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(71) Applicant: **IPI S.R.L.**
06132 S. Sisto (IT)

(72) Inventor: **Gabrielli, Stefano**
06129 Perugia (IT)

(74) Representative: **Marietti, Andrea**
Marietti, Gislon e Trupiano S.r.l.
Via Larga, 16
20122 Milano (IT)

(54) **A cap for opening/closing containers for pourable products**

(57) Cap (1) for opening a container (3) for pourable products having a breakable region (4), said cap comprising a collar (2) substantially fixed to said container over at least part of said breakable region and a perforation element (5) that extends, at least partly, in correspondence of said breakable region and that it is hinged to said collar and rotatable with respect to said collar between a position external to said container and a position inside said container, the cap being characterized by said perforation element (5) being provided with at least one perimeter portion (7) carrying a plurality of teeth (6) projecting from the lower surface (8) of the said perforation element (5) and leaning towards the said breakable region (4) of the said container (3) when said perforation element (5) is external to the said container (3).

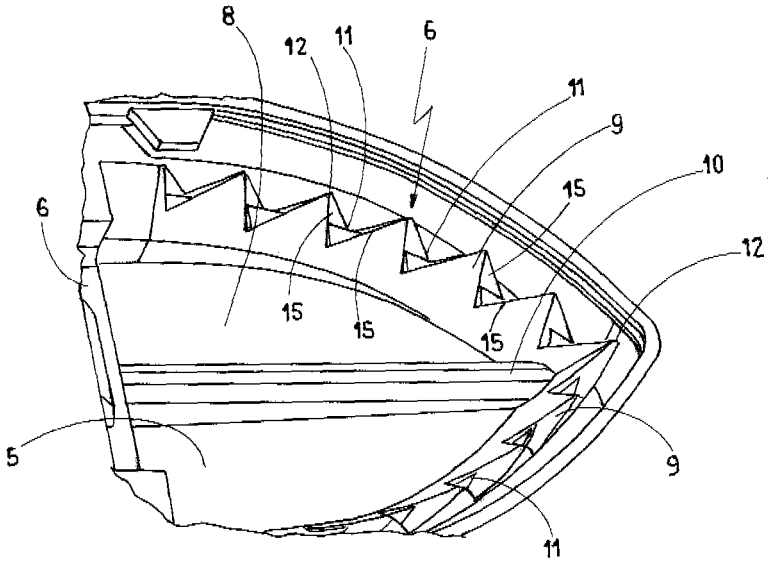

Fig. 4

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Description

[0001] The present invention relates to a cap for opening/closing containers for pourable products. In particular, the cap in question is used preferably in those containers, parallelepiped in shape, that are produced by welding some layers of different materials such as, for instance, paper, polyethylene and/or aluminum, and that also has at least one breakable region, i.e. a surface portion that can easily be pierced, or cut or broken, in such a way as to permit fluid communication between the inside and the outside of the container.

[0002] Such breakable region is produced by the elimination of one or more of said layers in different material, or alternatively, by the adoption of weakening lines predisposed on the surface of the container to facilitate opening the container while in the meantime maintaining the integrity of the preserved product inside.

[0003] According to the known art, there are caps provided with perforation elements arranged to correspond to the breakable region and having a ribs or series of teeth that are able to pierce such a region when operated by the user during opening of the container.

[0004] For instance, in US 6354467 a cap is described for opening of such containers, comprising a collar constrained substantially around a breakable region and a perforation element for the breakable region that is hinged to said collar and rotatable with respect to this collar from a position external to said container to a position inside said container. The perforation element is provided with a system of three parallel ribs and arranged in such a way as to act on the breakable region along a plain profile substantially parabolic in shape. Furthermore, the central rib system is provided with a pointed extremity used to initially engrave the breakable region along a line of weakening predisposed on the latter. The cap in object is revealed to be particularly effective in the case of containers that have a breakable region having an external layer in paper and one or more inside layers in aluminum.

[0005] On the other hand, in the case of a breakable region having one or more layers produced in a particularly tenacious material, of the type, for instance, in polyethylene or in a material having analogous mechanical characteristics, a perforation element of the type described above would not be usable in an effective way because the same breakable region, submitted to the action of the perforation element, would deform by stretching without however being engraved by the pointed portions of the ribs of the perforator element, thus frustrating its effectiveness.

