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(54) **Metal precontainer, a blow formed metal container**

(57) The invention relates to metal precontainer (1) for blow forming into a blow formed container (2) comprising a cylindrical body (3), an upper component (7) having an opening (8), and a lower component (4),

wherein the upper component (7) and/or the lower component (4) are connected to the cylindrical body (3) by a seam (5) comprising a component hook (22), a body hook (21) and means (19) for locking the body hook to the component hook (22), and to a container blow formed (2).

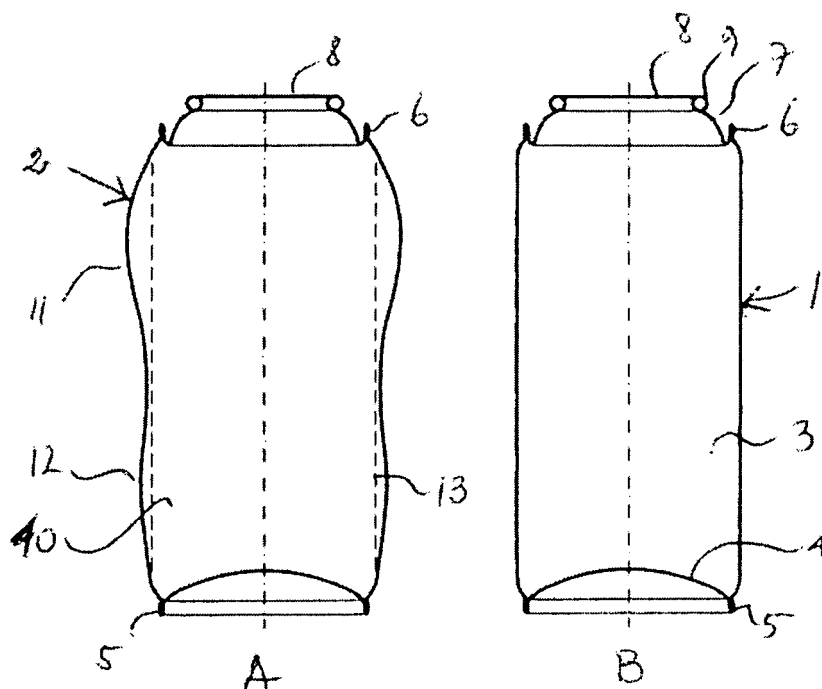


Fig. 1

Description

[0001] The present invention relates to a metal pre-container, and to a blow formed metal container.

[0002] These blow formed metal containers are generally used as containers for a pressurized content, such as aerosol containers, containers for shaving cream, whipped cream and the like. These containers may be three piece containers comprising a cylindrical body an upper component and a lower component both seamed to the cylindrical body. The container may also have to form of a two pieces container in which case one component, generally the lower component is unitary with the cylindrical body and produced by deep drawing and ironing.

[0003] In the prior art, such as EP 521 637, containers are produced with an apparatus comprising an elaborate and complicated clamping system. The clamping systems is required in order to ensure the double seam joints between the container body and its upper and lower components do not unroll, fail or leak during the blow forming operation. Due to the complicated clamping system this apparatus and process of making blow formed containers suffers from the drawback that the complexity reduces operational flexibility. The reduced flexibility forms a problem in meeting needs to cope with small batch sizes, frequent change overs for making containers with different sizes and forms, particularly for price sensitive customers

[0004] The present invention has for its object to avoid the aforementioned drawbacks and problems and provide a precontainer that can be made by blow forming using a far less complex blow forming apparatus and process.

[0005] The present invention is based on the insight that the apparatus and process for blow forming a container can be relatively simple when the precontainer comprises means that avoid (at least partially) unrolling of the seam thereby maintaining substantially the integrity of the seam. Thereby, the use of complicated systems for clamping and/or maintaining the integrity of the seam can be avoided. This will save apparatus and process costs. Still the blow formed container will meet the customers tolerances and specification to a very high degree of confidence.

[0006] This object of the invention is obtained by providing a metal precontainer for blow forming into a blow formed container, comprising a cylindrical body, an upper component having an opening, and a lower component, wherein the upper component and/or the lower component is connected to the cylindrical body by a seam comprising a component hook, a body hook and means for locking the body hook to the component hook. Although described for tinplate other metals and alloys are equally suitable, such as steel and aluminium.

