leak-tightness, is to assist the axial alignment of said stopper and of said rigid sleeve (5) and optionally the positioning of said first opening tongue (8).

According to the invention, it is advantageous that said contraction in area (54) and said seal (7) cooperate in a leak-tight manner, so that the outflow of the contents of said receptacle is made difficult, if not impossible, as long as said seal (7) has not been separated from said device on said first opening.

The present invention also relates to another anti-fraud sealing device (1) for a receptacle (2) with a neck (3), comprising the following elements:

- a) a headed stopper (4) comprising a head (40) and a cylindrical skirt (41),
- b) a rigid sleeve (5) comprising an upper flange (50), a cylindrical portion (51) which is coaxial with said cylindrical skirt (41) and which can interlocked with the internal surface of said neck (3) by means of fixation,
- c) a non-return valve (17) which prevents filling, which is interlocked with said rigid sleeve (5),

said means of fixation comprising a flexible sleeve (6) coaxial with portion (51) of said rigid sleeve (5), having an upper flange (60) and provided on its lower part (64) furthest from the opening of said neck (3) with means of latching with said neck (3), and permitting an axial locking of said rigid sleeve (5) by the cooperation of locking means of said flexible sleeve (6) and of said rigid sleeve (5).

Said valve (17) may be fixed to said rigid sleeve (5) by any means, for example by screwing it to the inside of the rigid sleeve which is threaded at its lower part, or as illustrated in Figure 14 also.

This device which comprises a non-return valve (17) does not enable the first opening to be made visible, which is a function which may also be performed, at least in part, by a closure cap. However, it forms a physical barrier of great solidity, which can be made as inviolable and as indestructible as said rigid sleeve (5) itself, and which prevents subsequent filling and therefore prevents the receptacle from being re-used.

The present invention also relates to the anti-fraud sealing cap comprising the device according to the invention in which said flexible sleeve (6) is employed. In this cap, which is intended to be used by the packaging works, said headed stopper is at least partially inserted, but is generally completely inserted, in said rigid sleeve (5), whilst said rigid sleeve (5) is only partially inserted in said flexible sleeve (6), so that firstly said cap can be manipulated without the separation of its various constituents, and secondly, when the sealing operation of said receptacle (2) is carried out, simply pressing on said head (40) effects the sealing of said receptacle, according to the process which follows.

This cap is typically illustrated in the left-hand part of Figure 1, where the partial latching of the rigid sleeve (5) in the flexible sleeve (6) can be seen.

In the event that the device according to the invention does not comprise a flexible sleeve (6), the device and the corresponding cap are identical.

The present invention further relates to the use of said devices according to the invention and of the caps according to the invention for the anti-fraud sealing of receptacles made of glass, particularly those containing alcohol, wines, liqueurs, spirits or other high-priced products (perfumes, etc.).

The present invention also relates to a method of irreversibly fixing a cap (17) on the rigid neck (3), which has a tapered portion, of a receptacle, by the sliding insertion of a cap according to claim 24, in which, simply by pressing (axial displacement) on said head (40) of said cap positioned on said neck (3), wherein

- a) the upper flange (60) of said flexible sleeve (6) firstly comes to rest on and in abutment with said rim (15, 16) before the relative displacement commences of said rigid sleeve (5) and of said flexible sleeve (6), the friction between the neck and the flexible sleeve necessarily being less than that between the flexible sleeve and the rigid sleeve,
- b) said upper flange (50) comes to rest on and in abutment with said upper flange (60) in such a way as simultaneously to spread out radially the lower part (64) of the flexible sleeve and to latch said flexible flange and said neck, and to lock said rigid sleeve (5) and said flexible sleeve (6), particularly by virtue of the latching of the reverse-locking catches (53, 65).

The left-hand part of Figure 1 corresponds to stage a) and to the cap as it appears before sealing, whilst the right-hand part of Figure 2 corresponds to stage b) and to the device according to the invention.

