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(54) **UNLOSEABLE CAP**

(57) A captive cap for a screw-neck container, with a cap shell (1), a ring (2) for the retaining thereof to the container, two articulable arms (3A, 3B) which at their forward extremities (31A, 31B) are linked to the cap shell (1) and at their rearward extremities (32A, 32B) are linked to the ring (2), an upper frangible line (10) extending circumferentially between 210° and 340° and defining a

frontal separation (31) between the forward extremities (31A, 31B) of between 150° and 20°, a lower frangible line (20) extending circumferentially between 180° and 330°, where the lower frangible line (20) comprises a recess (21) located at said frontal separation (31) and projecting toward the cap shell (1).

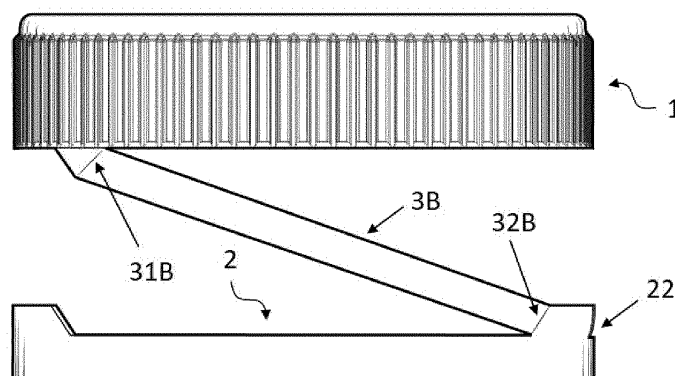


Fig. 3

Description

Field of the invention

[0001] The present invention relates to a captive cap destined for the closing of a screw-neck container. More specifically, the captive cap is of the type which comprises a ring for the retaining thereof to the container and articulable arms that enable the cap to remain linked to the retaining ring while open.

Background of the invention

[0002] Captive caps comprising a ring attached to the bottle and with arms linking the removable section with said ring are well-known in the state of the art. This makes it easier for the caps to be recycled together with the plastic of the bottles, instead of polluting the planet, for example by ending up in the sea via the sewer systems.

[0003] Most of this type of cap comprise a locking system to prevent the open cap from returning to its closed position. For example, document WO2020099516 discloses a captive cap with articulable arms and a recess, sized in such a way that the recess is blocked below the retaining ring due to the pulling force of the arms. The tendency of the cap to return to its position over the container opening, requiring the user to pay constant attention to the cap, is thus prevented. However, the necessary manipulation of the cap is not intuitive, and the user must be acquainted with this type of cap in order to block it. Furthermore, the cap remains upside-down, increasing the probability of catching particles that might contaminate the content of the container. It should be mentioned that said recess is intended to become locked in the retaining ring and not to endow the arms with greater flexibility.

[0004] In another version of this type of cap, portrayed in document WO2020041640, the arms extend over more than half the circumference of the cap, in such a way that the removable portion of the cap can be displaced to an open position without rotation, and remains in this position due to the resilience of the arms, with no need for locking. However, the joint that acts as a hinge between the arms and the removable portion is not sized so that the removable portion can remain easily in the open position, but the user must force the same for this to be possible.

[0005] Therefore, the structure of this type of cap might be improved in view of a cap retaining movement that is more convenient for the user.

Description of the Invention

[0006] The present invention provides a captive cap for a screw-neck container, comprising a cap shell with an internal thread sized to be screwed onto and unscrewed from the neck of the container, a ring for the retaining thereof to the container and two articulable arms

which at their forward extremities are linked to the cap shell and at their rearward extremities are linked to the ring. The cap shell comprises a capping wall and an annular wall, hermetically linked together, it being the annular wall that comprises the internal thread, and the capping wall that covers the container.

[0007] It goes without saying that the captive cap may be positioned in the space in countless ways, but in order to facilitate the explanation and the understanding of the invention, it will be supposed hereinafter that the cap is positioned as it would be when screwed onto a bottle resting on its base, that is, with the cap shell above the ring, its upper extremity and its lower extremity being thus defined.

