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(54) Over-pressurized packaging and a method of manufacturing such a packaging

(57) Over-pressurized packaging and a method of manufacturing such a packaging.

A packaging that comprises a wall that encloses a volume of the packaging and a closure that hermetically seals an opening of the bag to access said volume, wherein the volume is pressurized when compared with the pressure in the environment of the bag, wherein the packaging is a bag that comprises as wall a foil that comprises a sealable inside layer facing the inside of the bag and the wall comprises a first region and a second region between which the opening is limited, and the closure comprises said first region and said second region and a band sandwiched between the two regions, wherein the band has a first sealable side and a second sealable side, wherein the band is sealed with its second side to said inside layer of said second region by a non-peelable seal, and the band extends from the non-peelable seal into the volume and is sealed with its first side to the inside layer of said first region by a first peelable seal at a location beneath the non-peelable seal.

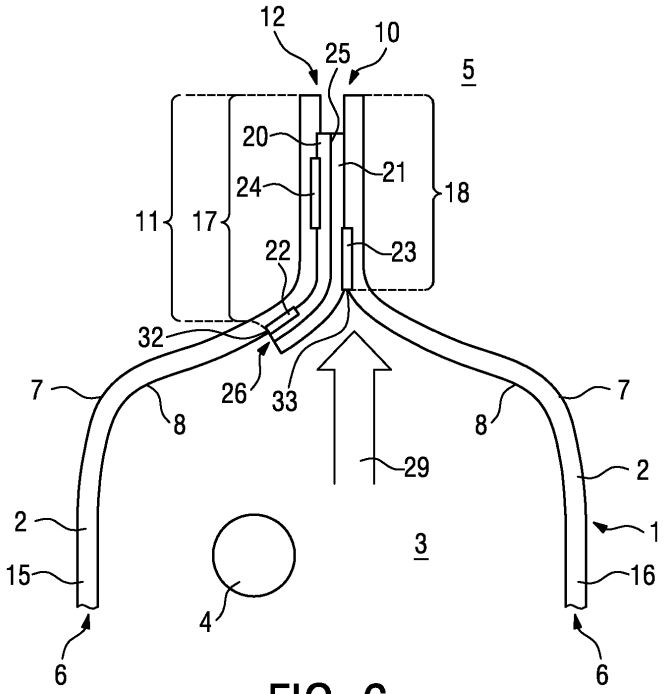

FIG. 6

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Description

DESCRIPTION

FIELD OF THE INVENTION

[0001] The invention relates to an over-pressurized packaging.

[0002] The invention further relates to a method of manufacturing such a packaging according to the first paragraph.

[0003] The invention further relates to a packaged good that is packed in a packaging according to the first paragraph.

BACKGROUND OF THE INVENTION

[0004] A packaging according to the first paragraph is known e.g. from US2002/0096521A1. The packaging in form of a container is an elongated tubular construction and typically stores three tennis balls. Tennis balls are manufactured with a hallow rubber core, which is pressurized with air or some gas. The pressure in the ball is in the rage of approximately 1,3 to 1,5 bar, which means the inside of the ball shows an overpressure when compared with the atmospheric pressure that is of the magnitude of 1013 mbar. The pressurization gives the balls their bouncing behavior or property. In order to avoid any gas diffusion from the inside of the ball to the outside of the ball, hence any loss of pressurization, the inside of the container in which the balls are packed is also pressurized. An elongated pressurized chamber of the container, which is typically made of plastic because of economical reasons, is closed with a closure panel that hermetically seals the pressure chamber. A part of the closure panel is a removable lid that can be pulled off by means of a pull-tab attached to it. The known container shows the disadvantage that the closure panel constitutes a major percentage of the overall costs of the container and in pulling the lid off, an immediately harmful situation is created for the fingers and hands of a user because the lid has razor-like edges.

[0005] Therefore, it is an object of the present invention to provide an improved over-pressurized packaging, and a packaged good that is packed in said improved packaging, so that the aforementioned disadvantages are avoided.

SUMMARY OF THE INVENTION

[0006] In order to achieve this object a packaging is provided that comprises a wall that encloses a volume of the packaging and a closure that hermetically seals an opening of the bag to access said volume, wherein the volume is pressurized when compared with the pressure in the environment of the bag, wherein the packaging is a bag that comprises as wall a foil that comprises a sealable inside layer facing the inside of the bag and the wall comprises a first region and a second region between which the opening is limited, and the closure comprises said first region and said second region and a band sandwiched between the two regions, wherein the band has a first sealable side and a second sealable side, wherein the band is sealed with its second side to said inside layer of said second region by a non-peelable seal, and the band extends from the non-peelable seal into the volume and is sealed with its first side to the inside layer of said first region by a first peelable seal at a location beneath the non-peelable seal.

[0007] Also a method of manufacturing a packaging achieves said object, wherein said method comprises the steps of using a foil as a wall of a bag that realizes said packaging, wherein the wall encloses a volume of the bag and the foil comprises a sealable layer to realize a sealable inside layer of the wall of the bag, and defining a first region and a second region of the wall so that an opening of the bag is limited between the first region and the second region, and creating a closure that hermetically seals said opening in the bag, the step of creating said closure comprises inserting a band between the two regions so that the band is sandwiched between the two regions, wherein the band has a first sealable side and a second sealable side, and sealing said second side to said inside layer of said second region by a non-peelable seal so that the band extends from the non-peelable seal into a direction towards the volume of the ready made bag, and sealing said first side to said inside layer of said first region by a first peelable seal at a location beneath the non-peelable seal.

[0008] Also a packaged good, in particular at least one tennis ball that is packed in a packaging according to the invention achieves said object.

[0009] Beneath indicates direction from the head to the foot of the bag.

[0010] Above indicates a direction from the of the bag to the head of the bag.

[0011] The invention provides the advantage that it completely deviates from the known solution because it not only avoids the use of a lid tightly sealed to a rigid container but it also avoids the use of the rigid container itself. It changes the concept of a pressurized packaging entirely because it provides a new pressurized packaging in form of a flexible bag made of a sealable foil, wherein the bag is closed by sealing two portions of said bag together. The new bag can be easily manufactured on existing, slightly modified pouch making lines, it is more cost efficient, there is no extra tool (knife or pair of scissors) needed for opening the pressurized bag, and it can easily be adapted to a wide range of machinery and packaging concepts that make use of or are based on flexible plastic foils. The invention also allows the use of foils having high mechanical resilience in order to achieve the required tightness of the pressurized bag during its entire shelf life.

[0012] The non-peelable seal acts as a permanent seal that is exposed to the force that pushes the first and sec-

ond region away from each other. The internal pressure in the volume creates this force. The non-peelable seal is also designed so that it cannot be manually opened by a user without the use of a tool.