EXAMPLES OF EMBODIMENTS

EXAMPLE 1

Anti-fraud sealing caps were produced as shown in Figure 1.

As mentioned above, the left-hand part of Figure 1 corresponds to the cap before the capping operation, and the right-hand part corresponds to the cap after the capping operation (anti-fraud sealing device).

The materials which were used were as follows:

- the stopper (1) is made from a plastic material (tests with PP and with HDPE) and was produced by injection moulding,
- the rigid sleeve (5) is made of stainless steel, and was produced by machining,
- the flexible sleeve (6) is made of plastic material, and was produced by injection moulding,
- the seal (7) is a glass ball.

The dimensions of this cap correspond to the references (capital letters) in Figures 1 and 2, which have the following meanings and numerical values:

- A (Figure 1) = outside diameter of the cylindrical skirt (41) of the stopper (4) or inside diameter of the rigid sleeve (5) = 9 mm
- B (Figure 1) = diameter of the opening (free space) formed by the flexible circular flange (141) = 8 mm
- C (Figure 1) = diameter of the glass ball (7) = 11 mm
- D (Figure 1) = inside diameter of the rigid sleeve (5) below the contraction in area (54) = 11.5 mm
- E (Figure 1) = outside diameter of the rigid sleeve (5) or inside diameter of the flexible sleeve (6) at the level of its upper flange (60) = 16 mm
- F (Figure 1) = diameter of the means of impact (42) = 3.5 mm
- G (Figure 1) = minimum inside diameter of the neck (3) = 18 mm
- H (Figure 1) = outside diameter of the flanges (50,60) = 22 mm
- I (Figure 1) = outside diameter of the head (40) of the stopper (4), substantially equal to the outside diameter of the neck (3) = 30 mm
- J (Figure 1) = outside diameter of the cylindrical portion (61) of the flexible sleeve (6) = 18 mm
- K (Figure 1) = inside diameter of the neck (lower part) = 20.5 mm
- L (Figure 1) = outside diameter of the ring (67) (or of the lower part (64) if there is no ring) after insertion of the rigid sleeve (5) = 20.5 mm
- M (Figure 1) = outside diameter of the ring (67) (or of the lower part (64) if there is no ring) before insertion of the rigid sleeve (5) = 17 mm
- N (Figure 2) = height between the rim (15/160) and the ring (67) after capping = 32 mm
- O (Figure 2) = height between the rim (15/160) and the lower end of flexible sleeve (6), after capping = 40 mm
- P (Figure 2) = diameter of the ring (67) (cross-section) = 2 mm
- Q (Figure 2) = height of the head (40) of the stopper (4) = 8.5 mm
- R (Figure 2) = height of the first opening tongue (8) = 6.5 mm
- S (Figure 2) = thickness of the upper flange (50) of the rigid sleeve (5) = 5 mm
- T (Figure 2) = thickness of the upper flange (60) of the flexible sleeve (6) = 5 mm
- U (Figure 1) = inside diameter of the external circular part of the rim (160)

- V (Figure 2) = axial distance between the upper flanges (50) and (60) corresponding to the cap before capping = 10 mm

It is important to note that, in reality, and in contrast to what is illustrated in the Figures, said lower part (64), particularly the ring (67), press against the inside wall of the neck.

Other elements of description:

