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(54) **Collapsible container**

Zusammenlegbarer Behälter

Conteneur pliable

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(56) References cited:  
**WO-A-94/24002** **FR-A- 1 124 843**  
**US-A- 3 220 544**

- **PATENT ABSTRACTS OF JAPAN vol. 1997, no.**  
**10, 31 October 1997 (1997-10-31) -& JP 09 150833**  
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**EP 1 544 118 B1**

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## Description

**[0001]** The present invention generally relates to molded plastic containers of the type commonly used for a variety of purposes including storage of both food items and non-food items, such containers preferably being adapted to receive an appropriate seal or lid. More specifically, the invention is concerned with containers of this type which, rather than being of a rigid construction as with a conventional bowl, are collapsible or foldable to a compact position when empty to facilitate convenient storage.

**[0002]** Such containers, in the form of cups, bowls, and the like, are generally known in the art and take many forms. These include collapsible cups or glasses wherein the glass is formed of telescopically stacked annular wall elements which slide relative to each other between a fully extended position and a collapsed position. As the wall elements are not integrally formed and slide freely relative to each other, there is a substantial possibility of leakage, and use other than as a temporary drinking vessel is not practical. Another form of collapsible container more pertinent to the present invention is illustrated in Patent No. 5,439,128, issued to Fishman on August 8, 1995. In the Fishman container, the wall elements are integrally molded and consist of a series of both vertical and angled elements alternately stacked to define the container wall. The elements, at the angular joint therebetween, are integrally joined by thin film hinges about which the wall elements fold. The actual downward folding and collapsing of the Fishman elements requires that the elements flex in order to accommodate the folding motion. This necessity for an actual flexing of the elements themselves, in addition to the folding at the film hinges, appears to be so significant as to, at least in some instances as illustrated in Figure 3 of Fishman, require significant central relief grooves in each of the inclined wall elements which would appear to cause an inherent weakening of these wall elements. It will also be noted that, in the Fishman container when collapsed, the alternate vertical wall elements of the open container retain their vertical orientation perpendicular to the base wall. As such the Fishman container is clearly not susceptible to injection molding in the collapsed position as would be commercially advantageous due to great economies in mold production and molding procedures.

**[0003]** WO 94/24002 discloses a reusable collapsible container including a bottom wall and a relatively flexible, peripheral side wall extending outwardly from the bottom wall, the side wall moveable between axially extended and collapsed positions. The side wall includes lower and upper relatively thicker portions and an intermediate relatively thinner portion, and the upper portion joins with an annular rim adapted to receive a removable cap. The intermediate side wall portion is tapered radially inwardly and downwardly, and a lower side wall portion is tapered radially outwardly and downwardly substantially to the bottom wall, such that in a collapsed position, the lower

side wall portion is partially telescoped within the upper side wall portion, with the intermediate portion reverse folded therebetween.

**[0004]** US 3,220,544 discloses a container comprising a wafer-like member having a central recessed portion and a series of accordion folds or pleats connected to the recessed portion peripherally thereof, the accordion folds or pleats terminating in an outer rim. When it is desired to use the container, the pleats may be unfolded to form a cup which can then be used and disposed of.

**[0005]** A principal object of the present invention is to provide a collapsible container which presents or forms a substantially rigid receptacle in its open or expanded position and which, with an appropriate lid or seal snap-fit thereto, provides a practical watertight storage container for, as an example, an appropriate foodstuff or the like. The container according to claim 1 is very convenient and provides a particularly desirable portable solution for food "on-the-go", such as at picnics, lunches for those who take their own lunch to work, and other instances wherein temporary storage is desired. The collapsible nature of the container, collapsing to a substantially completely compacted configuration of minimal height, particularly with a seal mounted thereon to confine any residue in the now empty container, allows the used container to be conveniently stored or packed away in a "brown bag", knapsack, picnic hamper, or the like, for subsequent cleaning and reuse.