[0006] One purpose of the present invention is to eliminate the drawbacks of the prior art by producing a cap provided with a structurally simple perforation element but which at the same time also guarantees opening of breakable regions produced with layers of material having characteristics of high strength, for instance, in polyethylene or in other analogous material.

[0007] A further purpose of the present invention is to provide a perforation element of that, besides producing a perforation for points of the breakable region, allows the breakable region inclusive between two adjacent points of perforation produced by two consecutive teeth, to be cut.

[0008] These and other purposes are achieved by the present cap for opening of a container for pourable products having a breakable region, said cap comprising a collar substantially fixed to said container for at least part of said breakable region and a perforation element that it is extended, at least partly, in correspondence of said breakable region and that is hinged to said collar and rotatable with respect to this between a position external to said container and a position inside said container. Advantageously, the cap is characterized by said perforation element being provided with at least one perimeter portion carrying a plurality of teeth projecting from the lower surface of the said perforation element and facing out onto the said breakable region of the said container when said perforation element is external to the said container.

[0009] According to a particular aspect of the cap, one or more cutting edges that connect the adjacent sides are arranged between at least two consecutive teeth of said plurality of teeth.

[0010] Furthermore, said one or more cutting edges are substantially parallel to said lower surface of said perforation element and in a lower position with respect to to the apical extremity of the teeth.

[0011] Furthermore, all the teeth of said plurality have triangular profile and increase in height from the portion of the perforator element hinged to the collar to the opposite extremity of said perforation element, preferably following a parabolic law. In such a way, during opening of the container the tooth that is furthest away from the hinged portion is the first to touch the breakable region and to pierce it. Furthermore, the said cutting edges start to chop through the portions of the breakable region inclusive between two consecutive perforations produced by two adjacent teeth of the plurality of teeth. Such perforation and cutting operations by the perforator element continue until the perforation element is completely inside the container, having dragged the said breakable region inside with itself.

[0012] A particular embodiment of the present invention will now be described by way of example and not limiting, with reference to the attached figures, in which:

Figure 1 is a perspective view of the cap for opening of a container for pourable products;

Figure 2a is a perspective view of the cap of figure 1, constrained to the container before opening the container;

Figure 2b is a perspective view of the breakable region of the container for pourable products according to the invention around which the cap is constrained ;

Figure 3 is a magnified view of the perforation ele-

ment of the cap of figure 1;

Figure 4 is a view from below of the cap according to the invention;

Figure 5 is a view in longitudinal section of the cap of figure 1;

Figure 6 is a view from above of the breakable region during the phase of opening.

[0013] With particular reference to such figures, the generic cap for opening containers for pourable products according to the invention is indicated by 1.

[0014] The cap 1 includes a collar 2 fixed to the parallelepiped-shaped container 3, around a breakable region 4 on the upper face 3a of the latter container 3 and a perforation element 5 that extends completely in correspondence of said breakable region 4 and that is hinged to said collar 2 at one connecting extremity 6. The collar 2 has a substantially rectangular form, with two sharp cutting edges in the form of a parabola, and is glued in correspondence of a portion 60 that surrounds the breakable region 4.

[0015] Note that the breakable region 4 includes various layers of different materials, among which the more internal is, for instance, polyethylene of the linear or high-density type, which is extremely difficult to pierce or to cut. In this way the breakable region 4 is provided with high mechanical resistance owing to the high strength of the polyethylene, thus differentiating itself from the external surface in paper (or cardboard) that covers the container 3 completely and onto which the same collar is glued. As mentioned above, the known perforation elements would be ineffective on a breakable region produced in polyethylene, since they would not succeed in piercing and cutting this type of breakable region.

[0016] According to the invention the perforation element 5 is a parabola shaped plate and it is provided with a plurality of teeth 6 that extend along the perimeter portion 7 of the same plate, taking the parabola form of the perforation element 5. The teeth 9 of the plurality of teeth 6 project from the lower surface 8 of the same perforation element 5 and lean out to the breakable region 4 of the container 3 when the perforation element 5 is still in a position external to the said container 3. The perforation element 5 is able to rotate around the connection extremity 6, with respect to said collar 2, between a position external to said container 3 and a position inside said container 3, cutting the breakable portion 4 and thus allowing the fluid to communicate between the inside and outside of the container 3.