- the rigid sleeve (5) comprises 3 annular reverse-locking catches (53), and has an external profile at its lower part which is matched to and designed to cooperate with the internal profile of the lower part (64) of the flexible sleeve (6),
- the flexible sleeve (6) comprises 4 annular reverse-locking catches (65) on its internal surface, the 3 upper hollows being occupied by the 3 corresponding catches of the rigid sleeve before capping so as to interlock the different parts of the cap before capping, the 3 lower hollows being occupied by said 3 catches of the rigid sleeve after capping. The flexible sleeve (6) also comprises annular reverse-locking catches (66) on its external surface. Apart from the axial latching of the rigid and flexible sleeves, these annular catches and hollows ensure that the liquid is contained in said receptacle (2) in a leak-tight manner.
- the lower part (64) of the flexible sleeve (6) comprises a lower support (14) formed by a tapered ring (146) and 4 support tongues (142) disposed at 90° as illustrated in Figure 10; each tongue, which has a width of 3 to 6 mm based on tests, has a flexible end (141) which allows the ball (7) to pass through irreversibly when the first opening takes place. The tests according to Example 1 were typically performed with a tapered ring (146) of thickness between 0.1 and 0.5 mm, and tongues (142) with a thickness less than or equal to this, which could be of the order of 0.05 mm at the flexible end (141).
- the metal ring (67) which encompasses the lower part (64) is an open ring with a spring action such that it has an outside diameter M before capping which is less than the inside diameter of the mouth of the neck, and after capping it has an outside diameter L which is close to the inside diameter K of the lower part of the neck.

The object of the invention is indeed achieved by the caps according to Example 1 of the invention.

In practice, by virtue of the means of the invention, firstly the rigid (5) and flexible (6) sleeves are irreversibly interlocked to the neck (3) of the receptacle (2). In this respect, due to the metal/glass contact with the neck, the metal ring (67) plays a particular part, in the sense that it will cause the destruction of the neck if a fraudulent attempt is made to extract the sealing device or the cap according to the invention from the neck, with the aim of recycling said receptacle.

Moreover, the fraudulent re-use of the receptacle with its sealing device would be difficult. In practice, the support tongues (142) tend to oppose the repositioning of the ball in its initial position above said tongues (142).

In order to make any fraudulent attempt to reposition the ball (7) even more difficult, other means are described in Examples 2 and 3 which follow.

EXAMPLE 2

This example is similar to Example 1.

It differs therefrom merely in that the support tongues (142) were replaced by a support strip (144) as illustrated in Figure 11. This strip has a central breaking zone (145) in the form of a prior incision.

In contrast to the support tongues (142) of Example 1, the support strip (144) of Example 2 has a lesser thickness so as to exhibit no elasticity in flexure and thus not to be capable of exerting the least action as a support once the breaking zone (145) has been destroyed.

In the tests of Example 2, this thickness was between 0.005 and 0.03.

For Example 2, a HDPE having a low breaking elongation was selected, so as to facilitate the breaking of the breaking zone (145) by pressing on the ball when the first opening takes place.

Once the breaking zone (145) is destroyed, the two remanning portions of said strip (144) do not have an elasticity which is sufficient for them to be capable of supporting the ball if necessary if there is a fraudulent attempt to re-use the receptacle with its cap.

EXAMPLE 3

This example is similar to Example 1.

It differs therefrom in that, as shown in Figure 5, the impact rod (42) which is integral with the stopper (4) was replaced by a movable part made of stainless steel (546). This movable part performs the function of a non-return valve which prevents filling, by virtue of the openings (5460) and of the inclined roof (5470) which allow the contents of the receptacle to be poured out, and by virtue of the valve seat (5490) which opposes the subsequent filling of the receptacle.

In practice, this movable part (546) opposes any attempt to cause any means to penetrate the receptacle with the aim of obtaining access to the ball in order fraudulently to reposition it above the support tongues (142).

EXAMPLE 4

Caps were produced as shown in Figure 14, similarly to the caps according to Example 1, except that the following were used:

- a rigid tube (5) without a contraction in area (54),
- a flexible tube (6) without support tongues (142),
- a stopper (4) without a means of impact (42),
- a non-return valve (17) made of stainless steel in place of a ball or seal (7), the non-return valve in the design illustrated in Figure 14 being fixed by its flange which is held between the ends of the rigid (5) and fixed (6) sleeves.

In another test according to Example 4, this valve (17) was screwed to the inside of the rigid sleeve, the inside of which sleeve was threaded at its lower end.

In other tests, valves made of high rigidity plastic material were also used.