[0008] The separations produced between said cap shell, said ring and said articulable arms at the time of opening the cap are defined first by an upper frangible line, defining the separable section of the cap shell with regard to the ring and with regard to the articulable arms, and which extends circumferentially between 210° and 340°, while in the remainder of the circumference a frontal separation of between 150° and 20° is defined between the frontal extremities of the articulable arms. And second, by a lower frangible line, defining the separable section of the ring with regard to the cap shell and with regard to the articulable arms, and which extends circumferentially between 180° and 330°, while in the remainder of the circumference a rearward separation of between 30° and 180° is defined between the rearward extremities of the articulable arms.

[0009] In order to make the joints between the forward extremities of the articulable arms and the cap shell less rigid and resilient, as these act as a hinge when the cap is opened and separated from the container, the captive cap is characterised by the fact that the lower frangible line comprises a recess located at said frontal separation and facing the cap shell.

[0010] Thanks to this recess, the rigidity and resilience of said joints is reduced; they can therefore be bent more easily and the tendency of the cap shell to return to its initial position is avoided. This characteristic is combined with a sufficient length of the articulable arms to enable the threaded section to be displaceable to the side of the rearward extremities of the arms, with no need to rotate it round any spatial axis. This combination of characteristics enables the threaded section to remain in a face-down position when open, without the user having to force it for it to remain in said position, and preventing contaminant particles from falling therein. In one possible embodiment, the recess comprises a horizontal upper section centred at said frontal separation. In a preferred embodiment, the upper section coincides on the same plane as the upper frangible line. In this way, the spaces available in the cap are exploited to their utmost, with the aim of achieving a reduction in the rigidity and resilience of said joints. In this case, the recess further comprises two oblique sections, which may be vertically defined, or preferably sloping, with a gradient of less than 90°. In this

last case, the preferred gradient is 45°. The fact that they are sloping facilitates the coupling of the recess when closing the cap once again.

[0011] In a preferred embodiment, the upper section extends circumferentially between 10° and 90°. Given that the range of extension of the upper frangible line is between 210° and 340°, each of the horizontal separations (that is, on a horizontal plane) between the extremities of the upper section of the recess and the extremities of the upper frangible line extend angularly at between 5° and 30°. Still more preferably, the upper frangible line extends angularly at between 260° and 300°, while the upper section extends angularly at between 30° and 60°. Consequently, each of the horizontal separations between the extremities of the upper section of the recess and the extremities of the upper frangible line can extend angularly at between 15° and 20°.

[0012] In a possible specific embodiment, the upper frangible line extends angularly at 270°, while the upper section extends angularly at 60°. Consequently, each of the horizontal separations between the extremities of the upper section of the recess and the extremities of the upper frangible line extend angularly at 15°. In another possible specific embodiment, where the extension of the articable arms is less, the upper frangible line extends angularly at 262°, while the upper section extends angularly at 60°. Consequently, each of the horizontal separations between the extremities of the upper section of the recess and the extremities of the upper frangible line extend angularly at 19°.

[0013] With regard to the lower frangible line, this preferably extends angularly at between 230° and 320°. In a possible specific embodiment, the lower frangible line extends angularly at 300°. In another possible specific embodiment, where the extension of the articable arms is less, the lower frangible line extends angularly at 240°.

[0014] In a preferred embodiment, the ring comprises at least one cut-out, centred at said rearward separation and below the upper frangible line. Preferably, this coincides on the same plane as the lower frangible line. This cut-out enhances the hinge function performed by the joints between the rearward extremities of the articable arms and the ring, making them less rigid and resilient when the cap shell is separated from the container. In other words, this cut-out enables said joints to be distorted with greater ease. On displacing the cap shell to one side of the container, said joints become twisted and do not attempt to return to their initial position, the cap shell remaining in an open position. Preferably, the cut-out extends angularly at between 10° and 90°, while each of the separations between the extremities of the cut-out and those of the lower frangible line extend at between 10° and 85°. Still more preferably, when the lower frangible line extends angularly at between 230° and 320°, the cut-out extends angularly at between 20° and 30°, while each of the separations between the extremities of the cut-out and those of the lower frangible line extend angularly at between 15° and 35°. In one specific em-

bodiment, when the lower frangible line extends angularly at 300°, the cut-out extends angularly at 28°, while each of the separations between the extremities of the cut-out and those of the lower frangible line extend angularly at 16°.