[0007] As indicated above the incorporation of the locking means will avoid unrolling and a rupture and leaking of the seam which would make it unsuitable for the in-

tended use. Still the costs for including the locking means into the precontainer will not to a major extent increase its costs. Furthermore, shorter cycle times are possible.

[0008] According to a preferred embodiment the seam is there called "double seam" because the metal from the component had been folded twice. Such a seam is reliable and generally used. However, it is noted at this point that other types of seams such as single seams may also be used.

[0009] According to another embodiment the locking means comprise a pinched part of the double seam. By pinching the seam shaper angels and/or kinked structures are formed in the seam. As a result the body hook is locked against unrolling from the component hook, so that during blow forming unrolling of the body hook and the component hook is to a major extent avoided as the unrolling force will be much larger than generated by the blow forming pressure exerted on the body and the component near the seam.

[0010] The pinching should be such that at least in the area of the overlap of the body hook and the component hook (where five metal layers overlap) the measured thickness of the seam relative to thickness of the five layers expressed measured as the seam tightness is more than 85%, preferably 90 - 100%, more preferably 95 - 100%. Without such pinching the seam tightness is generally less than 85%, such as less than 80%. This pinching operation can be carried out when making the double seam and additionally compress or pinch the seam particularly in the overlap area, which is generally the area with were the seam has its largest thickness.

[0011] When the pinching operation is (in addition) carried out in the area outside the overlap area then the seam like be provided in the pinched part with a kinked body hook and/or kinked component hook. Such kinking of the body hook and/or component hook will have a positive effect on the locking of the body hook to the component hook.

[0012] According to another embodiment the locking according to the present invention can be further improved by the selection of body plate material. Such that the body plate is easily formed and as a consequence reduces the tendency of the body hook to be pulled out of the component hook in the seam.

[0013] In order to optimise the material performance it has been found advantages to control the materials elongation properties but to also control the materials r value of the Lankford coefficient which is a measure for the plastic anisotropy of the metal sheet out of which the body is formed. In this way not only is the blow forming force on the double seam reduced, but blow forming expansions of up to 30% are also possible. The r value for the Lankford coefficient is preferably in the range of 1.0 - 2.0, preferably 1.2 - 1.8, more preferably 1.35 - 1.6. In practice, the r value is generally measured at 20% elongation in a tensile test.

[0014] According to another embodiment is in the cylindrical body the C-grain direction in the circumferential

direction. This has as an effect that in the circumference the body (particularly in the region of the longitudinal weld) is stronger and more resistant to splitting. This is beneficial at higher expansion and reduces the risk for leaking.

[0015] According to another embodiment of the locking means of the invention, is the locking of the body hook and of the component hook improved when the locking means comprise means adhering the body hook to the component hook, preferably the adhering means comprise adhesive and/or solder. By using adhesive or solder the body hook and component hook are strongly adhered to another. Obviously, this form of locking means can be used in combination with the pinched means. Particularly, for other types of seams.

[0016] According to a second aspect, the invention also relates to a blow formed metal container, obtainable by blow forming a precontainer. In particular, using a precontainer as described hereinbefore. Such container has an optimal resistance against a disruption of the seam due to the blow forming pressure resulting is a leaking seam, particularly when the seams are not clamped.

[0017] Mentioned and other features of the precontainer, the blow formed container, the apparatus and process for making such container according to the invention will be further illustrated by several examples and embodiments which are given for information purposes only and are not intended to limit the invention to any extent. In relation to these embodiments reference will be made to the annexed figures of which:

Figure 1A and 1B side views of the blow formed container and its precontainer, respectively;

Figure 2A - 2D schematically the formation of a double seam according to the invention;

Figure 3 schematically another double seam of the invention;

Figure 4A and 4B in cross section a double seam according to the invention before and after blow forming, respectively;

Figures 5 and 6 in cross section double seams of the invention with a tightness of 100% and 95%, respectively; and

Figure 7A and 7B alternative seams according to the invention.

[0018] Figure 1 shows a precontainer 1 and a blow formed container 2 according to the invention. Both containers 1 and 2 are a tinplate (gauge 0.19mm, TS260) three piece container 1,2. The precontainer comprises a cylindrical body 3 made from a sheet of tinplate and formed into a cylinder and longitudinally welded. A lower concave or dome shaped component 4 is connected to the body 3 via a double seam 5. Via a double seam 6 is an upper component 7 connected to the body 3. The upper component 7 has an opening 8 provided with a curl 9. When needed height compensation is possible.