[0013] As a consequence of the band that is sealed to the inside layer of the wall beneath the non-peelable seal the peel-off force caused by the over-pressure in the volume of the bag puts the non-peelable seal under peel-off stress while the first peelable seal is primarily kept without such peel-off stress. The band is bent in direction of the inside layer of the wall so that hardly any peel-off force (acting perpendicular to the surface of the peel-seal) exists at the edge of the peelable seal. The peelable seal is sensitive to a force that is applied in perpendicular direction at its edge of the peelable seal and causes a peel-stress in the sealed zone. The peel-stress, once above a threshold, creates a crack in the seal that propagates along the sealed zone until the sealed together components are separated. In contrast to being put under peel-off stress the first peelable seal is even supported in its closure state by the internal pressure because the band faces the same force (modulus and direction) created by the internal pressure of the volume as the adjacent part of the wall faces. Therefore the band is not pulled away from the wall but rather kept in position aligned with the wall so that the pressure cannot establish a peel-off stress in the first peelable seal. The first peelable seal mainly examines sharing force that can easily be withstood by the peelable seal so that the band and the inside layer of the wall remain stuck to each other.

[0014] This has a significant influence on the usability of the closure because now the peel-off force required to manually open the peelable seal can be limited by the design of the peelable seal so that a user can easily open the peelable seal by hand without the necessity of any tool like knife or pair of scissors. In fact the peel-off force to manually open the bag can be the same as it would be the case for a bag with a non-pressurized volume. The bond strength provided by the peelable seal can be tuned by the properties of the material sealed together, the temperature used to establish the seal and / or the duration during which the materials are exposed to the temperature or the pressure applied in the sealing process or, if these parameters are frozen or in other words not available, by the size of the area sealed together. The size of the area sealed together also defines the acceptable level of sharing force for the peelable seal.

[0015] On the other hand the bond-strength of the non-peelable seal can be tuned to relatively high values so to easily withstand the peel-off force caused by the pressure difference between the outside of the bag and the inside of the bag. However, the user, when intending to open the bag, will not be hampered by such relatively high bond-strength because the required opening force to peel off the peelable seal will only be determined by the properties of the peelable seal, which can be chosen to be widely independent from the pressure in the pressurized volume.

[0016] Advantageously the entire bag together with its closure is realized only by the foil. On the one hand one foil is used as the wall of the bag and on the other hand another foil is used as the band.

[0017] Once the closure is opened, which means that the peelable seal is in its peeled-off state, the opening of the bag is formed between the band and the first region. The outer ends of the opening may be defined by the edges of he wall surrounding the opening.

[0018] The bag may have the permanent seal (a further non-peelable seal) along its entire outer periphery except of the closure. In the permanent seal two confronting wall segments are sealed together to form the tightly sealed bag. In case of a folded foil used to create the wall of the bag, e.g. when producing a tubular structure by the foil prior to creating the permanent seal, the permanent seal may in fact extend only in such areas where the bag must be tightly closed. Such a bag may have a (one or more) further seals (edge-seal) substituting the closure-seal along the folding edge of the foil. In fact the bag may also have side gussets and each edge of the gusset may have its own edge-seal, wherein one edge seal is realized by the permanent seal. The bag may also be created by a stripe of said foil that realizes the wall, that is folded to create a bottom fold (gusset) to be used as bottom part of the bag. Here the permanent seal is applied along a right and left longitudinal edge of a front wall portion and a rear wall portion. Such a bag may have the closure along its entire head.

[0019] The bag may also show a dedicated bottom part intended to place the bag in an upright position in which the closure is located on top of the bag in a head area of the bag.

[0020] The foil used as the wall of the bag may comprise various layers, which are manufactured by using various materials or combinations thereof. Although a monolayer foil would be feasible, according to a preferred embodiment of the invention a multilayer foil is preferred because each layer may have individual functions assigned to it.

[0021] Accordingly the inside layer may be realized by e.g. PE, OPP, CPP, or PET. The wall of the bag, in particular the inside layer, should serve two practical constraints. Firstly the inside layer must be sealable against itself and against the band in order to hermetically close the volume. Secondly the so created seals as well as the wall itself must withstand the expected operation temperature during e.g. heating or cooking or even during transportation and storing of the bag. In case of food as packaged good, in particular the inside layer may not degrade or contaminate the packaged good during heating up the food or the entire bag, while the inside layer is in direct contact with the hot food.

[0022] One or more middle layer(s) may facilitate barrier functions against oil, moisture, oxygen and so on, and therefore realize a functional ply. Without any claim to completeness materials deployable are e.g. aluminum foil, metalized PET or OPA.

[0023] The outside layer may be used to provide a marketable finish of the bag that may show a glossy surface with or without any printings while typically not being sealable. Therefore, without any claim to completeness, materials like e.g. PET, PA, OPP, or paper are applicable.

[0024] The numerous layers may be assembled to form the foil by various techniques like blow extrusion, hot or cold lamination and so on.

[0025] Materials and structures explained to be usable for the foil are also useable for the band, in particular in order to realize its first side and its second side to be of a sealable nature and to realize the respective sealing properties with the inside layer of the foil.

[0026] The dependent claims and the subsequent description disclose particularly advantageous embodiments and features of the invention, whereby features disclosed and discussed in the context of one of the subject matters claimed by an independent claim can also be used to the advantage of the subject matter of another independent claim.

[0027] The first peelable seal comprises a first edge that faces towards the volume and also the band comprises a second edge that faces towards the volume. The alignment of the first peelable seal in relation to said second edge can be so that the first edge is remote from said second edge, provided that the band does not flip away from the inside layer of the wall, which will immediately cause a peel-off stress in the first peelable seal created by the pressure of the volume that will ultimately pull apart the band and the wall, hence open the first peelable seal. According to a preferred embodiment that fully avoids any distance between that end of the band that extends into the volume and the inside layer said first edge is congruently aligned with said second edge. Here the band is securely fixed on the wall. This measure guarantees that the pressure in the volume will not accidentally cause any peel-off stress at the beginning of the second peelable seal, which in the worst case may lead to an undesired opening or peeling-off of the second peelable seal and thereafter the first peelable seal.

[0028] In one embodiment of the invention the first peelable seal extends along the first region to a point above the non-peelable seal. Hence a continuous peelable seal is created from beneath the non-peelable seal to above the non-peelable seal. This embodiment is of advantage if the creation of the overlapping non-peelable seal and the peelable seal does not adverse effect one of the two seals.

[0029] According to a preferred embodiment of the invention the first side is sealed to said inside layer of said first region by a second peelable seal remote from the first peelable seal and above the non-peelable seal. The space between the two peelable seals reduces a possible adverse influence of the creation of one seal of the peelable seals on the non-peelable seal or the other way around.

[0030] According to a further aspect of the latter embodiment the first and the second peelable seal are located from each other in a distance that is equal to or wider than the width of the non-peelable seal. This provides the advantage that an influence on the peel-ability of the peelable seals or the non-peel-ability of the non-peelable seal is reliably avoided because the position of the two types of seals can be selected so that any overlap of the two types of seals is avoided.

[0031] According to one aspect of the invention the band has a length that is equal or longer than the length of the opening. If the length of the band is equal to the length of the opening, the band will typically not be embedded between permanent seals that are located adjacent to the opening and hermetically close the bag outside of the closure. In order to improve the rigidity of the entire bag it may be of advantage to use a band that is longer than the length of the opening, so that it can be embedded in the permanent seal adjacent to the opening.

