

Description

The invention relates to a construction for a cap for a container neck provided with a screw-thread or a bead, which grips beneath a retaining ring on the outside of a container mouth, wherein a guard ring of plastics material is secured to the lower rim of the screw cap, comprising:

a) a cap, more especially formed from metal, having an outwardly shaped bead disposed on the lower rim for inward deformation for the accommodation

b) of the guard ring, its upper portion being connected to the lower portion in the circumferential direction via a zone of reduced resistance and being provided externally with a projection which fits into the bead of the cap, and its lower portion having a lip which is inclinedly and inwardly orientated and extends to the upper portion, wherein the external projection on the upper portion of the guard ring is in the form of an outwardly orientated edge or an annular bead, and the lower portion of the guard ring has no outwardly orientated projection, with the result that the guard ring (construction according to DE-A-2 233 305) has a substantially Z-shaped cross-section.

The invention also relates to a mounting process for mounting a cap for a container neck provided with a screw-thread or a bead.

A reliable cap for bottles, phials and similar vessels is known, wherein the main component part, which is formed from one piece of plastics composition, is provided with a guard ring which is connected to the main component part by at least one annular region of low resistance and, when the vessel is opened for the first time, this region can easily be torn by tensile force. This cap is formed from one single piece of plastics material. In such a case, however, problems concerning manufacture may arise because the cap, which is of

a comparatively crude form, includes also the guard ring which is formed from precision parts; during the injection moulding process, however, this means that the injection moulding times, required for the cap itself and the guard ring, are not identical. In addition, caps made of plastics material cannot always be used; in fact, the more pressure-resistant metal caps are recommended for beverages having high carbon dioxide pressures.

Metal caps are in fact known, a metal ring being shaped to fit on the lower rim of the cap through the intermediary of connecting flanges and, when the metal cap is turned, the metal ring remains behind on the neck of the bottle while the connecting flanges break. However, such a cap is disadvantageous because, once the metal cap has been opened and the connecting flanges are broken, sharp metal edges may be produced, with the result that there is a high risk of injury to the user. Such metal caps are also only utilisable for container necks of low manufacturing tolerances since, of course, the metal cap can hardly be changed in respect of its own measurements.

French Patent Application FR-A-2 291 915 discloses a cap for a container neck provided with a screw-thread or a bead, which cap

a) comprises a cap having an outwardly shaped bead disposed on the lower rim, the lower rim of the bead being bent inwardly for the accommodation

b) of a guard ring formed from plastics material, its upper portion being connected to the lower portion in the circumferential direction via a zone of reduced resistance and being provided externally with a projection which fits into the bead of the cap.

The lower portion of the guard ring also has a lip which is inclinedly and inwardly orientated and extends to the upper portion; however, a projection which protrudes beyond the bead of the cap is moulded to fit on the outside of this lip, and the projection is

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supported against the lowermost rim portion of the cap which is bent outwardly.

The purpose of this two-part construction of the cap is to permit the material of the two component parts to be selectable independently of each other. Thus, the cap itself may be formed from metal, in particular, while the guard ring is in the form of a plastics material ring.

When the cap is unscrewed, the outwardly protruding projection on the lip should abut against the lowermost portion of the rim of the metal cap, which is bent in the form of an annular channel, so that a lever action of the projection ensures that the lower portion of the plastics material ring does not simply move outwardly; because otherwise the lip of the plastics material ring would move externally on the clamping bead of the container neck without the plastics material ring then severing along the zone of reduced resistance. The metal cap could also simultaneously undergo a widening effect in the same direction in respect of its circumference without the stable, lowermost rim which is bent in the form of an annular channel. This is all the more applicable when, upon the metal cap with the plastics material ring being slipped over the container neck, a certain amount of clearance has to be allowed between the plastics material ring, in this particular case the inwardly protruding tongue, and the circumference of the container neck precisely on account of this lever-like co-operation between the projection and the rim of the metal cap. In the case of a plastics material cap which is itself already resilient, the circumstances are even less advantageous. This supporting projection on the outside of the lip does, however, necessitate material. In addition, the plastics material ring here can also be severed inadvertently, since it protrudes beyond the rim of the cap; this would then indicate, incorrectly, that the bottle had been opened.