[0019] The blow formed container has a blow formed

body 10 comprising two expanded body portions 11 and 12 of larger but mutually different diameters. The contour of the precontainer 1 is illustrated by the broken line 13. Expansion up to 30 - 40% is possible.

[0020] Figure 2 shows the various steps of making a double seam of the invention comprising the inventive locking means 14. Figures 2A shows a chuck 15 contacting an upper component 16 resting on an edge 17 of a body 18. A seaming roller 19 contact a curl 20 of the upper component 16. As shown in figure 2B, the roller 19 moves while rolling towards the chuck 15 thereby forming the body hook 21 and the component hook 22. In a second step a seaming roller 23 is contacting the seam and ultimately forms the double seam 24. The double seam comprises pinched part 25 having a tightness of 98% and a kinked component part 26. Accordingly, the locking means 14 according to the invention as reliable and easily formed with adapted seam forming means (roller 23) resulting in a tightly pressing and kinking of the double seam 24.

[0021] Figure 3 shows another double seam 36 of the invention connecting a lower component 37 and a body 38. The tightness at the overlap of the body hook 39 and the component hook 40 is about 100%. Such tightness was obtained by pinching at least the overlap area 41.

[0022] Figure 4A shows a double seam 29 of the invention connecting a body 28 and an upper component 27. The double seam comprises a body hook 30 and a component hook 31 which partially overlap. At this location 32 is the tightness about 90%. In the pinched distal part 33 of the seam 29 is the tightness about 99%. The location 32 and the pinched part 33 form the locking means 14 of the invention. Figure 4B shows the double seam 29 after blow forming. It is evident that the blow forming had no substantial effect of the structure and form of the double seam 29. The tightness at the location is slightly smaller and in the pinched part 33 substantially not changed.

[0023] Figure 5 shows a double seam 35 having a tightness of about 100%. Figure 6 shows a double seam having a tightness of about 95%. Both measures of the tightness were done in the area of maximum thickness of the seam which is at the location of the overlapping body hook and component hook.

[0024] Figure 7A shows an alternative for the locking means 14 of the invention for the seam 42. The locking means 14 comprise adhesive 43 adhering the body hook 46 and the component hook 47 together. In a similar manner the locking means 14 of the seam 44 comprise solder 45 attaching the body hook 46 and the component 47 together.

Claims

1. Metal precontainer for blow forming into a blow formed container comprising a cylindrical body, an upper component having an opening, and a lower

component, wherein the upper component and/or the lower component is connected to the cylindrical body by a seam comprising a component hook, a body hook and means for locking the body hook to the component hook.

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2. Precontainer according to claim 1, wherein the seam is a double seam.
3. Precontainer according to claim 2, wherein the locking means comprise a pinched part of the double seam. 10
4. Precontainer according to claim 3, wherein the pinched part has a seam tightness being the measured thickness of the seam relative to the thickness of the five metal layers, is more than 85%, preferably 90 - 100%, more preferably 95 - 100%. 15
5. Precontainer according to claim 3 or 4, wherein the pinched part comprises a kinked body hook and/or kinked component hook. 20
6. Precontainer according to claim 1 - 5, wherein the metal of the cylindrical body has a Lankford coefficient of 1.0 - 2.0, preferably 1.2 - 1.8, more preferably 1.35 - 1.6. 25
7. Precontainer according to claim 1 - 6, wherein in the cylindrical body the C-grain direction is in the circumferential direction. 30
8. Precontainer according to claim 1 — 7, wherein the locking means comprise means adhering the body hook to the component hook, preferably the adhering means comprise adhesive and/or solder. 35
9. Blow formed metal container, obtainable by blow forming a precontainer according to claim 1 — 8. 40