[0032] The band may have a width that is equal to or lower than the length of the first edge region. This allows an easy installation of the band by aligning it with the outer end of the first edge region, in fact with the outer end of the opening that is given by the edge of the wall of the bag. This also allows the outer edge of the band to be grasped with the fingers of a user when the closure of the bag is opened. However, according to a preferred embodiment the band may also be located between the first and second region so that its outer edge is hidden beneath the edge of the wall of the bag. In this case the width of the band is lower than the length of the first region so that it still extends beneath the non-peelable seal into the volume. In case that the band is located with a distance to the outer edge of the opening the advantage exists that the bag can be grasped solely at the two wall portions of the opening and the opening process can be performed in the same manner, as it would be without any band. In fact a possible confusion of a user by an additional layer in form of the band is avoided because the distance between the band and the outer edge of the opening can be so large that the band is virtually out of reach and consequently any faulty operation of the opening becomes impossible.

[0033] Typically in the method of manufacturing the first and the second peelable seal are created before the non-peelable seal is created. The sealing temperature required to cerate the peelable seal may be higher than the sealing temperature required to create the non-peelable seal. Here any distance between the first and second peelable seal is of advantage because the peelable properties of the already created peelable seals may not be adversely influenced by the creation of the non-peelable seal. In order to selectively create the different seal types sealing jaws may be used that bring in heat only from the respective side of the band where the respective seal is to be created. In order to create the two peelable seals a sealing jaw may only heat the first edge region. In order to create the non-peelable seal a sealing jaw may only heat the second edge region.

[0034] In order to further reduce the heat transfer between the two sides of the band the band comprises a thermally isolating layer between the first sealable side and the second sealable side. Such a layer may be realized by a paper-based layer or by a metallic layer or other materials having thermally isolating properties or a combination of these layers.

[0035] At an area of the location of the non-peelable seal the band may not smoothly follow the curvature of the wall. The curvature of the band may deviate from the form defined by the curvature of the wall until that location where the first peelable seal seals the band to the wall. However, in order to avoid any undesired peel-off stress in any of the two peelable seals it is of advantage that the first region and the second region and the band extend parallel to each other above the non-peelable seal edge. In particular beneath the third edge the remaining part of the band continuously follows the contour of the inside layer. Typically the pressurized volume of the bag will force two confronting wall portions adjacent to the non-peelable seal to bend away from each other in different directions starting from an inner most point of the non-peelable seal. By using the appropriate distance between the two peelable seals any bumps along the band are avoided and the band will smoothly follow the bended wall so that the peel-off stress in the peelable seals is minimized or even fully avoided.

[0036] According to a further aspect of the invention the area of the first peelable seal and/or the second peelable seal is dependent on the pressure in the volume by a given bonding strength of the first and second peelable seal. Hence, it may be of advantage that the area of the first and / or the second peelable seal is adapted to the pressure in the pressurized volume. In fact at a given size of the bag, or more precisely of the size of the opening, the width of the band may be chosen to be wider for higher pressures as it would be the case for lower pressures.

[0037] According to one embodiment of the bag the opposing inside layers of the foil are sealed together to hermetically close the volume from the outside of the bag at an outer periphery of the bag, preferably along its entire circumference except of its closure, and said head of the bag comprises said closure, preferably along the length of the head, and said first region is realized by an edge area of a front wall portion of the bag and said second region is realized by an edge region of a rear wall portion of the bag. Hence a relatively compact e.g. square shaped bag can be created showing a fin like head at which the closure is embedded between the front wall portion and the rear wall portion.

[0038] The bag, also sometimes termed pouch, may be a premade bag, which can be applied e.g. on one side open to fill and close it as soon as filled with packaged good. Accordingly it is of advantage that in the method of manufacturing the steps of sealing said first side of the band to the inside layer is performed prior to the step of sealing said second side to said inside layer, preferably at a site for manufacturing a pre-manufactured bag that has an open opening. In this embodiment of the method of manufacturing the step of sealing said second side to the inside layer is performed after said steps of sealing said first side to said inside layer at a site for filling goods into the pressurized volume of the bag.

[0039] However, the bag may also be pre made with a bottom open to be filled with packaging goods. In this embodiment of the method of manufacturing said step of sealing said first side to the inside layer and said step of sealing said second side to the inside layer is performed simultaneously or consecutive to each other at a site for manufacturing a pre-manufactured bag. Thereafter the bag is delivered to a site for filling it and closing its bottom.

[0040] The bag may also be directly made according to the method of manufacturing on a filling machine, e.g. a so termed Form-Fill and Seal (FFS) machine. Without any claim to completeness the bag may be shaped in form of a pillow pouch, stick pack and so on. In general, the bag may have any shape or size.

[0041] Hence the invention provides a bag, which shows a wider range of applications than the packaging known from US2002/0096521A1, which is only suitable as tennis ball container. In contrast thereto the bag according to the invention can be applied as flexible tennis ball container as well as a packaging for food even during its processing like pre-cooking during which gas in the bag expands and an overpressure is created in the volume. Given its innovative design, such a bag may be used e.g. in food processing without the need for a counter pressure applied to it from its outside, hence the use of an autoclave may be avoided. This simplifies the processing and makes the underlying process more cost efficient.

[0042] In summary the invention provides the advantages that a bag according to the invention can be easily processed on existing pouch making machines or lines. Although it is designed to be as robust as to withstand an overpressure in its volume it will be relatively cheap and no extra tool will be needed to open the pouch. Advantageously the flexible bag combines high sealing properties, in fact pressure resistance in case of a permanently over pressurized volume or in case of an occasionally (temporary) over pressurized volume (e.g. heating or cooking process or caused by a bag that dropped from a shelf or a table) with an easy open feature that does not require any additional tools to easily open the flexible bag, as it would have been the case prior to the invention.

[0043] Other objects and features of the present invention will become apparent from the following detailed descriptions considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed and the description shall be used solely for the purposes of illustration of the invention and not as a definition of the limits of the invention.

BRIEF DESCRIPTION OF THE DRAWING

[0044] In the drawings like features show identical numerals. The figures schematically show in:

Fig. 1 an embodiment of a bag according to the invention that comprises a closure.

Fig. 2 a step in a method of manufacturing the bag according to Fig.1.

Fig. 3 a band used in said method to create said closure.

Fig. 4 a step of sealing said band to one part of the bag.

Fig. 5 a step of sealing said band to another part of the bag.

Fig. 6 a lateral cut through the closure manufactured according to said method.

Fig. 7 a view according to Fig. 6 during an opening of said closure.

Fig. 8 a view according to Fig. 6 on the opened closure.