By comparison, European Patent Application No. 81810029.9, Publication No. EP-A-0 034 997, discloses a one-piece plastics material cap with a guard ring which can be shrunk by heat treatment to fit below the clamping bead of the container neck. Otherwise, however, such a plastics material cap also has the disadvantages already indicated above.

DE-OS 2 233 305 relates to a screw cap made of metal and having a special guard ring which grips beneath a retaining ring on the outside of a container mouth, such a cap being characterised in that the guard ring is formed from plastics material, preferably from a polyolefin or the like, and is secured to the lower rim of the screw cap, the external projection on the upper portion of the guard ring being in the form of an outwardly orientated edge or an annular bead, and the lower portion of the guard ring has no outwardly orientated projection, so that the plastics material ring has a substantially Z-shaped cross-section.

This screw cap also has the above-mentioned disadvantages.

By comparison, the present invention seeks to provide a cap with a separate guard ring formed from plastics material, so that not only can the materials of the two component parts be selected independently of each other, as in DE-A-2 233 305, but also the plastics material guard ring cannot possibly be inadvertently destroyed.

According to the invention, this object is achieved with a construction of the initially mentioned type (according to DE-A-2 233 305), in that, towards the lower portion of the plastics material ring, the lip is provided with a toothing which fits into a corresponding grooving in the lower portion of the plastics material ring on sides of the lip.

In consequence, the guard ring of plastics material has the form and effect of a barbed hook. This promotes the tearing of the ring when the cap is opened. It does not matter that the guard ring is somewhat wider than the container neck, so that it can be slipped effortlessly over the neck. Material is also saved since there is no bulky, external projection on the lower portion. Since this external projection is eliminated, there is now no longer any possibility of tearing the plastics material ring inadvertently at this external projection without the cap being opened.

In consequence, this object is achieved with a construction in accordance with Claim 1.

One particular embodiment of the present invention is characterised in that at least the lower portion of the guard ring is made shrinkable.

Further particular embodiments are characterised in that the bead is made shrinkable,

in that the lower portion of the guard ring is provided, at right angles to the circumferential direction, with at least one attenuation line, preferably one to nine attenuation lines which are possibly spaced at regular intervals from one another,

in that at least one retaining flange, which joins the upper portion and the lower portion, is disposed at intervals at right angles to the circumferential direction of the guard ring instead of the zone of reduced resistance, wherein at least one attenuation line is disposed in the lower portion at right angles to the circumferential direction of the guard ring,

in that retaining flanges, which join the upper portion and the lower portion, are disposed at intervals at right angles to the circumferential direction of the guard ring instead of the zone of reduced resistance, wherein an attenuation line is disposed in the

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lower portion of the guard ring at right angles to its circumferential direction on the one side of the retaining flanges, and

in that extensions are disposed at least sporadically in the lip.

A mounting process is also claimed for mounting a cap according to at least one of the claims according to the invention, which process is characterised in that the cap is disposed over the guard ring, and then the lower encircling rim of the cap is bent around the outwardly orientated edge of the plastics material ring without thereby flanging the lower rim outwardly.

Further particular embodiments of the mounting process according to the invention are characterised in that the bead is inclined over its periphery in an upwardly and inwardly sloping manner, and in that the inwardly bent lower rim of the cap is pressed upwardly so that the bead is inclined over its periphery in an upwardly and inwardly sloping manner.

Finally, a cap is claimed which is characterised in that it is produced in the mounting process according to the invention.

It is self-evident that, perhaps also with a construction according to Claim 1, the guard ring or even the bead can be made shrinkable. In addition, according to Claims 2 and 3, at least the lower portion of the plastics material ring and possibly also the bead of the cap can also be made shrinkable. In such a case, particularly large tolerances of the container neck can be counterbalanced.

A plastics material ring permits a further saving of material to be achieved with an almost constant stability of the guard ring and a reduction in play when the guard ring is slipped over the container neck. In consequence, the lip is able move even further outwardly than was the case hitherto into the external, lower portion of the guard ring; as a result, the lip can move even better past the

container neck, especially past its clamping bead. Inadvertent destruction of the guard ring precisely when it is being slipped over the container neck is, therefore, even more improbable. If the lower portion of the plastics material ring is also made shrinkable, the shrinking process can make the lip be enclosed in a form-locking manner by the external, lower portion and, as a result, can form virtually a one-piece lower portion.