**[0006]** In furtherance of the principal object of the invention, it is also an object of the invention to provide a method of molding the container in its collapsed position as a means of achieving maximum economies in mold apparatus and procedures, and in providing a molded product which is compact yet fully expandable to a relatively rigid self-sustaining position.

**[0007]** A significant aspect of the container of the invention is its capability to fold open in increments, one section at a time, to vary the capacity thereof and at the same time maintain itself in any incrementally folded position.

**[0008]** Other desired features of the invention include providing a container which can be washed in a dishwasher in its folded position and stacked therein in the same manner as conventional dishes, a container which stays open when in use and stays closed in storage, and a container which maximizes usable space for packing in a shipping carton as well as storage in the home.

**[0009]** In order to achieve the improved and highly practical container of the invention, the peripheral wall of the container, extending between a substantially rigid base and a substantially rigid top ring adapted to receive a snap-fit seal, includes a series of generally rigid annular or peripherally continuous wall sections joined to adjacent sections at fixed annular apex forming joints which are alternately inwardly and outwardly directed relative to the interior of the container. These sections have annular portions therebetween that are relatively flexible. The wall sections, in the expanded or open position of

the container, are themselves alternatively angled inward and outward relative to the interior of the container and relative to the vertical, with the wall sections, sequentially upward from the base to the top ring, each being generally diametrically or peripherally progressively greater than the base. The configuration thus formed for the expanded container will be that of an inverted truncated cone with the wall sections basically outwardly stepped upward from the base. This in turn allows for a direct downward collapsing of the wall sections into concentric surrounding relation to the base with the top ring surrounding the collapsed folded wall sections.

**[0010]** The actual folding of the wall sections relative to each other occurs within a flexure portion at an apex area between the sections where each of the wall sections joins the wall section or sections immediately adjacent thereto and is of a thickness less than that of the thickness of the sections to each side thereof. The thicker sections are both more rigid than the flexure portions and of substantially more limited flexibility. The thinner portions, in the expanded position of the container, form arcuate continuations of the thicker wall sections, forming an arc of greater than 90 degrees and, until physically moved over center during a collapsing of the container, provides a substantial degree of rigidity to the wall sections for the full height of the container wall. Upon the application of a positive physical force collapsing the top ring and base toward each other, the flexible portions between the wall sections will flex laterally in the direction of the fold in the manner of a flexible hinge with this flexure providing for both the actual folding and at the same time, minimizing any tendency for the wall sections to want to laterally flex or move as the wall sections collapse about each other. Each of the flexure zones formed by the thinner portions is bordered along each edge thereof by adjacent thicker wall sections. Once the arc of the flexure zone is reduced to less than 90 degrees, moving over center, the inherent resistance to the movement of the flexure zone is overcome and the collapsed zone assumes a dome-like configuration of less than 90 degrees. In moving from the closed to the open state, or vice-versa, each flexure zone is twisted and slightly distorted until it overcomes its stable position and flips to the other position.

**[0011]** A collapsed molded container in accordance with the invention is such that opposed rigid wall portions define a generally triangular interstitial space formed by two walls diverging from the vertical in a range of from about 8° to about 40°. However, for reasons that shall become apparent hereinbelow, a preferred range is from about 10° to about 16°.

**[0012]** Expansion of the container from its collapsed position will involve a downward push or pull on the base as the top ring is moved vertically upward therefrom. As the flexure portions unfold and move to arcs of greater than 90 degrees, the wall will tend to rigidify and in effect lock the container in the open position.