DETAILED DESCRIPTION OF EMBODIMENTS

[0045] Fig. 1 shows a bag 1 with a wall 2 that encloses a volume 3. The bag 1 contains tennis balls 4 in its volume 3. In order to preserve the bouncing properties of the tennis balls 4 the volume 3 is pressurized with approximately the same pressure that exists inside the tennis balls 4. The pressure inside the volume 3 is above the atmospheric pressure that exists in the environment 5 of the bag. The pressure difference between the volume 4 and the environment 5 causes the bag 1 to look swelled. The wall 2 is made of a flexible two-layer plastic foil 6. The foil 6 has a non-sealable outside layer 7 that is glossy, transparent and shows some information regarding the tennis balls 4 printed on it (not depicted). The foil 6 also has a sealable inside layer 8 (not visible in Fig. 1) that faces the inside of the bag 1, so to say the volume 3. The bag 1 is constructed in a way so that it has a bottom (foot) 9 and a top (head) 10 and that allows the bag 1 to stand in an upright position so that the volume 3 can be accessed from top-down via the head 10. The bag 1 also comprises a closure 11 that hermetically seals an opening 12 of the bag 1.

[0046] The bag 1 also has corner seals 13 and structure seals 14 (only one visible). Along the corner seals 13 opposing inside layers of the foil are sealed together to hermetically close the volume 3 from the environment 5 of the bag 1 at an outer periphery of the bag 1. The corner seals 13 extend along the entire circumference of the bag 1 except of its head 10 that comprises said closure 11 along its entire head length HL. The structural seals 14 help to structure the bottom 9 of the bag 1 to be flat, while the head 10 has the form of a fin.

[0047] The wall 2 comprises a front wall portion 15 (visible in the drawing plane of Fig. 1) and a rear wall portion 16 (invisible in the drawing plane of Fig. 1 because it is hidden behind the front wall portion 15).

[0048] The closure 11 comprises a first region 17 at the edge region of the front wall portion 15 in proximity to the head 10 and a second region 18 at the edge region of the rear wall portion 16 in proximity to the head 10 and a band 19. The first region 17 is longer than second region 18 when measured in direction from the head 10 to the foot 9.

[0049] The band 19 is depicted in Fig. 3. The band 19 has a first sealable side 20 and a second sealable side 21 as depicted in Fig. 3. As shown in Fig. 1 the band 19 is sealed with its first side 20 to said inside layer 8 of said first region 17 by a first peelable seal 22 and with its second side 21 to said inside layer 8 of said second region 18 by a non-peelable seal 23. The first peelable seal 22 and the non-peelable seal 23 do not overlap and the first peelable seal 22 has its beginning beneath the non-peelable seal 23 in direction of the volume 3. The band 19 is also sealed by a second peelable seal 24 to the inside layer 8 of the wall 2 in a first region above the non-peelable seal 23. The first peelable seal 22 has a first edge 32 that faces towards the volume 3. The band 19 has a second edge 26 that faces towards the volume 3. The non-peelable seal 23 has a third edge 33 that faces towards the volume 3.

[0050] In the following the terms "inner edge" and "outer edge" are used. With regard to one of the seals 22, 23 and 24 the term "outer edge" means that this edge is located further way from the volume 3 than the other (inner) edge of the respective seal 22, 23 or 24 is located, while the term "inner edge" means that this edge is located closer to the volume 3 than the other (outer) edge of the respective seal 22, 23 or 24 is located. The second peelable seal 24 is located closer to the head 10 than the non-peelable seal 23 and does not overlap with the non-peelable seal 23. While the inner edge of the second peelable seal 24 and the outer edge of the non-peelable seal 23 are congruent, the outer edge of the first peelable seal 22 and the inner edge (the third edge 33) of the non-peelable seal 23 are separated from each other by approximately 10 mm.

[0051] In fact the first and the second peelable seal 22 and 24 are located from each other in a distance D that is wider than the seal width SW of the non-peelable seal 23, which is located between the peelable seals 22 and 24. This is visualized e.g. in Fig. 5 that shows the closed closure 11. Also indicated in Fig. 5 is the existence of a thermally isolating layer 25 between the first sealable side 20 and the second sealable side 21 of the band 19. The band 19 has a width BW that is narrower than the length R1L of the first region 17. The band 19 has an

inner band edge 26 that faces towards the volume 3 of the bag 1.

[0052] As can be seen in Fig. 4, 5 and 6 an inner edge (the first edge 32) of the first peelable seal 22 is located at the position of the inner band edge 26 of the band 19. Hence the two edges 32 and 26 are aligned congruently to each other.

[0053] In contrast to the situation shown in Fig. 4, which shows the closure 11 and adjacent wall portions 15 and 16 surrounding the volume 3, Fig. 5 shows the bag with a pressurized volume 3. Here the wall 2 beneath the non-peelable seal 23 is deformed (front wall portion 15 and rear wall portion 16 are pushed apart from each other) while at the location of the non-peelable seal 23 and above the non-peelable seal 23 the first region 17 and the second region 18 extend parallel to each other with a part of the band 19 sandwiched in parallel thereto in between. The remaining part of the band 19 follows the contour of the inside layer 8 adjacent to the first region 17. In particular beneath the inner edge of the non-peelable seal 23 the remaining part of the band 19 follows the contour of the inside layer 8 into the volume 3.

[0054] Beneath the non-peelable seal 23 the pressure in the volume 3 pushes the front wall portion 15 to the left and the rear wall portion 16 to the right, which means apart from each other. This is depicted in Fig. 6 in which a third arrow 29 indicates the pressure in the volume 3. Also the band 19 that is fixed by the aid of the first peelable-seal 22 to the inside layer 8 is pushed to the left with the same force that applies to the front wall portion 15 beneath the end of the band 19. Hence, the first peelable seal 22 is not exposed to a peel-off force created by the pressure in the volume 3. In contrast thereto the entire force that pushed the front wall portion 15 away from the rear wall portion 16 is focused on the non-peelable seal 23, which is designed to withstand the peel-off force created by the pressure in the volume 3.

[0055] Fig. 1, 5, 6 and 7 depict that at the head 10, that is located remote (approximately 10 mm) from the band 19, the front wall portion 15 and the rear wall portion 16 are not sealed together so that they can be individually grasped by a user's hands (not depicted) and pulled apart from each other to open the closure 11 of the bag 1. Hence, the length of the opening 12 is equal to the head length HL. In order to provide a tight seal at the head 10 the band 19 is longer than the head length (= length of the opening 12), wherein the difference is twice the width of the corner seals 13. This length is chosen in order to seal the band 19 at its left and right end into the corner seals 13.

[0056] The bag 1 can be opened as depicted in the sequence of the Figures 7 and 8. Pulling the front wall portion 15 away from the rear wall portion 16 (indicated by a fourth arrow 30 and a fifth arrow 31) at the head 10 initially forces the second peelable seal 24 to peel-off (open) as shown in Fig. 7. Pulling the two wall portions 15 and 16 further away from each other also forces the first peelable seal 22 to peel-off (open) as shown in Fig. 8. Now the closure 11 is completely opened. Through an opening formed between the first wall portion 15 and the band 19 the tennis balls 4 can be taken out of the bag 1.