It is preferable, in all cases, for a plastics material ring to be provided with attenuation lines in accordance with Claim 4. Then, in fact, the plastics material ring can also tear over its circumference and fall away from the container neck. As a result, this arrangement prevents the lower portion of the plastics material ring from remaining behind on the container neck and having to be laboriously removed subsequently when the container is refilled.

The zone of reduced resistance between the upper and lower portions of the plastics material ring may be formed when openings are provided in the plastics material ring, and they are alternately interrupted by connecting flanges. The connecting flanges may preferably be disposed in the upper third of the plastics material ring, and the openings may preferably be provided in the lower third of the plastics material ring. The attenuation lines may have a V-shaped cross-section, that is to say without provision having to be made for openings or savings in material.

A problem associated with the above-mentioned caps, which is still always possible, resides in the fact that the plastics material ring does not sever and tear-off completely from the cap. If, however, the cap is then replaced on the container neck, the torn-off lower portion or portions of the plastics material ring which, however, remain behind on the upper portion, can again be slipped upwardly towards the upper portion of the plastics material ring close to beneath the lower rim of the cap. Then, however, the lower portion

of the plastics material ring of the cap, which is visible from outside, can no longer be readily considered to have been severed, that is to say that the container has already been opened once. In order to prevent such deception, the plastics material ring can then be formed in accordance with Claim 5. A particular mounting process is still required therefor, which is described in detail hereinafter.

The embodiment according to Claim 6 is therefore preferred, the particular effect of which will also be explained hereinafter.

If the plastics material ring is formed in accordance with Claim 7, a positive means for avoiding deception is already provided with the usual mounting in accordance with Claim 8. The extensions of the lip will press the severed parts of the lower portion of the plastics material ring outwardly away from the container neck, especially away from the clamping bead. In consequence, after the cap has been opened, at least individual parts of the lower portion of the plastics material ring splay out and can also no longer be bent-back to create deception and abut against the container neck beneath the lower rim of the cap.

In the mounting process according to Claim 9, as a consequence of the inclination of the bead, the upper portion of the plastics material ring disposed in the bead is tensioned. If, however, the lower portion of the plastics material ring is severed from the container neck, during opening of the cap, in an attenuation line extending at right angles to the circumferential direction, the stable retaining flange or flanges between the upper portion and the lower portion will splay out from the container neck as a result of the tension in this partial region of the lower portion of the plastics material ring, which tension has been imparted to the flanges by the upper portion. Even then it is no longer possible to simply slide

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this splayed-out portion of the plastics material ring inwardly again towards the upper portion beneath the cap.

This tension resulting from the inclination of the bead can be imparted to the bead, especially in accordance with a mounting process as claimed in Claim 10. In such a case, the bead is compressed upwardly from below to a certain extent. The bead attempts to counter this pressure by widening in the region of the lower rim, while the diameter of the bead is compressed in its upper region, that is to say that it bends inwardly. As a result, the bead undergoes an inwardly sloping inclination in an upward direction over its circumference. The invention will be explained more fully with reference to the drawings. In the drawings:

Figure 1 is the perspective view of a cap which is known per se and is formed from metal, namely from an aluminium alloy;

Figure 2 is the perspective view of a plastics material ring according to the invention, with a Z-shaped cross-section;

Figure 3 is the perspective view of a plastics material ring according to the invention, but with stable retaining flanges between the upper and lower portions;

Figure 4 is a perspective view of a large section taken from the plastics material ring of Figure 3;

Figure 5 is the cross-sectional view through a plastics material ring with extensions on the lip;

Figure 6 is the cross-sectional view of a plastics material ring with a Z-shaped cross-section, showing how it is positioned in a cap on a container neck;

Figure 7 corresponds to Figure 6, but showing a plastics material ring provided with an extension on the lip;

Figure 8 corresponds to Figure 6, but with a plastics material ring which is tensioned in the upper portion as a result of the inward inclination of the bead of the cap.

Figure 1 shows a cap which is known per se and is formed, for example, from metal. It has a profile rim 31 for easier turning during opening. The cap wall 32 is not yet flange-mounted onto the screw-thread of the container neck and is therefore still smooth. The outwardly shaped bead 4 of the cap, which is attached to the lower rim 3, can clearly be seen. The bead serves to accommodate the upper portion of the guard ring which is formed from plastics material.