In all these cases, and in the case of caps according to the preceding examples, the non-return valve (17), which was associated with the presence of inviolable sleeves (5,6) enable the fraudulent recycling of receptacles to be prevented.

The caps according to Example 4, in contrast to those of the preceding examples, prevent fraudulent filling, but they do not themselves possess the means of detecting the first opening. For the latter, a sealing cap which performs this function can be associated with the sealing cap according to the invention.

Figure 14 illustrates an anti-theft or identification means of detection (18) accommodated in a cavity (19) on the external surface of the rigid sleeve (5).

Any means of detection known in the art may potentially be suitable, provided that it satisfies the dimensional constraints. In general, these means of detection are formed by circuits which can be activated or deactivated at will:

they are deactivated on passing through the cash desk of any shop equipped with detection panels. However, the fraudulent passage of a receptacle which is not deactivated triggers a signal during the compulsory passage between the detection panels when leaving the shop.

These means of detection or identification are most often passive circuits which resonate with or modify the electromagnetic field which is emitted and detected by said panels.

These anti-theft means can be used on all the caps according to the invention, particularly on those of the preceding examples. The cavity (19) could also of course be situated in the flexible sleeve (6) provided that the thickness of said anti-theft or identification means of detection (18) permits this.

One of the benefits of the association of these anti-theft means with the present invention is based on the fact that they are made totally inaccessible by their confinement between two inviolable sleeves (5,6).

EXAMPLE 5

Caps were produced as shown in Figures 15a to 15c, and were provided with a slatted stainless steel ring (68). These caps were found to provide protection against fraud which is even greater than that of those provided with a ring (67).

ADVANTAGES OF THE INVENTION

The invention has enabled a range of anti-fraud sealing caps and devices to be developed. These are all products which are derived firstly from a concept of inviolability based on the association of two sleeves, one rigid (5) and one flexible (6). This concept is all the more beneficial in that its implementation during capping may generally only necessitate a simple axial displacement.

This range has different degrees of inviolability, as has been shown previously. With the products according to the invention, it is therefore possible to ensure that any attempt to separate said sleeves (5,6) from the neck results in the destruction of the neck, which is the sought-after objective.

The invention is based secondly on the addition to a set of inviolable sleeves (5,6) of other complementary means, either in order to provide evidence of a first opening - typically by the use of a seal (7) which is detachable when the first opening takes place, or to prevent subsequent fraudulent filling - typically with the aid of a non-return valve. In these two cases, the recycling and the reuse of empty receptacles are prevented.

This concept of inviolability may also be applied to fields other than that of wines, liqueurs, alcohol and spirits. It can also be applied to the field of perfumes or other luxury products provided that there is an adaptation, particularly of the dimensions, to these luxury products.



CLAIMS

1. An anti-fraud sealing device (1) for a receptacle (2) with a neck (3), comprising the following elements:
 - a) a headed stopper (4) comprising a head (40) and a cylindrical skirt (41),
 - b) a rigid sleeve (5) comprising an upper flange (50), a cylindrical portion (51) which is coaxial with said cylindrical skirt (41) and which can interlocked with the internal surface of said neck (3) by means of fixation,
 - c) a seal (7) which is interlocked with said device before the first opening of said receptacle by virtue of retention means and which is separated from said device on the first opening of said receptacle by virtue of separation means, in such a way that said seal is free in said receptacle, said rigid sleeve having a contraction in area which prevents the extraction of said seal.
2. A device according to claim 1, wherein said means of fixation comprises a flexible sleeve (6) coaxial with portion (51) of said rigid sleeve (5), having an upper flange (60) and provided on its lower part (64) furthest from the opening of said neck (3) with means of latching with said neck (3), and permitting an axial locking of said rigid sleeve (5) by the cooperation of locking means of said flexible sleeve (6) and of said rigid sleeve (5).
3. A device according to claim 2, wherein said means of latching comprises a radial spreading of said lower part (64), by virtue of its profile, on the introduction of said rigid sleeve (5), which spreading results in an increase in the diameter of said lower part (64) and in the impossibility of withdrawing said device (1) from said neck (3) taking into account the flaring of the latter, and wherein said axial locking means comprises the cooperation of reverse-locking catches (53) of the rigid sleeve (5) with those (65) of said flexible sleeve (6).