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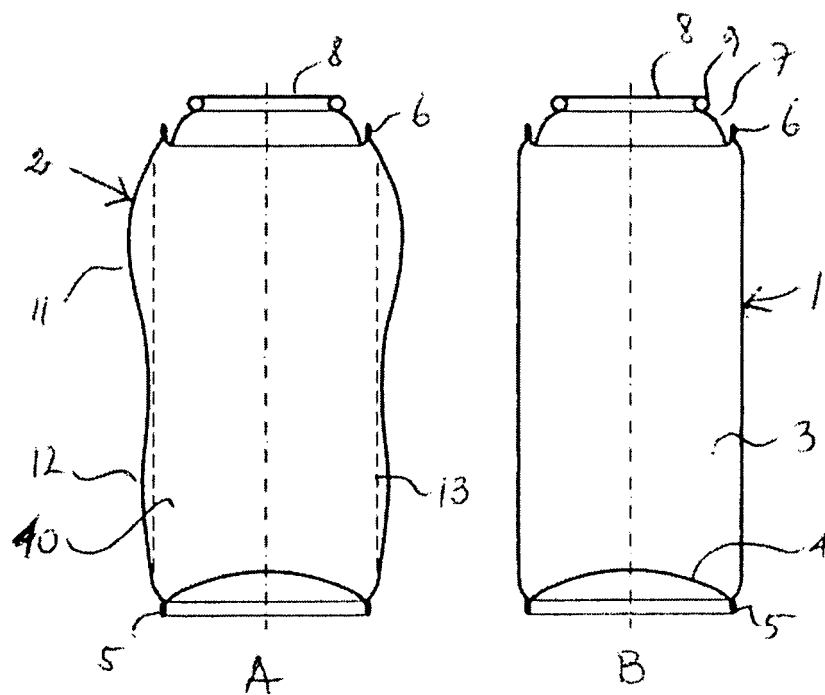