Figure 2 is a perspective view of a plastics material ring 7 itself; in this case, the ring is a plastics material ring with a Z-shaped cross-section, but without any stable retaining flanges. The latter are described in the embodiment shown in Figure 3. In the circumferential direction 12, this plastics material ring 7 has dividing flanges 10 and openings 11 alternating in the upper third. Together, these form the zone of reduced resistance. Three identically distributed attenuation lines 13 are disposed in the lower portion 24 at right angles to the circumferential direction 12; they extend into the lip 26. If this plastics material ring 7 is inserted into the cap 1, so that the outwardly orientated edge 8 of the plastics material ring 7 engages in the interior of the bead 4 of the metal cap 1, then a cap is formed which can be placed upon a container. Then, accordingly, the operation can still be carried out in accordance with one of the claimed mounting processes; a screw-thread, which matches the screw-thread of the container neck, can possibly also be flanged into the cap wall.

Figure 3 shows a plastics material ring which is provided with the special toothing between lip 26 and the external, lower portion 24 and with stable retaining flanges 28. The upper portion 23 and the lower portion 24 can generally be clearly distinguished. These two portions are interconnected by means of the stable retaining flanges 28. The retaining flanges 28 are clearly thicker than the much thinner dividing flanges 10 which are to tear when the cap is unscrewed. However, the retaining flanges 28 should not tear. The dividing flanges 10 span the zone 25 of reduced resistance, which is in the form of a gap, leaving openings 11 inbetween. An attenuation line at right angles to the circumferential direction 12 in the lower portion of the plastics material ring 7 cannot be clearly seen, but in one case it is at least designated by the reference numeral 13. Here, the lower portion 24 can sever from the retaining flange 28, in the same way as the dividing flanges 10 can tear when the container is opened. In consequence, then, this lower portion of the plastics material ring is only still attached to another retaining flange with its other end since such an attenuation line is not provided on this side. The grooving 30 can clearly be seen on the inside of the external, lower portion 24 of the plastics material ring 7 opposite the lip 26. In addition, the lip 26 itself, for its part, has a toothing 27 opposite the grooving 30. In such a case, the teeth 35 of the toothing 27 are provided opposite the respective grooves 34 of the grooving 30. If, as the plastics material ring is being slipped over the container neck, the lip is pressed outwardly from the container neck, especially its screw-thread and clamping bead, then the lip can move into the grooves of the grooving, although it is rigid as a result of the toothing, as is also the external, lower portion of the plastics material ring.

Figure 4 again shows in large detail a section taken from the plastics material ring of Figure 3. It can clearly be seen here that the dividing flange 10 only forms a very thin connecting line between the upper portion 23 and the lower portion 24. In consequence, it

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tears easily. The grooves 34 converge downwardly in the lower portion 24; the same is true of the teeth 35, though this is not apparent. Consequently, this arrangement prevents the grooves 34 or even the teeth 35 from extending into the bend at the bottom of the lower portion 24. One groove 34 always lies opposite one tooth 35. Accordingly, one ridge 33 of the grooving 30 always lies opposite one recess 36 in the toothing 27. Hence, therefore, the teeth 35 can move into the grooves 34, and the ridges 33 can move into the recesses 36. In this way it is easy to ensure that the lip 26 apparently only still has half the thickness of a conventional lip, although it is virtually just as rigid. In consequence, this toothed lip can move particularly far outwardly into the external part of the lower portion 24, while it nevertheless has a stable clamping or hooking action on the container neck.

Figure 5 shows another embodiment of a plastics material ring, wherein the tension is possibly caused solely by the special extensions 29. These extension tongues may otherwise be disposed on the lower portion 24 at intervals, that is to say separated from the remaining lip 26, so as to extend approximately parallel to the lip 26. A cross-section through this plastics material ring is shown, wherein the cross-section extends through an extension 29 according to the invention.