[0017] Furthermore, each of the teeth 9 of said plurality of teeth 6 is substantially triangular in profile, although teeth of different profile, for instance, trapezoidal or other analogous forms are possible, provided that they are pointed in form and able to provide equally for the perforation of the breakable region 4, as will become clearer from the description of the operation of the perforation element 5.

[0018] Furthermore, as Figure 5 shows, the apical portions 12 of the teeth 6 are arranged to follow along a curvilinear profile S whose lower extremity M corresponds to the free extremity 10 of said perforation element 5. According to a particular embodiment of the invention not shown here, the heights of the teeth 9 increase from the hinged extremity 6 of the perforation element 5 up to the free extremity 10 of the said perforation element 5, substantially following a parabolic law. The two possible solutions foresee however that, during the rotation of the perforation element 5 around the hinged extremity 6, the first tooth 9 that comes into contact with the breakable region 4 is that on the free extremity 10 of the element perforator 5, i.e. in proximity of the lower extremity M of the curvilinear profile S, or, alternatively, on the vertex of the parabola drawn by the apical portions 12 of the teeth 9.

[0019] Furthermore, Figure 4 shows that between two consecutive teeth 9 of said plurality of teeth 6 there is a cutting edge 11 that connects the adjacent sides 15 of two teeth 9. In particular, according to the preferred embodiment described here, the cutting edge 11 is is substantially parallel to the lower surface 8 of the perforation element 5 and is reduced with respect to the apical portions 12 of the teeth 9.

[0020] Furthermore, the cap 1 includes a protection cover 16 hinged to one of the external extremities 2a of the collar 2, in such a way that by a simple rotation it can be superimposed on and associate by interference and in a reversible way with the external cutting edges 2b of the collar 2, before and after opening the breakable region 4 by the perforation element 5.

[0021] Furthermore, the effort that the perforation element 5 produces on the breakable region 4 is transmitted by a lever 20 that is hinged to a pivot of rotation 21 integral with the collar 2 and extending between two opposite sides 2b and 2c of the same. The lever 20 rotates upwards and drags in rotation the perforation element constrained to the pivot 21 in correspondence to the connection extremity 6.

[0022] Note that although one particular embodiment of the invention is described here, in which a lever is included in the cap for facilitating the action of the perforation element, a possible cap in which such lever is not present and the action on the perforation element is produced directly by the hand by the user, still comes within the scope of protection of the present patent. In the latter case, the extremity of connection 6 of the element perforator 5 and the pivot of rotation 21 coincide in a single element that is arranged along an inside cutting edge of the collar 2.

[0023] In use, the perforation element 5, either operated indirectly by the use of the aforementioned lever 20, or operated directly by hand pressure of the user, is made to rotate toward the breakable region 4 in such way that the teeth 9 of the plurality of teeth 6 begin to pierce the breakable region 4 in a point to point way, substantially describing a parabola, as shown in Figure 6.

[0024] Furthermore, when the teeth 9 have entered

the container 3 for a certain distance, meeting the cutting edge 11, the latter starts to cut the portions 30 of the said breakable region 4 inclusive between two consecutive perforations 29 produced by two adjacent teeth 9 of said plurality of teeth 6.

[0025] In this way the breakable region 4 is also cut after being pierced, starting from the portion of the breakable region furthest from the connection extremity 6 of the perforation element and terminating in close proximity to the connection extremity 6. The final shape of the portion 100 of breakable region 4 cut is parabolic, thus reflecting the shape of the perforation element 5.

[0026] At the end of the rotation, the perforation element 5 is completely inside the container 3, having dragged the portion 100 of the said breakable region 4 - or rather the subject of the action of the perforation element 5 - into the container 3 with itself.

Claims

1. Cap (1) for opening of a container (3) for pourable products having a breakable region (4), said cap comprising a collar (2) fixed to said container substantially over at least part of said breakable region and a perforation element (5) that extends, at least partly, in correspondence of said breakable region and that it is hinged to said collar and rotatable with respect to the latter between a position external to said container and a position inside said container, the cap being **characterized by** said perforation element (5) being provided with at least one perimeter portion (7) carrying a plurality of teeth (6) projecting from the lower surface (8) of the said perforation element (5) and leaning towards the said breakable region (4) of the said container (3) when said perforation element (5) is external to the said container (3).