Fig. 1

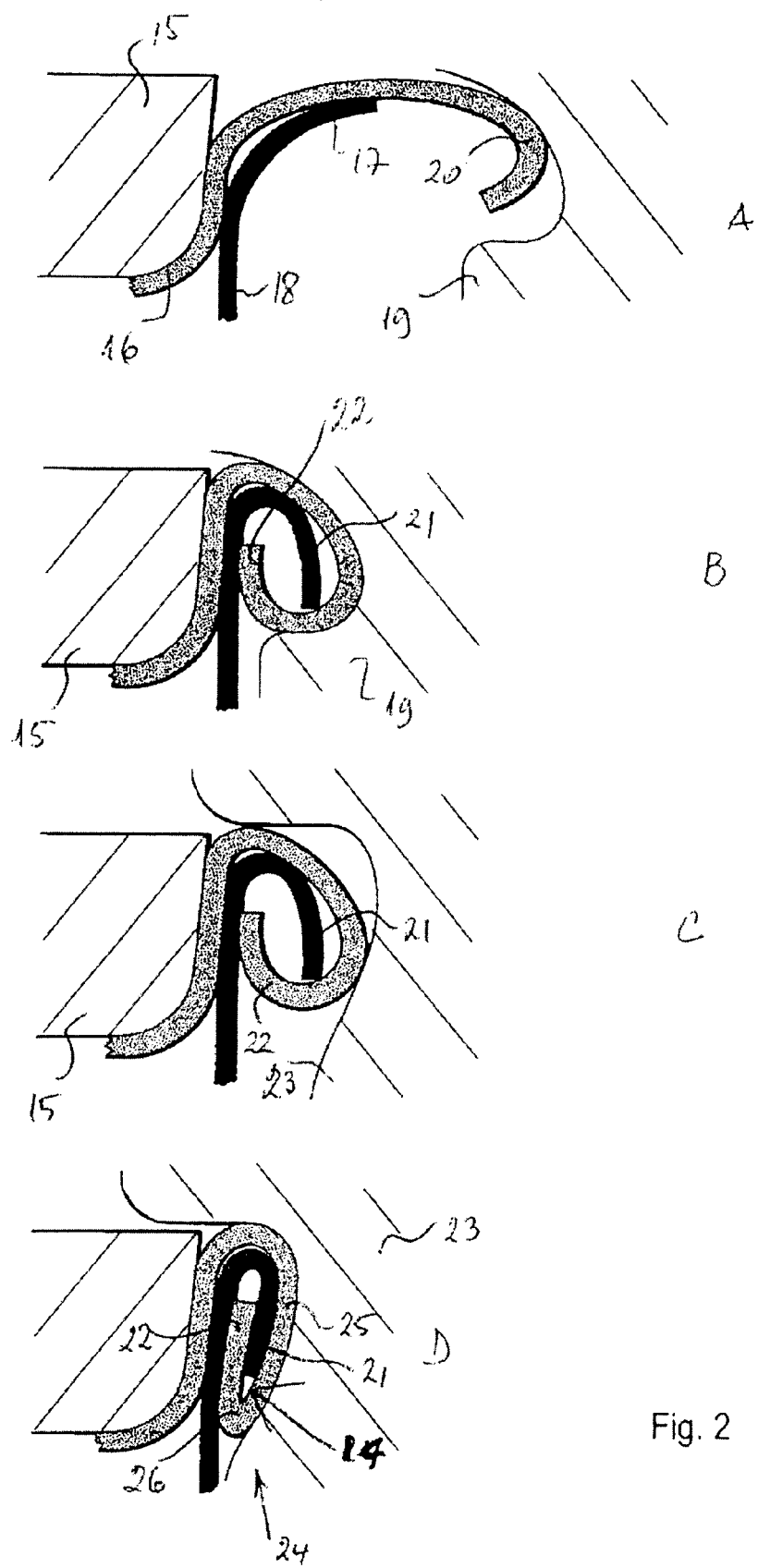


Fig. 2

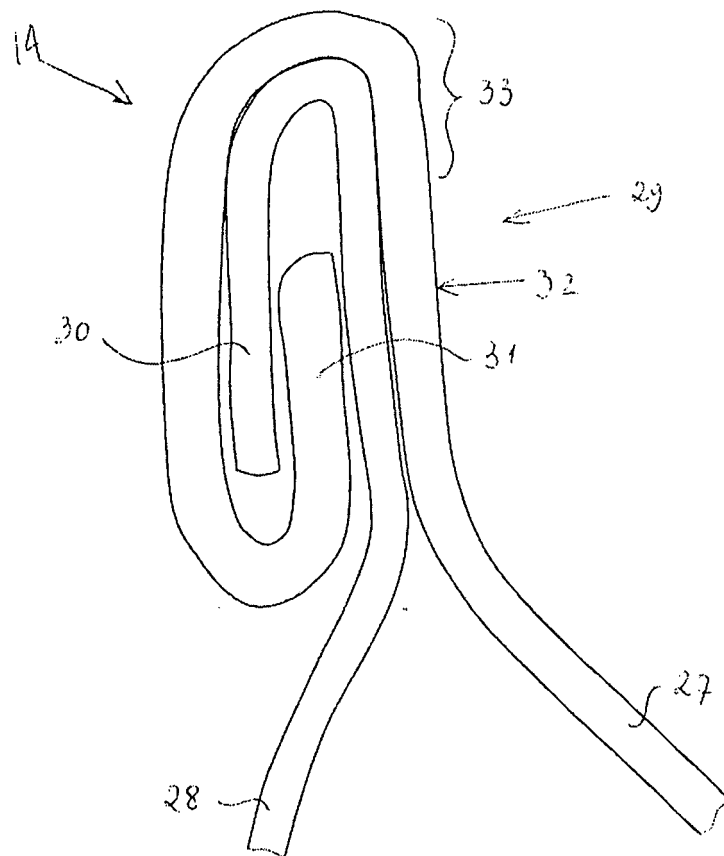


Fig 4 A

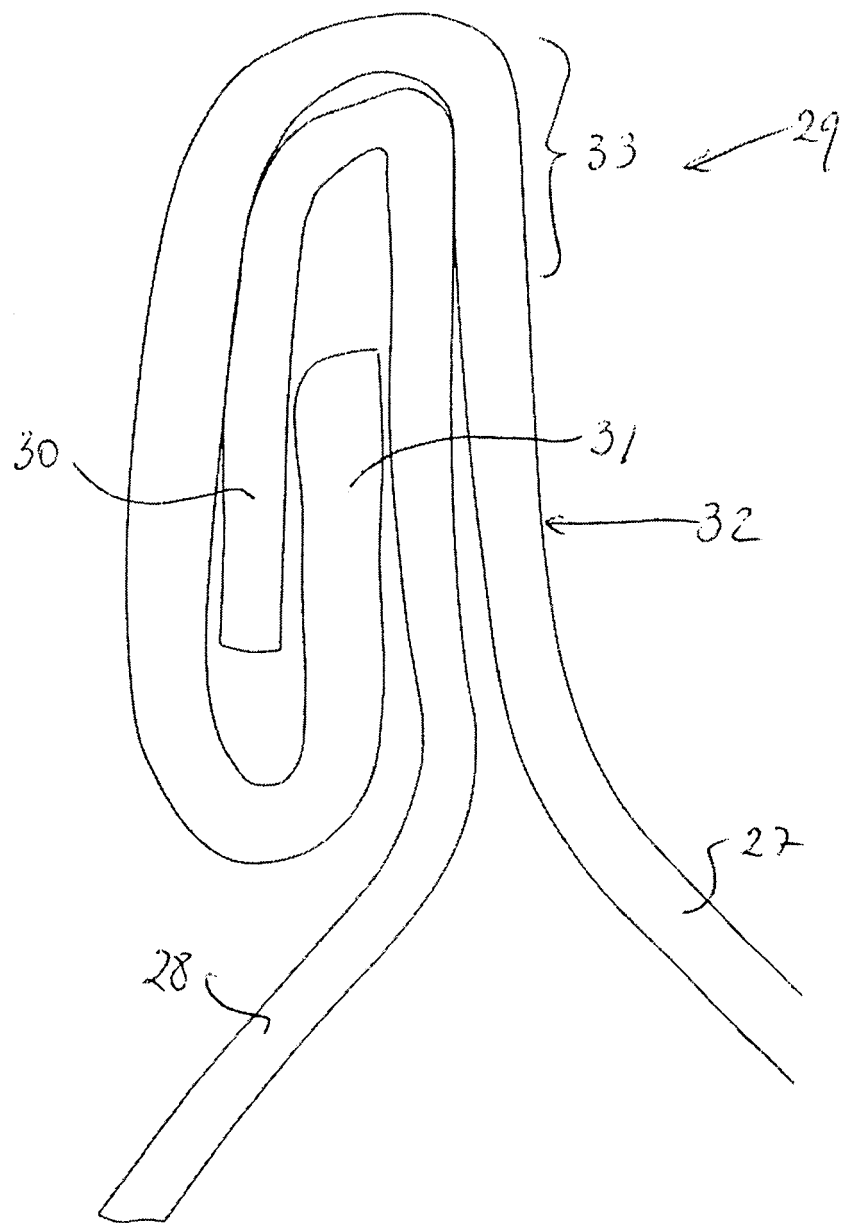