**[0013]** Further features, objects and advantages of the

invention will be noted as the construction and details of the invention are more fully hereinafter set forth.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

### **[0014]**

Figure 1 is a top perspective view of the container of the invention in its open or expanded position; Figure 2 is a top perspective view of the container fully collapsed; Figure 3 is a transverse cross-sectional view of the expanded container; Figure 4 is a transverse cross-sectional view of the collapsed container; Figure 5 is an enlarged detailed view of the area designated A in Figure 3; Figure 6 is an enlarged detailed view of the area designated B in Figure 4; Figure 5A is a view similar to Figure 5 illustrating a modified construction; Figure 6A is a view similar to Figure 6 illustrating the modified construction; Figures 7, 8 and 9 sequentially illustrate one manner of opening, or closing the wall sections utilizing a twisting or sequential ratchet action; Figure 10 is a cross-sectional view similar to Figure 4 with the seal snap-fitted to the collapsed container; Figure 11 is a cross-sectional detail of a modified pressure bump in the base provided with a pull bar; and Figures 12-22 illustrate a further embodiment and sequentially correspond to Figures 1-11.

## **DESCRIPTION OF THE PREFERRED EMBODIMENTS**

**[0015]** In the drawings, the features of the embodiment of Figs. 1-11 are referred to by two digit numbers. Similar features in the embodiment of Figs. 12-22 are referred to by the same numbers with the number 1 as a prefix.

**[0016]** Referring now more specifically to the drawings, the collapsible container 10 comprises a base 12, a top ring 14 and a folding wall 16 extending therebetween. The base 12 is a substantially rigid member including a bottom 18 with a peripheral upstanding base wall 20. The base, which may be flat, preferably includes a central slightly upwardly extending pressure area or bump 24 of any appropriate configuration, such as a dome, to assist in expanding the container as shall be described subsequently. The base will also preferably have a series of small foot defining knobs 26 or a continuous foot rib, not shown, depending from the base bottom 18.

**[0017]** The top ring 14 includes a continuous or annular ring wall 28 with a peripheral horizontally outwardly directed flange 30 at approximately mid-height on the ring wall 28. The top ring 14, similarly to the base 12, is sub-

stantially rigid and is of a greater diameter or other non-circular cross-sectional area than the base 12 to encircle the base in the collapsed position of the container, as in Figure 4, sufficiently outward thereof to accommodate the folded container wall therebetween. The top ring flange 30 provides additional lateral stiffness to the top ring, and a convenient means for handling the bowl, especially when filled. In addition, the ring flange 30, when the collapsed bowl is to be opened, allows a user to easily engage fingers about and under this flange 30 while pressing downward with the thumbs on the base domed pressure area 24 to forcibly vertically expand the base and top ring relative to each other. As an alternative to pressure on area 24, particularly with a large bowl, pressure can be applied sequentially about the base bottom 18 immediately adjacent the base wall 20 peripherally thereabout. As desired, and as will be best noted in Figures 1 and 2, the ring flange 30 can be slightly outwardly extended or enlarged at diametrically opposed portions to define gripping handles 32.

**[0018]** The molding of the base and top ring as separate entities from the wall is a preferred method of molding enabling the provision of substantially greater rigidity to these components relative to the wall sections, wherein the actual extending and collapsing action occurs, by utilization of polymers of differing degrees of rigidity, and/or flexibility.

**[0019]** The container side wall 16 is formed of a series of annular or peripherally continuous wall elements or sections 34, the lowermost section encircling and being intimately bonded, such as autogenously during a multi-component molding procedure, to the wall 20 of base 12 and seated on a support shoulder 21 slightly above the base bottom.

**[0020]** In the embodiment of Figure 5A, the lowermost or bottom section, being of a height slightly less than the remaining sections thereabove, is integrally joined to a thin upwardly projecting base portion 22 which, as the container wall folds, will define a flexure zone between this lowermost wall section and the base.

**[0021]** The wall sections 34, upward from engagement of the lowermost section with the base, are alternately inclined outwardly and inwardly relative to the interior of the container and to the vertical with each section joined to the section immediately thereabove at alternating outwardly and inwardly directed apexes or apex portions forming, respectively, angle joints as generally designated at 36 and 38.