Finally, Figure 6 is a sectional view through a cap 1 which is placed upon a container 14 and is provided with a plastics material ring 7 having a Z-shaped cross-section. The screw-thread of the cap itself is already flanged into the cap wall 32 so as to correspond to the screw-thread 20 of the container neck. The opening rim of the container neck 15 is sealed beneath the cap cover 2 by the sealing insert 5. The clamping bead 16 is provided on the outside of the container neck 15 beneath the screw-thread 20 of the container neck. It serves as a closure for the inwardly and upwardly sloping lip 26 of the plastics material ring 7. Further below, that is to say outside

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the bead 4 and its lower rim 3 of the cap 1, the zone 25 of reduced resistance is provided in the form of openings 11. The outwardly orientated edge 8 of the upper portion 23 of the plastics material ring 7 is situated in the bead 4. The barbed-hook form of the plastics material ring 7 can be seen in this cross-sectional view. When the cap 1 is unscrewed upwardly, the lip 26 is retained by the clamping bead 16; it becomes more intensely inwardly orientated with the increased raising of the plastics material ring 7 and, in consequence, it is pressed all the more effectively beneath the clamping bead 16. The same applies to the outwardly orientated edge 8 which is also in the form of a barbed hook here. Finally, the lower portion 24 of the plastics material ring is severed from the upper portion 23 in the zone 25 of reduced resistance, and the cap 1 can be removed from the container neck 15 with the upper portion 23 of the plastics material ring 7 remaining behind in its bead 4.

Figure 7 shows one embodiment of a plastics material ring, wherein tension results from special extensions 29. These extensions 29 may be disposed at intervals, that is to say separated from the remaining lip 26, on the lower portion 24 otherwise so as to extend approximately parallel to the lip 26. They are so long that they cannot fall beneath the clamping bead 16, as the remaining lip 26 does, but rather they still have to be supported with their free end against the clamping bead 16. In such a case, it is particularly advantageous if these extensions 29 are also provided with a toothing like the lip 26 in Figure 4, a grooving corresponding thereto on the other side on the external, lower portion 24. This Figure shows in cross-section here how the tooth 35 on sides of the extension 29 can slide into the groove 34 on the inside of the outer part of the lower portion 24. The same applies to the ridge which cannot be seen and which can be slipped into a corresponding recess 36 in the extension 29. If the upper portion 23 is connected to the lower portion 24 via stable retaining flanges which are not shown, then, after the lower portion 24 of the plastics material ring 7 has been torn at suitable

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attenuation lines, the torn parts of the lower portion 24 of the plastics material ring 7 splay out. Since the individual annular portions of the guard ring 7 are retained by the retaining flanges on the upper portion 23 in the bead 4 of the cap 1, they indicate that in actual fact a guard ring had also been present, but that it had now been torn; in consequence, the user cannot be under any illusion that the bottle had not in fact possessed a guard ring of plastics material, so that an examination to ascertain the initial opening of the container would not in fact be possible.

Finally, Figure 8 shows how the plastics material ring 7 can be pretensioned by a deformation of the bead 4. It can clearly be seen here how the bead 4 on the lower rim 3 of the cap is inclined in an upwardly and inwardly sloping manner.

This inclination is also forced upon the upper portion 23 of the plastics material ring 7. In consequence, it is tensioned in such a manner that it also seeks to transfer this inclination to the lower portion 24. In its upper region, it is in fact compressed, and in its lower region it is tensioned. However, the lower portion 24 cannot temporarily change its diameter. Therefore, where possible, it is necessary to note that, in the region of the zone 25 of reduced resistance, the plastics material ring is not subjected to any tension over its circumference. Otherwise, as a result of such tension, the lower portion 24 could undesirably tear from the dividing flanges 10. This can in fact be achieved, however, by the inwardly bent rim 3 of the cap being pressed upwardly; any improper circumferential expansion of this rim 3 is to be prevented, if possible. However, the lower portion 24 may even be expanded or compressed to a certain extent in the region of the zone 25 of reduced resistance. If, however, when the cap is opened, the lower portion 24 of the plastics material ring tears at any attenuation line 13 which extends at right angles to the circumferential direction, the tension indicated by the sloping position of the upper portion 23 can be positively transferred to the

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severed lower portion 24 by the stable retaining flanges 28. This portion 24 then positively seeks to position itself parallel to the upper portion 23; in consequence, the torn parts of the lower portion 24 of the ring splay outwardly from the container neck 15 beyond the rim 3 of the cap. In consequence, the torn parts of the lower portion 24 of the plastics material ring can also no longer be slipped inwardly in order to give the impression of an non-severed plastics material ring.