Fig 4 B

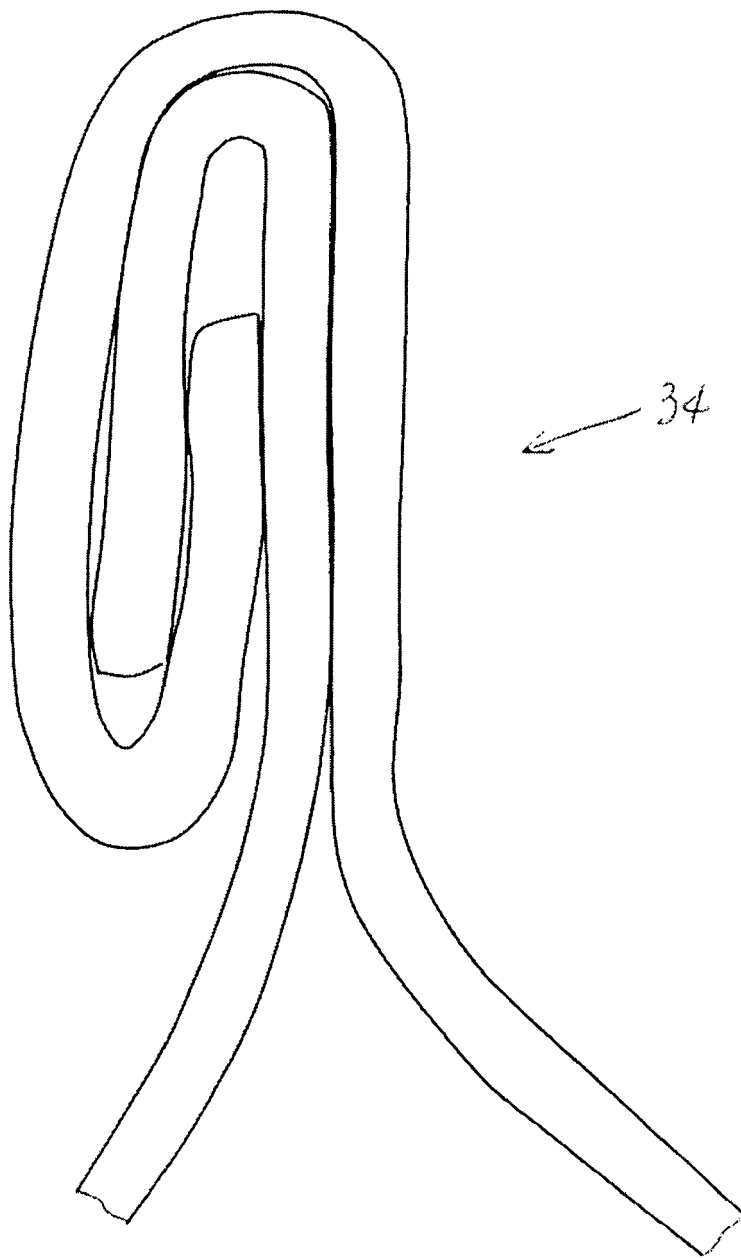


Fig 5

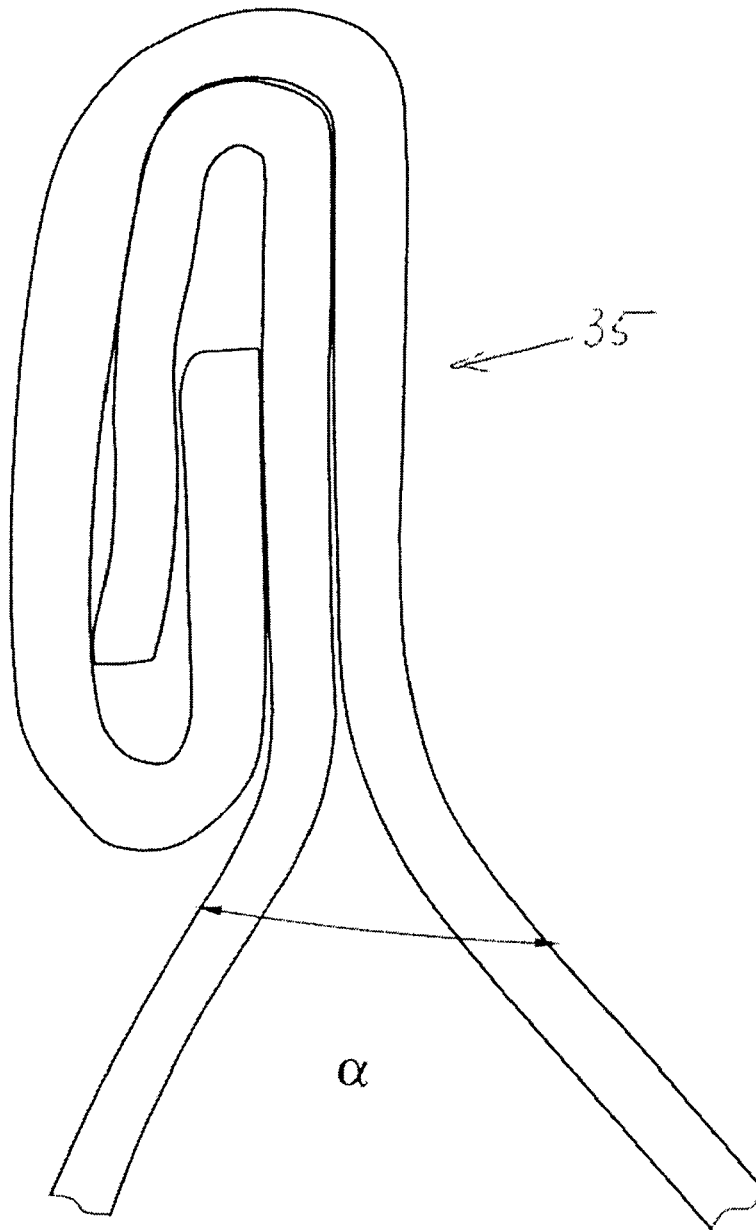
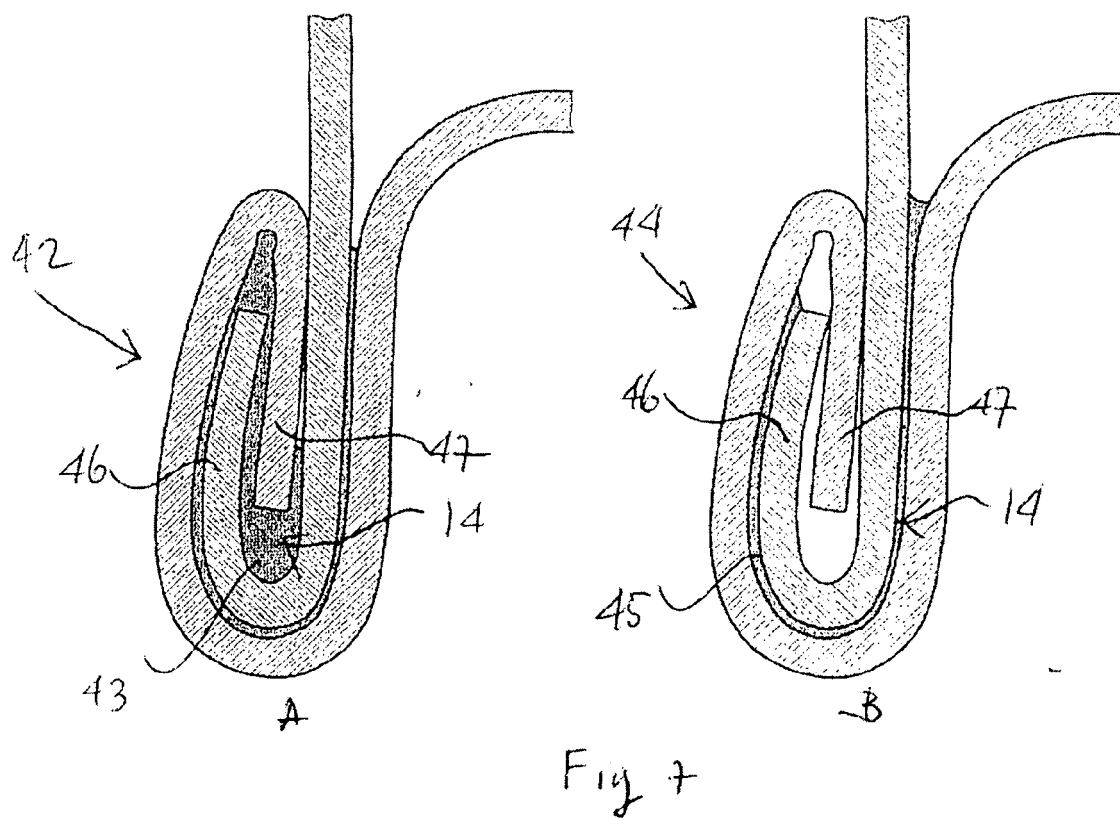