**[0022]** Noting Figure 5, the uppermost or top section 34 is joined by a flexure portion to an upwardly directed collar 37 received and intimately fixed within the lower portion of the ring wall 28, for example in the manner suggested with regard to the lowermost section. In the embodiment of figures 5A and 6A, the uppermost section 34 is integral or otherwise intimately peripherally joined to the lower edge portion of the top ring 14.

**[0023]** Each of the alternately inclined wall sections, noting the open container, is of a predetermined thick-

ness and of limited flexibility relative to flexure zones or portions 40 joining adjacent sections 34. The flexure portions 40 are relatively thinner than the sections 34 and substantially equal in thickness to the extending portion 22 of the base in Figure 5A. The flexure zones or portions 40 generally define the angled joint, 36 or 38, between each section and the section immediately adjacent thereto. As noted, the height of these reduced thickness portions 40 is substantially less than the height of the sections 34. These flexure zone portions 40, in the expanded or open position of the container, again noting Figure 5, form, with regard to the outwardly inclined wall sections 34, continuations of the inner face of the corresponding portion 34 therebelow, and, with regard to the inwardly inclined wall sections, are continuations of the outer face of the corresponding wall section. So formed, the thicker wall sections to each side of these flexure zone portions 40, and the angle thereof, inherently defining the direction of the folding action, note in particular the folding sequence suggested in Figure 8. It will also be appreciated that, prior to folding, the flexure zones 40 and the positioning of these zones 40 between adjacent sections, provides a degree of over center stability to prevent inadvertent collapse of the wall 16. This stability can only be overcome by applying sufficient positive vertical pressure, forcing the top ring and base vertically toward each other to effect an over center movement of the flexure zones 40 and a "snap action" folding action of the zones to the collapsed position. Upon initiating the folding action, each involved flexure zone 40 distorts slightly until it moves to what might be considered an over center position, at which point it flips to the folded position. In this manner, any tendency for the container to self close or collapse accidentally, particularly with goods within the container, is minimized.

**[0024]** As will be noted in the drawings, the adjacent sections 34, in the collapsed position of the container, form oppositely facing V-shaped or triangular openings. The center line of each V-shaped opening is generally perpendicular to the horizontal plane of the collapsed container. This structure is significant in allowing the injection mold to separate to eject the molded piece.

**[0025]** The angle of divergence between adjacent collapsed sections 34 has an overall possible range of 8° to 40°, with the preferred range being 10° to 16°. An angle of 10° is considered optimum in achieving a desired balance between rigidity of the container in the open position and the force necessary to collapse or expand the container. This angle is also considered, as a practical matter, to be the smallest angle that will allow consistent ejection of the molded piece from the mold. As will be appreciated, as the angle increases, the rigidity of the open container decreases.

**[0026]** With particular attention to Figures 7-9, it will be seen that, if desired, both the opening and collapsing of the container can be facilitated by applying pressure sequentially about the container or by rotating the container as pressure is applied to provide a stepping or ratcheting

effect on the wall sections 34 rather than by snap positioning each flexure zone in its entirety at one time.

**[0027]** Figure 9 is of particular interest in showing the container partially folded or unfolded for use when a reduced capacity is desired or required. In such a position, the container is fully functional to receive and store food-stuffs and the like, and the seal 42, as in the open container of Figure 3, is also fully functional in that the top ring is dimensionally stable in every position of the container.

**[0028]** Noting in particular Figure 3, it will be seen that the general outward stepping of the sections upward from the base to the top ring forms, in the open container, a generally inverted truncated conical configuration.

**[0029]** Again noting Figures 7-9, as the container is vertically collapsed, the flexure zones 40 fold between adjacent sections to assume a generally domed configuration. Thus the adjacent wall sections are folded to bring the thicker major height of the sections into concentric generally parallel relation to each other, with the angle between adjacent sections preferably being approximately  $10^{\circ}$  to  $16^{\circ}$ , with the sections laterally aligned and surrounding said base between the base wall 20 and the top ring wall 28. This will best be seen in the cross-sectional detail of Figure 6.