The new cap is particularly suitable for fluids containing carbon dioxide, such as mineral water or similar beverages.

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List of reference numerals

- 1 cap
- 2 cap cover
- 3 lower rim
- 4 bead
- 5 sealing insert
- 6 screw-thread of cap
- 7 plastics material ring
- 8 outwardly orientated edge
- 10 dividing flange
- 11 opening
- 12 circumferential direction
- 13 attenuation line
- 14 container
- 15 container neck
- 16 clamping bead
- 18 screw-thread
- 20 screw-thread of container neck
- 21 screw-thread of cap
- 23 upper portion
- 24 lower portion
- 25 zone of reduced resistance
- 26 lip
- 27 toothing
- 28 retaining flange
- 29 extension
- 30 grooving
- 31 profile rim
- 32 cap wall
- 33 ridge
- 34 groove
- 35 tooth
- 36 recess

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Claims

1. Construction for a cap for a container neck provided with a screw-thread or a bead, which grips beneath a retaining ring on the outside of a container mouth, wherein a guard ring (7) of plastics material is secured to the lower rim of the screw cap, comprising:

a) a cap (1), more especially formed from metal, having an outwardly shaped bead (4) disposed on the lower rim (3) for inward deformation for the accommodation

b) of the guard ring (7), its upper portion (23) being connected to the lower portion (24) in the circumferential direction via a zone (25) of reduced resistance and being provided externally with a projection which fits into the bead (4) of the cap (1), and its lower portion (24) having a lip (26) which is inclinedly and inwardly orientated and extends to the upper portion (25*); wherein the external projection on the upper portion (23) of the guard ring (7) is in the form of an outwardly orientated edge (8) or an annular bead, and the lower portion (24) of the guard ring (7) has no outwardly orientated projection, with the result that the guard ring (7) has a substantially Z-shaped cross-section, characterised in that, towards the lower portion (24) of the guard ring (7), the lip (26) is provided with a toothing (27) which fits into a corresponding grooving (30) in the lower portion (24) of the guard ring (7) on sides of the lip (26).

2. Construction according to claim 1, characterised in that at least the lower portion (24) of the guard ring (7) is made shrinkable.

3. Construction according to claims 1 to 2, characterised in that the bead (4) is made shrinkable.

*Translator's note

Presumaly "(25)" is a clerical error for "(23)" in the German text.

4. Construction according to at least one of claims 1 to 3, characterised in that the lower portion (24) of the guard ring (7) is provided, at right angles to the circumferential direction (12), with at least one attenuation line (13), preferably one to nine attenuation lines which are possibly spaced at regular intervals from one another.

5. Construction according to at least one of claims 1 to 3, characterised in that at least one retaining flange (28), which joins the upper portion (23) and the lower portion (24), is disposed at intervals at right angles to the circumferential direction (12) of the guard ring (7) instead of the zone (25) of reduced resistance, wherein at least one attenuation line (13) is disposed in the lower portion (24) at right angles to the circumferential direction (12) of the guard ring (7).

6. Construction according to claim 5, characterised in that retaining flanges (28), which join the upper portion (23) and the lower portion (24), are disposed at intervals at right angles to the circumferential direction (12) of the guard ring (7) instead of the zone (25) of reduced resistance, wherein an attenuation line (13) is disposed in the lower portion (24) of the plastics material ring (7) at right angles to its circumferential direction (12) on the one side of the retaining flanges (28).

7. Construction according to claim 5 and/or 6, characterised in that extensions (29) are disposed at least sporadically in the lip (26).

8. Mounting process for mounting a cap with a construction according to at least one of claims 1 to 7, characterised in that the cap (1) is disposed over the guard ring (7), and then the lower encircling rim (3) of the cap (1) is bent around the outwardly

orientated edge (8) of the guard ring (7) without thereby outwardly flanging the lower rim (3).

9. Mounting process according to claim 8, characterised in that the bead (4) is inclined over its periphery in an upwardly and inwardly sloping manner.

10. Mounting process according to claim 9, characterised in that the inwardly bent lower rim (3) of the cap (1) is pressed upwardly so that the bead (4) is inclined over its periphery in an upwardly and inwardly sloping manner.

11. Cap, characterised in that it is produced in a mounting process according to one of claims 8 to 10.