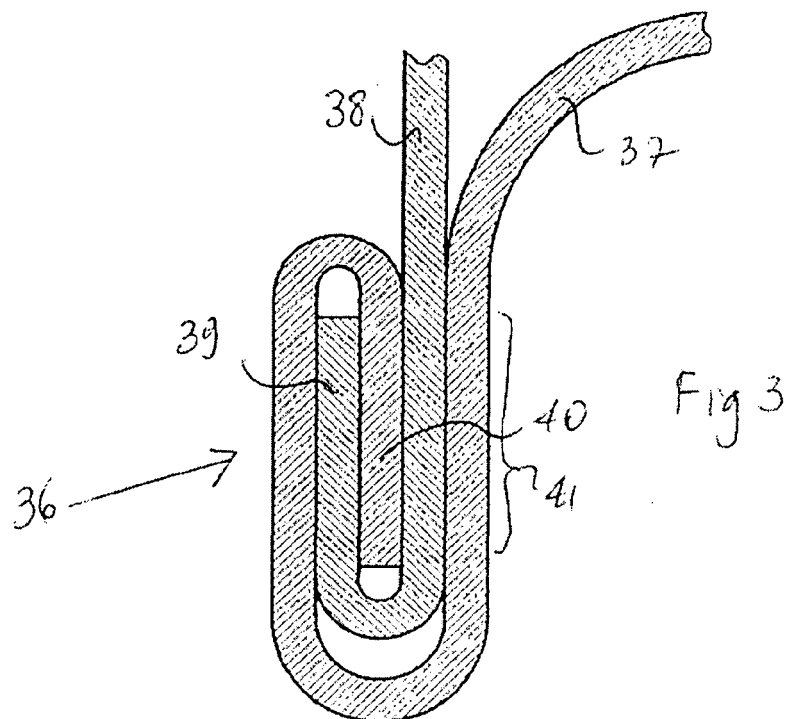


Fig 6





EUROPEAN SEARCH REPORT

 Application Number
 EP 10 00 1829

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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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