**[0030]** Noting Figures 3, 9 and 10, it will be seen that the seal 42 is capable of being snap-fitted to the top ring 14 in an appropriate manner in any position assumed by the container. To facilitate this engagement, the upper portion of the top ring wall 28, above the circumferential flange 30, may be slightly outwardly inclined for reception within a peripheral downwardly directed groove on the seal. It is to be appreciated that inasmuch as the folded wall sections are, in any position of the container, positioned concentrically inward of the substantially rigid top ring 14, the seal 42 functions as an appropriate closure for the open container, the partially expanded container, and the collapsed container wherein a compacted storage position is achieved.

**[0031]** As previously noted, when the container is to be opened prior to use, one need merely engage fingers about the peripheral flange 30 of the top ring and, with one or both thumbs, exert a downward pressure on the bottom push bump 24 projecting upwardly from the center of the base bottom 18. Alternately, pressure can be exerted on the bottom itself sequentially about the periphery thereof. Further, rather than relying on direct pressure on the bump 24 or bottom 18, and noting Figure 11, a cross bar 44 can be provided diagonally across the concave recess or depression formed by the bump in the lower face of the bottom 18. This cross bar 44 can be physically gripped by the user's fingers for a direct downward pull on the container base, moving the base downward relative to the top ring and expanding the wall sections.

**[0032]** Again referring to Figure 6, it will be noted that the lowermost folding wall section 34 will act as a limit to the downward collapsing of the remaining wall sections

and top ring relative to the base wall, retaining the sections and top ring slightly above a support plane defined by the base bottom and support feet thereon whereby support of the container, both expanded and collapsed, is on the base and base feet rather than on the much thinner flexure zones.

**[0033]** Referring now more specifically to the embodiment illustrated in Figures 12-22, the basic components of this embodiment substantially duplicate those of the previously described embodiment, and as such, have been designated by the same reference numbers with the number 1 as a prefix. Thus, the container 110 is comprised of a base 112, a top ring 114, and a folding wall 116 of alternating rigid wall sections 134 and flexure zones or portions 140.

**[0034]** The container 110, as with the first embodiment, both expands and collapses in the previously described manner and, in the collapsed position, is so configured as to allow for a practical and preferred molding of the container in this position. Pursuant thereto, the wall sections 134, in the collapsed position, define oppositely facing V-shaped openings where the angle between the sections, while having a possible range of  $8$  to  $40^{\circ}$ , will preferably be in the range of  $10^{\circ}$  to  $16^{\circ}$  with an optimum angle of  $10^{\circ}$ . Each V-shaped opening has the centerline thereof, extending from the apex defined by the converging sections 134, perpendicular to the horizontal plane of the collapsed container. In the expanded or open position of the container, the wall sections 134 angle both relative to each other, at greater than  $90^{\circ}$ , and to the vertical as defined by a perpendicular to the base.

**[0035]** In order to enhance the folding and unfolding action of the wall sections 134, each wall section 134, along the edges thereof, is beveled, as at 135, to provide a gradual transition area between the wall section 134 and the adjacent flexure portion 140. This differs from the rather abrupt transition area of the first embodiment, note in particular Figures 5 and 6.

**[0036]** As with the first embodiment, the flexure zone portions 140, in the open position of the container, form, with regard to the outwardly inclined wall sections 134 of Figure 16, continuations of the inner face of the corresponding section 134 therebelow. Similarly, the flexure zone portions 140, with regard to the inwardly inclined wall sections 134, are continuations of the outer face of the corresponding wall section 134. This relationship, as previously described, will inherently tend to define the direction of the folding action, note in particular the folding sequence suggested in Figure 19, as well as the previously described Figure 8.