[0057] In the Figures 2, 4 and 5 some steps of a method of manufacturing the bag according to Fig. 1 are visualized in form of lateral cuts through the area of closure 11 and explained in the following. In a first step of the method said foil 6 is used to create the wall 2 of the bag 1. Therefore the foil 6 is folded so that the inside layer 8 of the front wall portion 15 and rear wall portion 16 face each other. At the bottom 9 a gusset is created by folding inward a part of the foil 6. The two wall portions 15 and 16 are located from each other with sufficient distance so that said closure 11 can easily be created by the aid of some automated machinery (not depicted). Beneath the head 10 the band 19 is placed between the two wall portions 15 and 16, which is indicated by a first arrow 27. A second arrow 28 indicates the propagation direction of the bags 1 and the band 19 along the manufacturing process.

[0058] In the next step of the creation of said closure 11, which is shown in Fig. 4, sealing said first side 20 of the band 19 to said inside layer 8 of said first region 17 is performed in order to create the second peelable seal 24. Simultaneously thereto sealing said remaining part of the first side 20 to the inside layer 8 of the wall 2 adjacent to the second peelable seal 24 where the band 19 extends into the volume 3 is performed in order to create said first peelable seal 22.

[0059] The two peelable seals 22 and 24 are created by a pair of sealing jaws (not visualized), which squeeze together the first wall portion 15 with the band 19 at the locations where the two peelable seals 22 and 24 shall be created. During a pre-determined time heat is transferred into the squeezed structure only via that sealing jaw that is in contact with the front wall portion 15. This avoids any negative effect that heat applied by the other sealing jaw may have on the seal-ability of the second side 21 of the band 19. The first peelable seal 22 is aligned with regard to the second edge 26 of the band 19 so that the first edge 32 of the first peelable seal 22 is created at a position of the second edge 26 of the band 19. Hence the two aforementioned edges 32 and 26 are congruently aligned. After the two peelable seals 22 and 24 were created the pair of sealing jaws is removed. The result is shown in Fig. 4.

[0060] In a next step of the method the corner seals 13 are created by sealing jaws (not depicted) that squeeze together the opposing inside layer 8 of the front wall portion 15 and the rear wall portion 16 at the location where the corner seals shall be created. Heat can now be introduced into the squeezed structure via both sealing jaws. Also the structure seal 14 is created in a similar manner.

[0061] At that stage the method is interrupted and the pre-made bag 1 that still has an open head 10 is supplied from a so termed converter that converts the foil into said pre-made bag 1 to a filler that fills the bag 1 with tennis

balls 4 and finally closes the bag 1 with a pressurized volume 3.

[0062] At the filler's site the bag is filled with tennis balls and the volume is pressurized. Thereafter the non-peelable seal 23 is created by a further pair of sealing jaws (not depicted), which squeeze together the rear wall portion 16 with the already sealed together compound of the first wall portion and the band 19 at the locations where the non-peelable seal 23 shall be created. The position of the non-peelable seal 23 is selected along the band width BW of the band 19 so that the non-peelable seal 23 is created on the second side 21 of the band 19 between the first and second peelable seal 22 and 24. During a pre-determined time heat is transferred into the squeezed structure only via that sealing jaw that is in contact with the rear wall portion 16. This avoids any negative effect that heat applied by the other sealing jaw may have on the already existing two peelable seals 22 and 24. After the non-peelable seal 23 was created the pair of sealing jaws is removed. The result is shown in Fig. 5 where the completed and closed closure 11 is shown.

[0063] It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. The word "comprising" does not exclude the presence of elements or steps other than those listed in a claim. The word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. In the illustration enumerating several means, several of these means may be embodied by one and the same item. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

Claims

1. A packaging that comprises a wall that encloses a volume (3) of the packaging and a closure (11) that hermetically seals an opening (12) of the packaging to access said volume (3), wherein the volume (3) is pressurized when compared with the pressure in the environment (5) of the packaging, wherein

- the packaging is a bag (1) that comprises as wall (2) a foil (6) that comprises a sealable inside layer (8) facing the inside of the bag (1) and the wall (2) comprises a first region (17) and a second region (18) between which the opening (12) is limited, and
- the closure (11) comprises said first region (17) and said second region (18) and a band (19) sandwiched between the two regions (17, 18), wherein the band (19) has a first sealable side (20) and a second sealable side (21), wherein the band (19) is sealed with its second side (21) to said inside layer (8) of said second region (18) by a non-peelable seal (23), and
- the band (19) extends from the non-peelable seal (23) into the volume (3) and is sealed with its first side (20) to the inside layer (8) of said first region (17) by a first peelable seal (22) at a location beneath the non-peelable seal (23).

2. The packaging according to claim 1, wherein the first peelable seal (22) comprises a first edge (32) that faces towards the volume (3) and the band (19) comprises a second edge (26) that faces towards the volume (3) and said first edge (32) is congruently aligned with said second edge (26).

3. The packaging according to claim 1 or claim 2, wherein the first peelable seal (22) extends along the first region (17) until a point above the non-peelable seal (23).

4. The package according to claim 1 or claim 2, wherein the first side (20) is sealed to said inside layer (8) of said first region (17) by a second peelable seal (24) remote from the first peelable seal (22) and above the non-peelable seal (23).

5. The packaging according to claim 4, wherein the first and the second peelable seal (22, 24) are located from each other in a distance that is equal to or wider than the width of the non-peelable seal (23).

6. The packaging according to any of the preceding claims, wherein the band (19) has a length that is equal to or longer than the length of the opening (12).

7. The packaging according to any of the preceding claims, wherein the band (19) has a width that is equal to or lower than the length of the first region (17).

8. The packaging according to any of the preceding claims, wherein the band comprises a thermally isolating layer between the first sealable side (20) and the second sealable side (21).

9. The packaging (1) according to any of the preceding claims, the non-peelable seal (23) has a third edge (33) that faces towards the volume (3), wherein the first region (17) and the second region (18) and the band (19) extend in parallel to each other above the third edge (33) and beneath the third edge (33) the remaining part of the band (19) continuously follows the contour of the inside layer (8).

10. The packaging (1) according to any of the preceding

claims, wherein the area of the first and/or the second peelable seal (22, 24) is dependent on the pressure in the volume (3) by a given bonding strength of the first and second peelable seal (22, 24).

11. The packaging (1) according to any of the preceding claims, wherein the opposing inside layers (8) of the foil (6) are sealed together to hermetically close the volume (3) from the outside of the bag (1) at an outer periphery of the bag, preferably along its entire circumference except of its closure (11), and said head (10) of the bag (1) comprises said closure (11), preferably along the length of the head (10), and said first region (17) is realized by an edge area of a front wall portion of the bag (1) and said second region (18) is realized by an edge region of a rear wall portion of the bag (1).

12. A method of manufacturing a packaging, wherein said method comprises the steps of:

- using a foil (6) as a wall (2) of a bag (1) that realizes said packaging, wherein the wall (2) encloses a volume (3) of the bag (1) and the foil (6) comprises a sealable layer to realize a sealable inside layer (8) of the wall (2) of the bag (1), and
- defining a first region (17) and a second region (18) of the wall (2) so that an opening (12) of the bag (1) is limited between the first region (17) and the second region (18), and
- creating a closure (11) that hermetically seals said opening (12) in the bag (19, the step of creating said closure (11) comprises:

  + inserting a band (19) between the two regions (17, 18) so that the band (19) is sandwiched between the two regions (19), wherein the band (19) has a first sealable side (20) and a second sealable side (21), and
  + sealing said second side (21) to said inside layer (8) of said second region (18) by a non-peelable seal (23) so that the band (19) extends from the non-peelable seal (23) into a direction towards the volume (3) of the ready made bag (1), and
  + sealing said first side (20) to said inside layer (8) of said first region (17) by a first peelable seal (22) at a location beneath the non-peelable seal (23).