4. A device according to claim 1, wherein said means of fixation comprises an adhesive layer (10) which permits the fixation of said rigid sleeve (5) to said neck (3).
5. A device according to any one of claims 1 to 4, wherein said contraction in area (54) is formed by an internal bore (541) of said rigid sleeve (5) which is smaller than the dimensions of said seal (7), or by an internal fold (543) of said rigid sleeve (5), or by the lower edge (544) of said rigid sleeve (5), or by an inserted annular part which is interlocked with said rigid sleeve (5) or with said flexible sleeve (6) and which has an internal opening of limited cross-section such that said seal cannot be extracted from said device or from said receptacle.
6. A device according to claim 5, wherein said inserted annular part may be a fixed part (542) inside said rigid sleeve (5) or a movable part (546) having an axial course limited by the height of an internal channel (547) on the internal surface of said rigid sleeve (5).
7. A device according to any one of claims 1 to 6, wherein said retention means comprise an adhesive layer (11), or the cooperation of male (12) and female (13) parts, or any other known means which makes said seal (7) temporarily integral with said headed stopper (4) before the first opening of said receptacle, and wherein said separation means which enable said seal (7) to be separated from said headed stopper (4) comprise said contraction in area (54), so that when withdrawing said headed stopper (4) upwards on the first opening the force of opening is sufficient for said seal (7) to come up against said contraction in area (54) and to be irreversibly separated from said headed stopper (4) by falling into the receptacle.
8. A device according to any one of claims 1 to 7, which comprises a first opening tongue (8) which performs a chocking function for said head (40) in such a way that it only permits a downward axial displacement of said stopper (4) after the removal of said tongue (8) on said first opening, and wherein said seal (7), which is surrounded laterally by the peripheral wall formed by said rigid sleeve (5) and/or said flexible sleeve (6), is confined at the top by said contraction in area (54) and at the bottom by a lower flexible



support (14) which constitutes said retention means, said separation means comprising said stopper or an extension thereof which acts as a means of impact on said seal (7) in such a way as to ensure the irreversible ejection of said seal (7) on the downward axial displacement of the stopper (4) on the first opening.

9. A device according to claim 8, wherein said lower support (14) comprises a flexible circular flange (141) and/or at least one tongue (142), said lower support either being part of an insert (143) or the extension of said flexible sleeve (6) or said rigid sleeve (5), said flanges or tongues having a flexibility which is sufficient for them to be able to spread out and allow said seal (7) to pass when there is impact on said seal (7) as a result of said downward axial displacement of the stopper (4).

10. A device according to claim 9, wherein said lower support is formed by two opposing tongues which are joined so as to form a strip (144) having a central breaking zone (145).

11. A device according to any one of claims 8 to 10, wherein said stopper comprises a means of impact (42) which, unlike said skirt (41), passes through the central opening of said contraction in area (54).

12. A device according to any one of claims 6 and 8 to 10, wherein said means of impact (42) is replaced by said movable part (546), which may comprise an impact rod (548), and which functions as a non-return valve which prevents filling, by virtue of a profiled channel (547) which is level (5490) at its bottom part and inclined (5470) at its top part, the peripheral part of said movable part which faces said channel (547) being pierced solely in order to permit the passage of the contents of said receptacle.

13. A device according to any one of claims 1 to 12, wherein said upper flange (50) of said rigid sleeve (5) and optionally said upper flange (60) of said flexible sleeve (6) abut either against the rim (15) of the neck or against an internal shoulder (16) in such a way that the edge of these flanges (50,60) is protected by the higher, external circular portion of the rim (160).