2. Cap according to the Claim 1, **characterized by** said perforation element being a plate.

3. Cap according to Claims 1 or 2, **characterized by** there being one or more cutting edges between at least two consecutive teeth 9 of said plurality of teeth 6, said cutting edges connecting the adjacent sides of said at least two teeth.

4. Cap according to the Claim 3, **characterized by** said one or more cutting edges being recessed with respect to the apical portions of said teeth.

5. Cap according to the Claims 3 and 4, **characterized by** said one or more cutting edges being substantially parallel to said lower surface of said perforation element.

6. Cap according to any one of the Claims from 3 to 5, **characterized by** said one or more cutting edges connecting all the adjacent sides of said plurality of teeth.

7. Cap according to any one of the preceding claims, **characterized by** said teeth having a triangular profile.

8. Cap according to any one of the preceding claims, **characterized by** the apical portions of said teeth being arranged along a curvilinear profile whose lower extremity corresponds to the free extremity of said perforation element.

9. Cap according to one any of the preceding Claims, **characterized by** said teeth increasing in height from the portion of said perforation element hinged to the collar to the opposite extremity of said perforation element.

10. Cap according to the Claim 9, **characterized by** said teeth having a height that varies with a substantially parabolic law.

11. Cap according to any one of the preceding Claims, **characterized by** said perforation element being extended substantially in correspondence of the said whole breakable region of said container.

12. Method for opening a container for pourable products by a cap according to Claims from 1 to 11, comprising the phases of:

    a. associating the said perforation element to the said breakable surface portion;
    b. piercing said breakable region in a point to point way by said plurality of teeth of said perforation element;
    c. cutting said breakable region by said sharp portions inclusive between two consecutive perforations produced by two adjacent teeth of said plurality of teeth.

13. Method for opening a container according to Claim 12, **characterized by** the said perforation in a point to point way being produced initially in correspondence of the portion of breakable region furthest from the portion of said perforation element hinged to the collar.

14. Method for opening a container according to Claims 12 and 13, **characterized by** phase c) of the same method being followed by the phase of rotating the said perforation element into the said container dragging in rotation at least part of the said breakable region of the said container