13. The method according to claim 12, wherein the step of creating said closure (11) comprises a congruent alignment of a first edge (32) of the first peelable seal (22) with a second edge (26) of the band (19), wherein said first edge (32) and said second edge (26) face towards the volume (3) of the ready made bag (1).

14. A method according to claim 12 or 13, wherein the steps of sealing said first side (20) to the inside layer (8) is performed prior to the step of sealing said second side (21) to said inside layer (8), preferably at a site for manufacturing a pre-manufactured bag (1) that is open.

15. A method according to claim 12 or 13, wherein the step of sealing said second side (21) to the inside layer (8) is performed after said steps of sealing said first side (20) to said inside layer (8), preferably at a site for filling goods, in particular tennis balls, into the pressurized volume (3) of the bag (1).

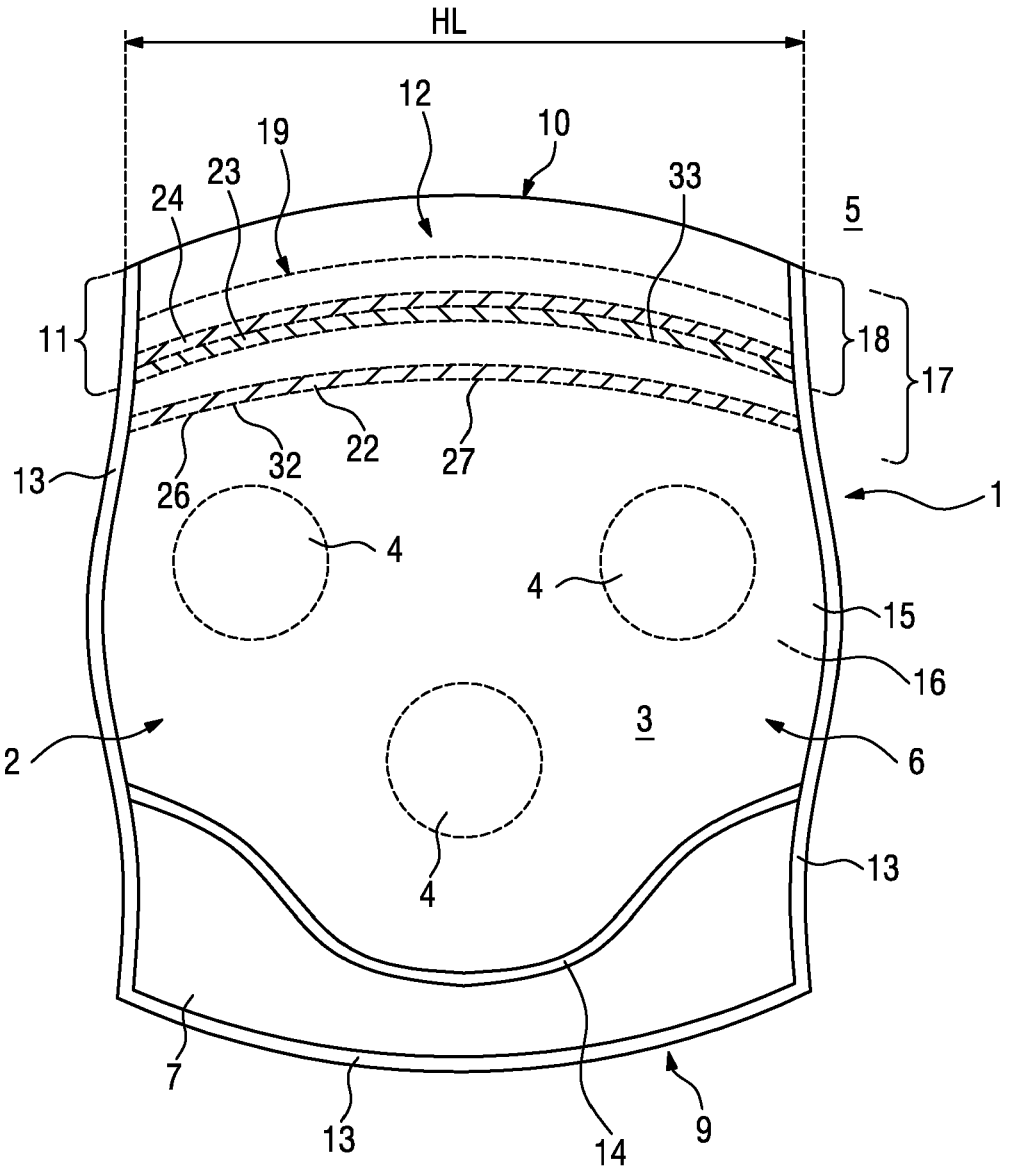
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FIG. 1