[0015] With regard to the height of the articable arms, defined as the axial separation between the upper frangible line and the lower frangible line along the length of the articable arms, this is up to 10 mm, and preferably between 1 mm and 2.5 mm. It is conceivable to allow the axial position of the frangible lines to vary, provided that they maintain a sufficient distance between each other at the area where they overlap to form the articable arms. Preferably, the geometry of the articable arms is symmetric, with regard to a sagittal plane of the ring.

Brief description of the figures

[0016] For the better understanding of the description propounded herein, a set of drawings is attached wherein, schematically and solely by way of a non-limitative example, a practical case of an embodiment is portrayed.

Figure 1 - Illustration of the frontal view of a preferred embodiment of the present captive cap.

Figure 2 - Illustration of the rear view of the embodiment in figure 1.

Figure 3 - Illustration of the lateral view of the embodiment in figure 1, in an unscrewed position.

Figure 4 - Illustration of the lateral view of the embodiment in figure 1, in a laterally displaced position.

Description of a preferred embodiment

[0017] A preferred embodiment of the captive cap is described below, with reference to figures 1 to 4.

[0018] Figure 1 portrays the frontal view of the present embodiment, showing the following:

- the cap shell (1),
- the ring (2) retaining the same to the container,
- the two articable arms (3A, 3B) with their forward extremities (31A, 31B) linked to the cap shell (1) and defining the frontal separation (31) between the two, their rearward extremities (32A, 32B) being linked to the ring (2),
- the upper frangible line (10),
- the lower frangible line (20), and
- the recess (21), located in said frontal separation (31) and projecting toward the cap shell (1).

[0019] In this preferred embodiment, the recess (21) comprises a horizontal upper section (21A) centred in said frontal separation (31), and two oblique sections (21i, 21i') at each side of the upper section (21A), these

having a slope of 45°.

[0020] Figure 2 portrays the rear view of the present embodiment, where the rearward extremities (32A, 32B) of the two articulable arms (3A, 3B) may also be seen, linked to the ring (2), these defining the rearward separation (32). In this rearward separation (32) we can see the cut-out (22), centred in, and in this embodiment, coinciding on the same plane as, the lower frangible line (20).

[0021] Throughout the length of the frangible lines (10, 20), prior to opening, the cap shell (1), the ring (2) and the articulable arms (3A, 3B) are linked by one or more regularly- or irregularly-distributed bridges (10', 20'), whose dimensions are designed to be easily torn by a user when unscrewing the cap shell (1). The frangible lines (10, 20) and the respective bridges (10', 20') may be created when moulding the cap or subsequently, by means of cutting operations.

[0022] Figure 3 portrays laterally a condition of the captive cap where the cap shell (1) is separated vertically from the articulable arms (3A, 3B) and the ring (2). This position is equivalent to the position adopted by the cap shell (1) when unscrewed from the container. Given that in this embodiment the geometry of the articulable arms (3A, 3B) is symmetric with regard to the sagittal plane of the ring (2), one of the articulable arms (3A) is hidden by the other.

[0023] Figure 4 portrays another condition of the captive cap, where in this case the cap shell (1) is displaced laterally. This position is equivalent to a possible final open position of the captive cap (1). As has been portrayed schematically, the joints between the articulable arms (3A, 3B) are twisted or distorted. However, on the one hand thanks to the recess (21) and on the other hand to the cut-out (22), these joints have less rigidity and less resilience, causing the cap shell (1) to remain unmoving in said final open position, causing no difficulty to the user. Likewise, the dimensions of the articulable arms (3A, 3B) are suited to be articulated in such a way that the cap shell (1), in its unscrewed condition, is susceptible to be displaced to one side of the neck of the container without rotating on any spatial axis and without returning when released.