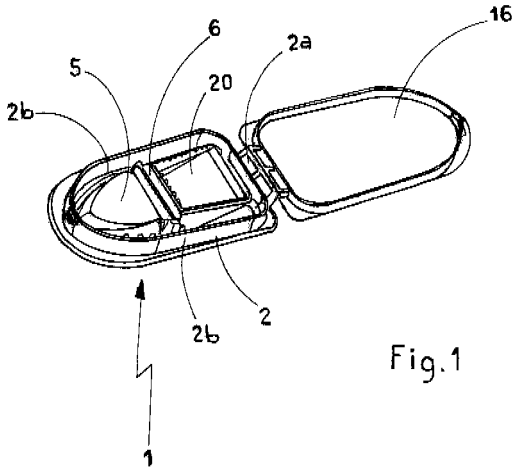

Fig.1

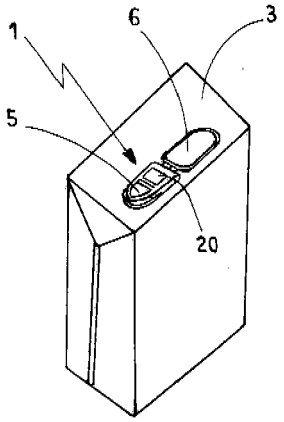

Fig.2a

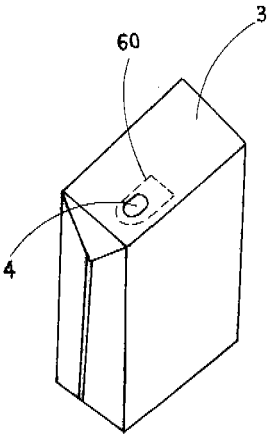

Fig.2b

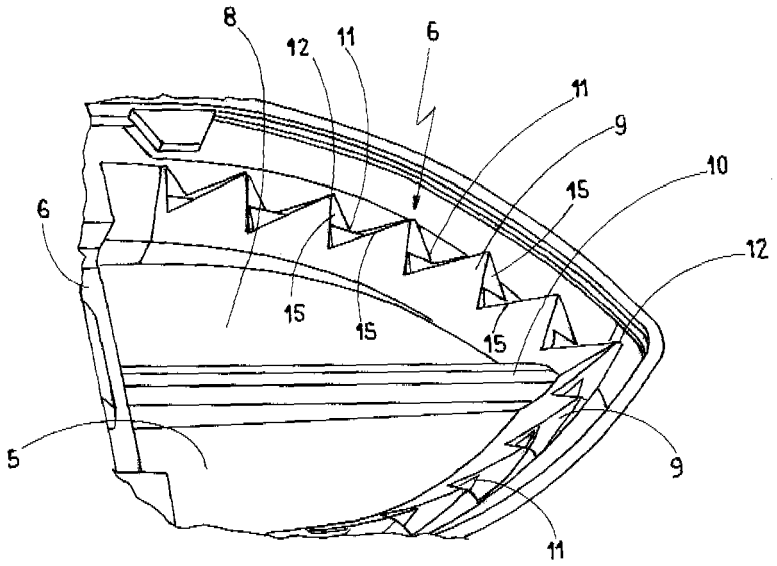

Fig. 4

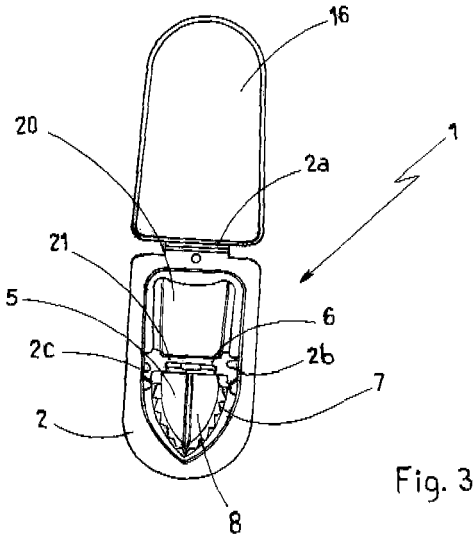

Fig. 3

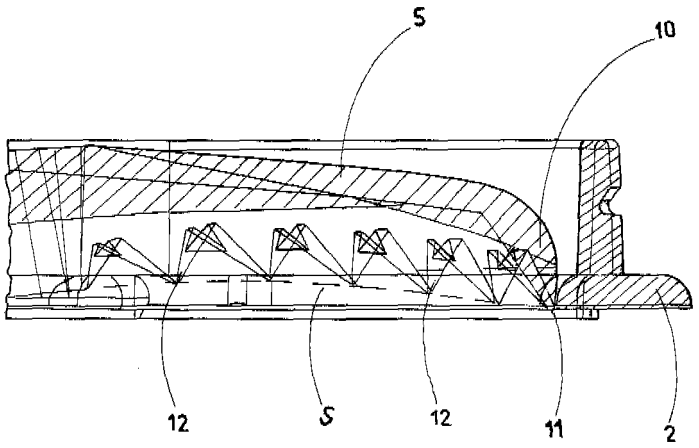

Fig.5

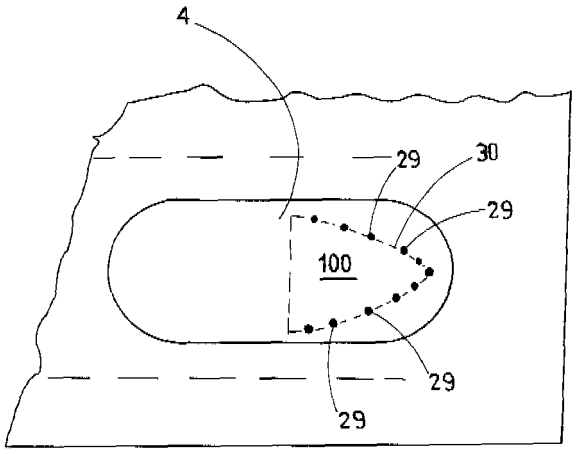

Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5403

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 November 2006	Vesterholm, Mika

CATEGORY OF CITED DOCUMENTS

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