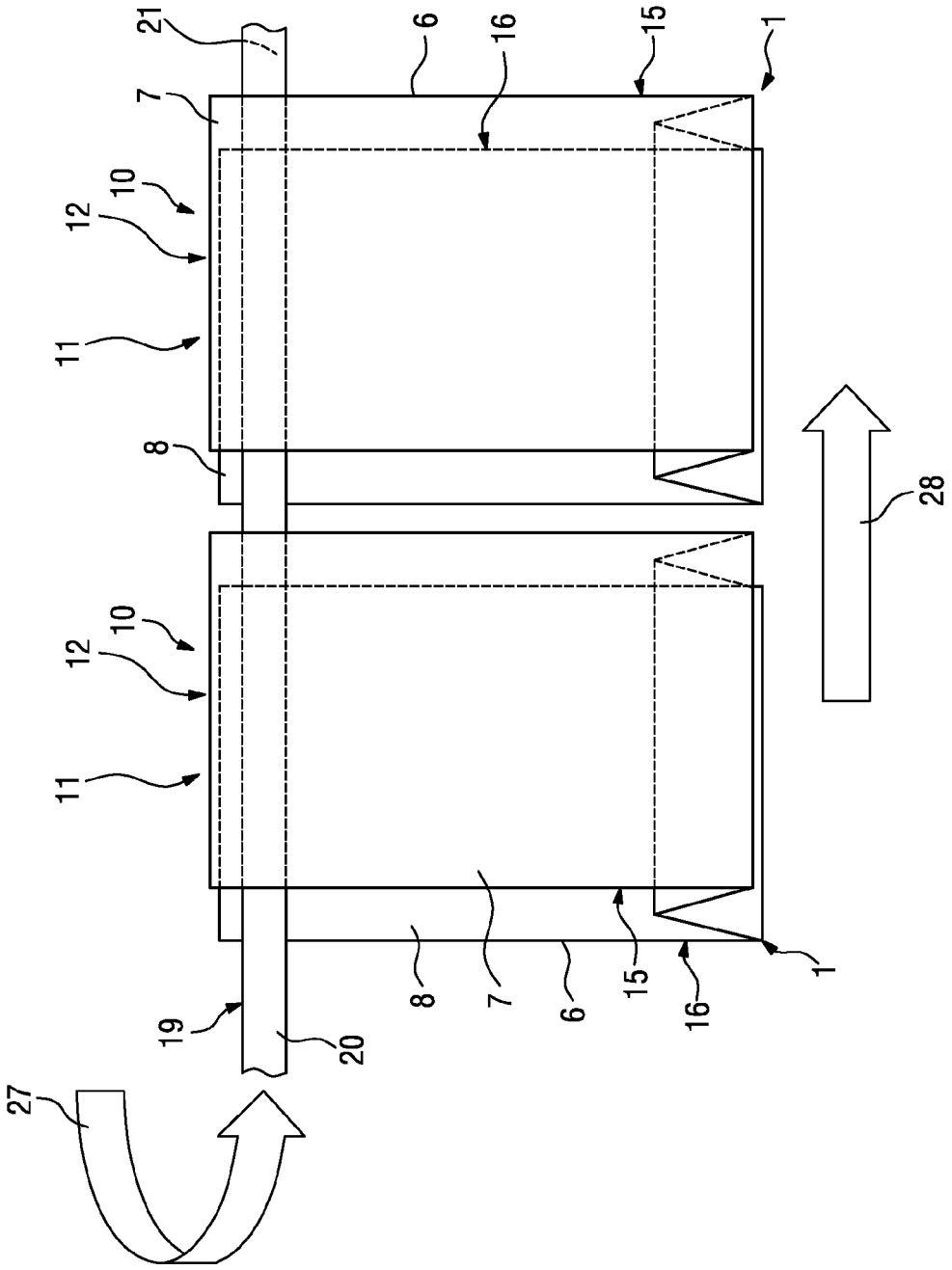

FIG. 2

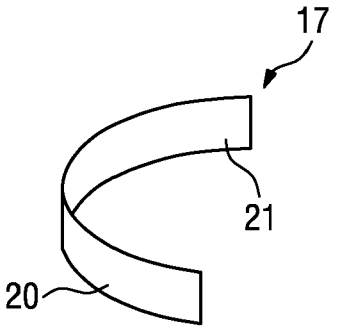
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FIG. 3

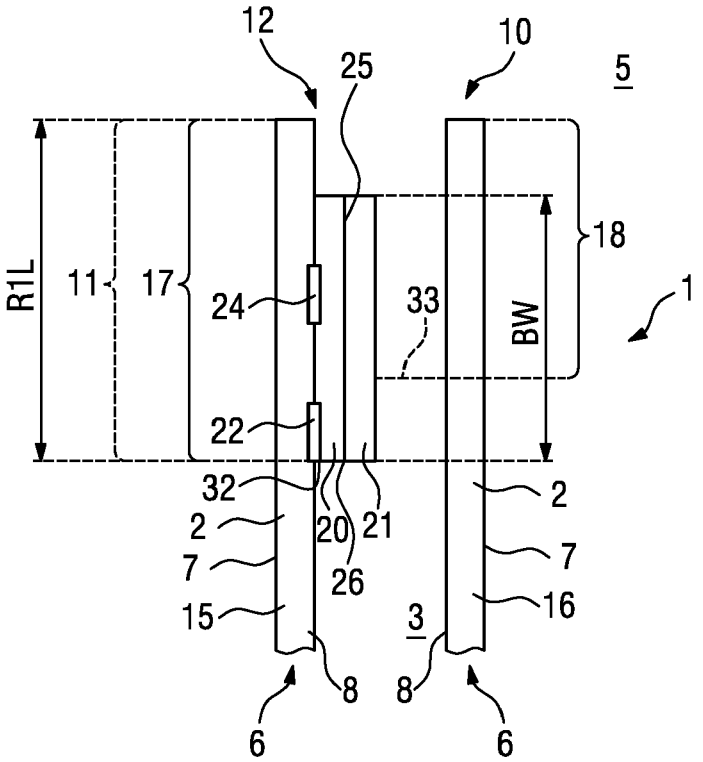
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FIG. 4

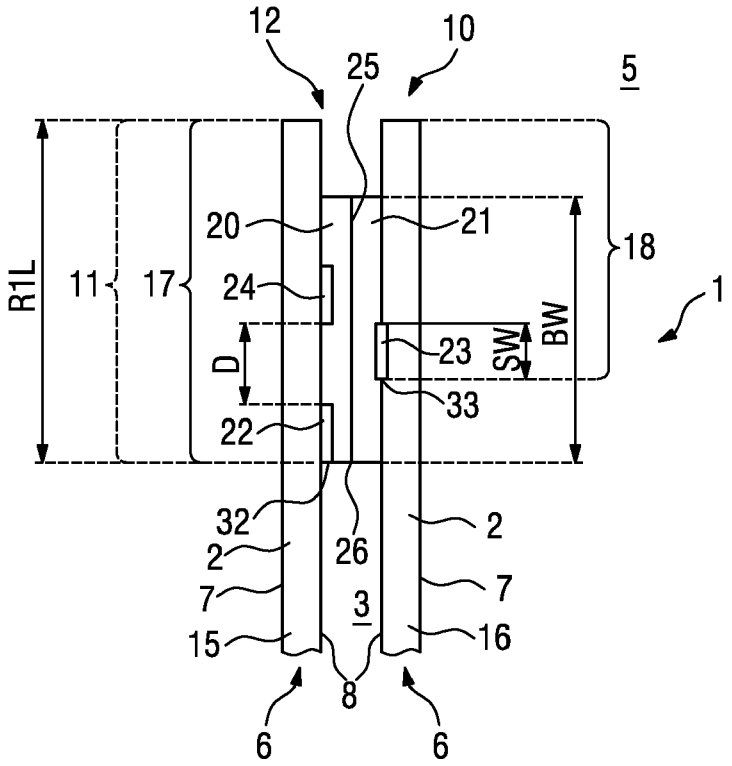
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FIG. 5