Claims

1. A captive cap for a screw-neck container, being the captive cap of the type comprising:

- a cap shell (1) with an internal thread sized to be screwed onto and unscrewed from the neck of the container,
- a ring (2) for retaining the captive cap to the container,
- two articulable arms (3A, 3B) linked by their forward extremities (31A, 31B) to the cap shell (1) and linked by their rearward extremities (32A,

32B) to the ring (2),

- an upper frangible line (10), defining the separable portion of the cap shell (1) with regard to the ring (2) and to the articulable arms (3A, 3B), which extends circumferentially between 210° and 340°, while at the remainder of the circumference a frontal separation (31) of between 150° and 20° is defined between the frontal extremities (31A, 31B) of the articulable arms (3A, 3B),

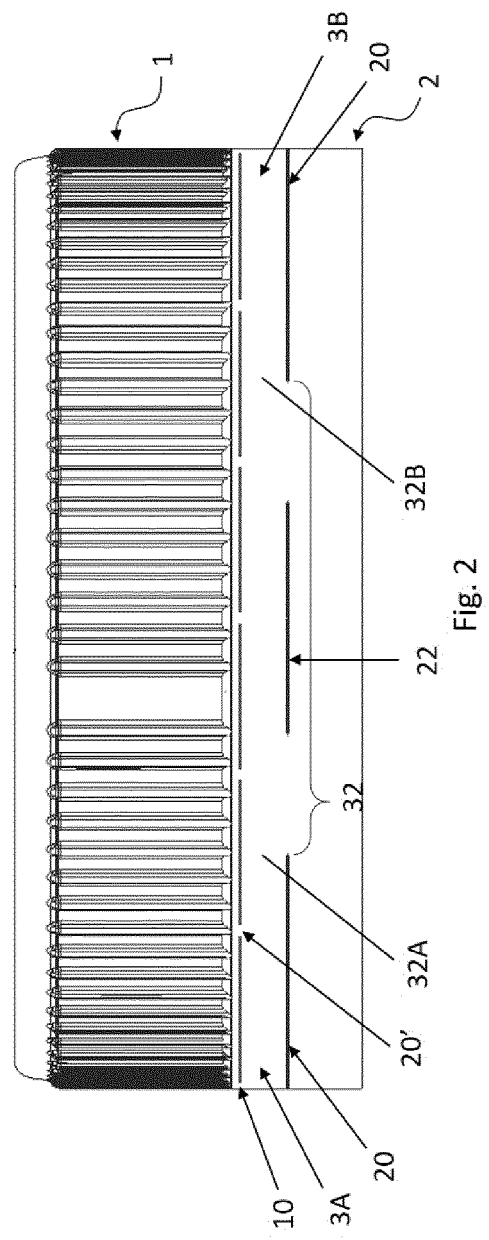
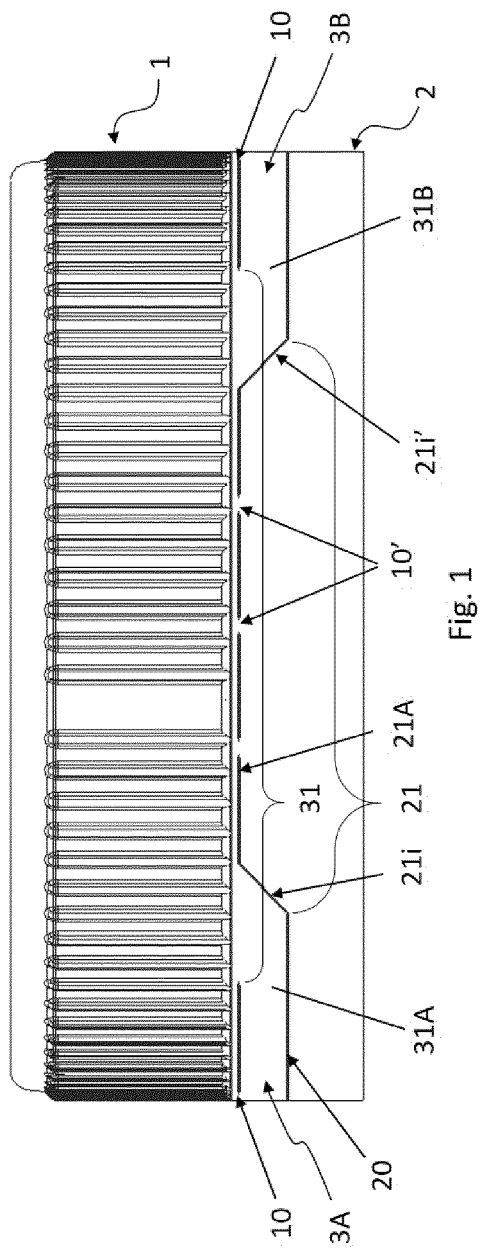
- a lower frangible line (20), defining the separable section of the ring (2) with regard to the cap shell (1) and with regard to the articulable arms (3A, 3B), which extends circumferentially between 180° and 330°, while in the remainder of the circumference a rearward separation (32) of between 180° and 30° is defined between the rearward extremities (32A, 32B) of the articulable arms (3A, 3B),