14. A device according to any one of claims 8 to 13, wherein said first opening tongue (8) is either integral with said head (40) by way of a circular line of weakness (80) or is a separate part with an axial line of weakness (81).
15. A device according to any one of claims 1 to 14, wherein the material forming said rigid sleeve (5) is a metal or metal alloy, a ceramic, or a plastic material having a modulus of elasticity at least equal to $2 \cdot 10^3$ MPa.
16. A device according to claim 15, wherein the material is preferably stainless steel.
17. A device according to any one of claims 2 to 16, wherein the material forming said flexible sleeve (6) is a plastic material having a modulus of elasticity less than that of the material forming the rigid sleeve (5).
18. A device according to claim 17, wherein said material is preferably a polyolefine, HDPE or PP.
19. A device according to any one of claims 1 to 18, wherein said headed stopper (4) is made of plastic material or of cork.
20. A device according to any one of claims 1 to 19, wherein said seal (7) is made of rigid material which is inert to the contents of said receptacle, and is preferably made of glass, and has a shape which is preferably spherical or cylindrical.
21. A device according to any one of claims 1 to 20, wherein said upper flange (50) of said rigid sleeve (5) comprises a raised circular rib (55) designed to cooperate with a hollow channel (43) of said head (40) of the stopper so as to assist the axial alignment of said stopper and of said rigid sleeve (5) and optionally the positioning of said first opening tongue (8).
22. A device according to any one of claims 1 to 21, wherein said contraction in area (54) and said seal (7) cooperate so as to prevent the outflow of the contents of said



receptacle as long as said seal has not been separated from said device on said first opening.

23. An anti-fraud sealing device (1) for a receptacle (2) with a neck (3), comprising the following elements:

- a) a headed stopper (4) comprising a head (40) and a cylindrical skirt (41),
- b) a rigid sleeve (5) comprising an upper flange (50), a cylindrical portion (51) which is coaxial with said cylindrical skirt (41) and which can interlocked with the internal surface of said neck (3) by means of fixation,
- c) a non-return valve (17) which prevents filling, which is interlocked with said rigid sleeve (5),

said means of fixation comprising a flexible sleeve (6) coaxial with portion (51) of said rigid sleeve (5), having an upper flange (60) and provided on its lower part (64) furthest from the opening of said neck (3) with means of latching with said neck (3), and permitting an axial locking of said rigid sleeve (5) by the cooperation of locking means of said flexible sleeve (6) and of said rigid sleeve (5).

24. An anti-fraud sealing cap comprising the device according to any one of claims 1 to 3 and 5 to 23, wherein said rigid sleeve (5) is only partially inserted in said flexible sleeve (6), so that firstly the cap can be manipulated without the separation of its various constituents, and secondly, when the sealing operation of said receptacle (2) is carried out, simply pressing on said head (40) effects the sealing of said receptacle.

25. The use of said devices according to any one of claims 1 to 23, and of the caps according to claim 24, for the anti-fraud sealing of receptacles, typically made of glass, containing alcohol, wines, liqueurs or spirits.

26. A method of irreversibly fixing a cap (17) on the rigid neck (3), which has a tapered portion, of a receptacle, by the sliding insertion of a cap according to claim 24, in which, simply by pressing on said head (40) of said cap positioned on said neck (3), wherein



a) the upper flange (60) of said flexible sleeve (6) firstly comes to rest on and in abutment with said rim (15, 16) before the relative displacement commences of said rigid sleeve (5) and of said flexible sleeve (6), the friction between the neck and the flexible sleeve necessarily being less than that between the flexible sleeve and the rigid sleeve,

b) said upper flange (50) comes to rest on and in abutment with said upper flange (60) so as simultaneously to spread out radially the lower part (64) of the flexible sleeve and to latch said flexible flange and said neck, and thus to lock said rigid sleeve (5) and said flexible sleeve (6), particularly by virtue of the latching of reverse-locking catches (53) in reverse-locking hollows (65).