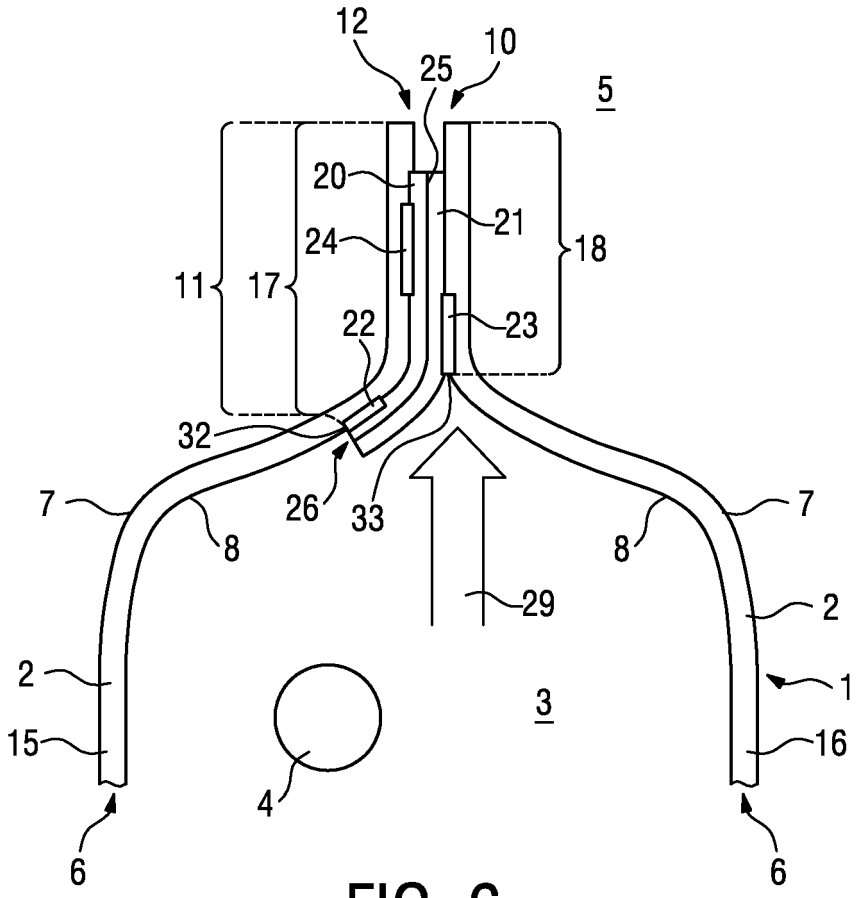

FIG. 6

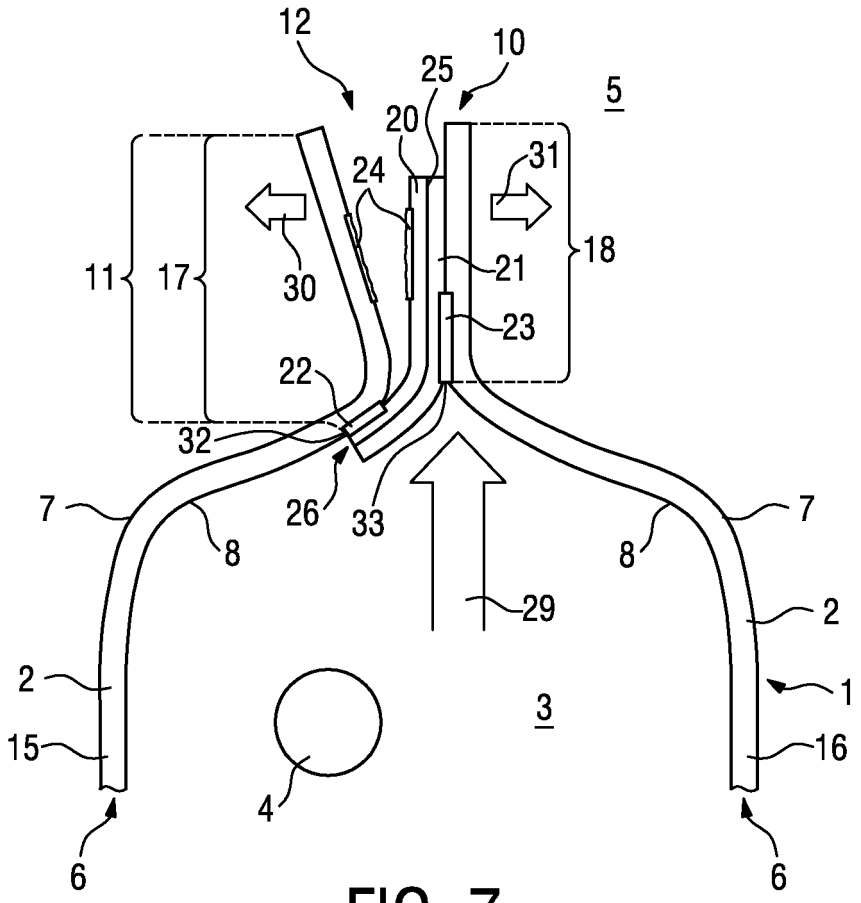

FIG. 7

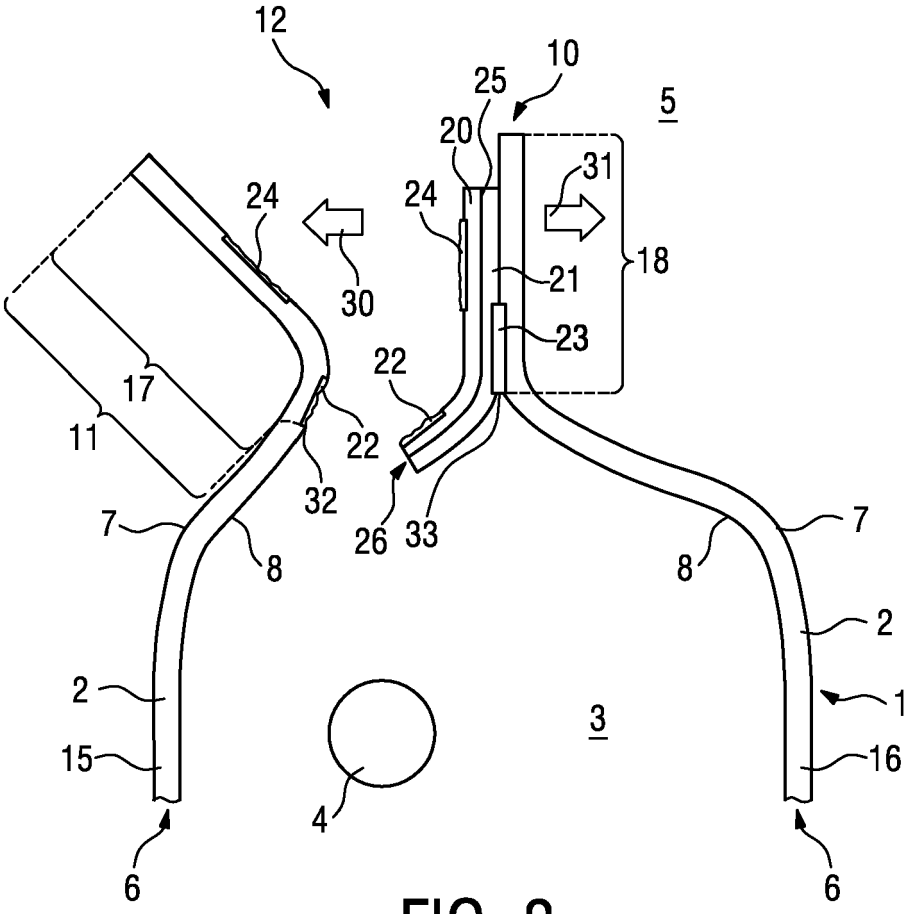
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FIG. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 11 16 9025

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B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 November 2011	Jervelund, Niels

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