the captive cap being **characterised in that** the lower frangible line (20) comprises a recess (21) located in said frontal separation (31) and projecting toward the cap shell (1).

2. A captive cap, as claimed in claim 1, where the recess (21) comprises a horizontal upper section (21A), centred in said frontal separation (31).
3. A captive cap, as claimed in claim 2, where the recess (21) comprises two oblique sections (21i, 21i') sloping at 45° on each side of the upper section (21A).
4. A captive cap, as claimed in claim 2 or 3, where the upper frangible line (10) coincides on the same plane as the upper section (21A).
5. A captive cap, as claimed in any of claims 2 to 4, where the upper section (21A) extends angularly at between 10° and 90°, while each of the horizontal separations between the extremities of the upper section (21A) of the recess (21) and the extremities of the upper frangible line (10) extend angularly at between 5° and 30°.
6. A captive cap, as claimed in any of claims 2 to 4, where:

- the upper frangible line (10) extends angularly at between 260° and 300°,
- the upper section (21A) extends angularly at between 30° and 60°, and
- each of the horizontal separations between the extremities of the upper section (21A) of the recess (21) and the extremities of the upper frangible line (10) extend angularly at between 15° and 20°.

7. A captive cap, as claimed in any of claims 2 to 4, where:
- the upper frangible line (10) extends angularly at 270°,
 - the upper section (21A) extends angularly at 60°, and
 - each of the horizontal separations between the extremities of the upper section (21A) of the recess (21) and the extremities of the upper frangible line (10) extend angularly at 15°.
8. A captive cap, as claimed in any of claims 2 to 4, where:
- the upper frangible line (10) extends angularly at 262°,
 - the upper section (21A) extends angularly at 60°, and
 - each of the horizontal separations between the extremities of the upper section (21A) of the recess (21) and the extremities of the upper frangible line (10) extends angularly at 19°.
9. A captive cap, as claimed in any of the preceding claims, where the lower frangible line (20) extends angularly at between 230° and 320°.
10. A captive cap, as claimed in claim 9, where the lower frangible line (20) extends angularly at 300°.
11. A captive cap, as claimed in claim 9, where the lower frangible line (20) extends angularly at 240°.
12. A captive cap, as claimed in any of the preceding claims, where the ring (2) comprises at least one cut-out (22) which is centred in said rearward separation (32) and coincides substantially on the same plane as the lower frangible line (20).
13. A captive cap, as claimed in claim 12, when this depends on claims 1 to 8, where it comprises a single cut-out (22) extending angularly at between 0.1° and 90°, while each of the separations between the extremities of the cut-out (22) and those of the lower frangible line (20) extend angularly at between 10° and 85°.
14. A captive cap, as claimed in claim 12, when this depends on claim 9, where it comprises a single cut-out (22) extending angularly at between 20° and 30°, while each of the separations between the extremities of the cut-out (22) and those of the lower frangible line (20) extend angularly at between 15° and 35°.
15. A captive cap, as claimed in claim 12, when this depends on claim 10, where it comprises a single cut-out (22) extending angularly at 28°, while each of the separations between the extremities of the cut-out (22) and those of the lower frangible line (20) extend angularly at 16°.
16. A captive cap, as claimed in any of the preceding claims, where the geometry of the articable arms (3A, 3B) is symmetric with regard to a sagittal plane of the ring (2).
17. A captive cap, as claimed in any of the preceding claims, where the height of the articable arms (3A, 3B), defined as the separation between the upper frangible line (10) and the lower frangible line (20) along the length of the articable arms (3A, 3B), is up to 10 mm.
18. A captive cap, as claimed in claim 9, where the height of the articable arms (3A, 3B) is between 1 mm and 2.5 mm.



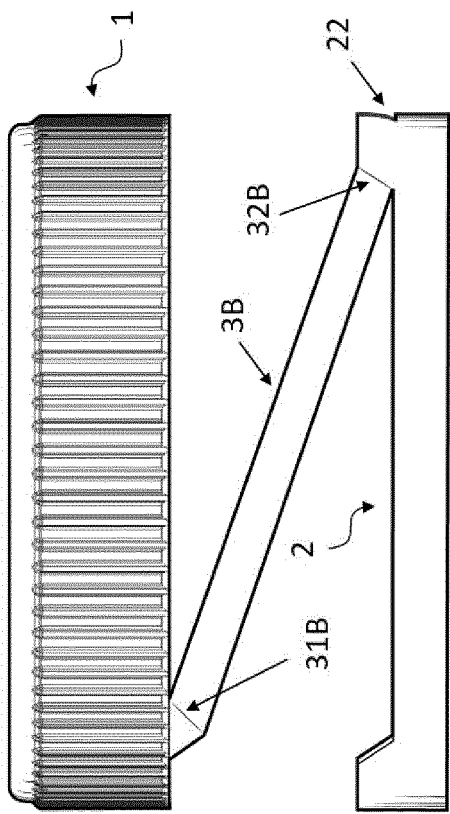


Fig. 3

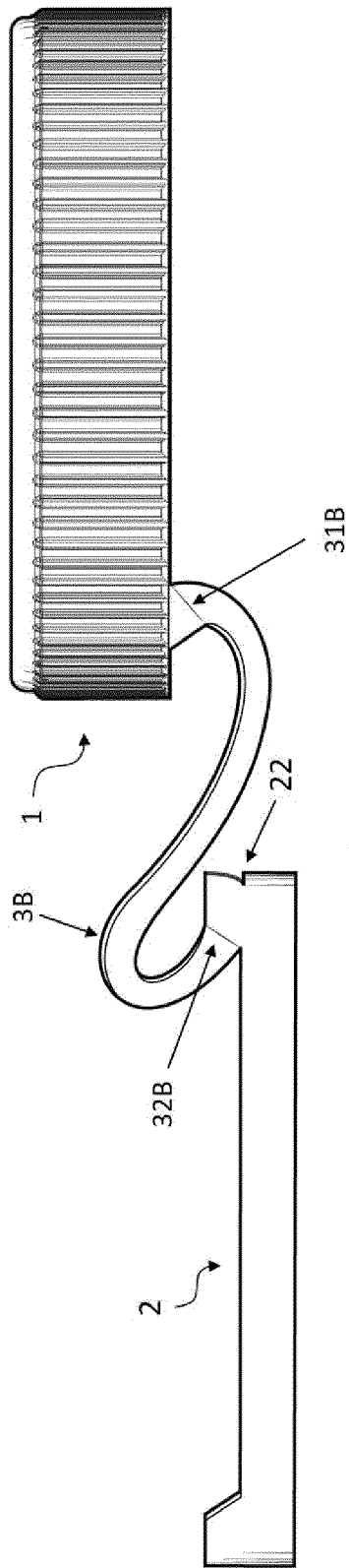


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No

PCT/ES2021/070085

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D41/34 B65D55/16
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)
B65D

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

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A	WO 2020/041640 A1 (NOVEMBAL USA INC [US]) 27 February 2020 (2020-02-27) cited in the application figures -----	1-18
A	CH 715 914 A1 (ALPLA WERKE ALWIN LEHNER GMBH & CO KG [AT]) 15 September 2020 (2020-09-15) figures ----- -/--	1



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

4 November 2021

Date of mailing of the international search report

10/11/2021

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No
PCT/ES2021/070085

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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