**[0037]** With particular reference to Figures 16 and 17, it will be seen that the bottom wall section 134 is of a greater height than the wall sections thereabove, and extends for the full height of the peripheral upstanding base wall 120. The lower extremity of this lowermost wall section 134 is turned under the bottom 118 of the base 112 and engaged within a receiving recess 119, thus in effect defining a portion of the support plane of the con-

tainer. As will be appreciated, the enhanced area of overlap between the lower portion of the container wall and the base enhances the joinder therebetween.

**[0038]** The engagement of the container wall to the top ring is effected by a laterally directed collar 137 joined to the uppermost wall section 134 by the uppermost flexure portion 140. The collar 137 includes an upwardly directed locking bead 139 on the outer edge thereof with both the collar 137 and bead 139 being received within a corresponding locking recess found in the base of annular ring wall 128. The top ring 114, as with the previously described ring 14, includes an integral annular outwardly projecting ring flange 130, providing both lateral stiffness to the top ring and a convenient means for both manipulating and handling the bowl. As a means for facilitating a gripping of the flange, it is proposed that an integral depending gripping bead 131 be provided peripherally about the outer edge portion of the flange 130.

**[0039]** A final area of variance between the embodiments will be seen in Figure 12, and the various cross-sectional views of the container 110. As will be appreciated from a comparison of these figures with the figures of the first embodiment, the base 112 includes a substantially enlarged central upwardly extending pressure area or bump 124. This enhances the area upon which opening pressure, in particular, can be applied, facilitating the manipulation of the container and at the same time having a tendency to further strengthen the otherwise flat bottom 118. As noted in Figure 22, the bottom push bump 124 can also be provided with a diagonal cross bar 144 for purposes previously noted with regard to cross bar 44.

**[0040]** Also, as described with regard to the first embodiment, an appropriate seal 142, capable of being snap-fitted to the top ring 114 can be provided. Such a seal, in light of the manner of collapsing and expanding the container with the concentric folded wall sections, will comprise an appropriate closure for the container whether fully open, fully collapsed, or partially expanded.

**[0041]** With reference to Figure 21 in particular, it will be seen that the downwardly collapsed wall sections 134, and more particularly the downwardly directed flexure portions 140 are retained slightly above the support plane defined by the base bottom and/or support feet, providing a more stable support and avoiding engagement of the substantially thinner flexure zones with a support surface.

**[0042]** The container as described is designed in a configuration that utilizes a "network" of flexure zones. It is not an accordion shape that stretches to open and close like a spring. Instead, the flat storage container functions to open and close based on a principle of "opposing angles".

**[0043]** In known expanding containers, the containers are generally molded in the open or expanded configurations. Open is thus the natural state for those containers, that is those containers would 'prefer' to remain open than in any other position. Thus, when one tries to fold or collapse these containers, the containers tend to want

to spring back open, that is return to their natural state. This is not the case with the container of the invention wherein the container is preferably molded in a flattened or collapsed position. This is its initial natural state meaning that the container will initially prefer to stay in this closed configuration. There are multiple folds within the network of flexure zones. In the illustrated embodiment three sets of independently activating zones are provided (more can be added to increase capacity if desired). As seen in Figure 9, each of the independently activatable flexure zones has a second 'natural' or at rest state when open wherein the fold will prefer to remain open independently of the remaining folds. In the present structure, both the action of collapsing the container and the action of expanding the container require the folds to be individually manipulated. Positive action is required to both fold and unfold the container. This can be referred to as the principle of "opposing angles". The angle of the fold in the closed position keeps the fold closed; the angle of the fold in the open position keeps the fold open. To move from the closed to the open state or vice-versa, the flexure zone is twisted and distorted slightly until it overcomes the opposing angle and then flips to the other position configuration. This action results because the diameters of the flexure zones cannot change. There is no other intermediate position for the fold. It is either open or closed, or it is being twisted (one side open and the other side closed). It is not possible in this construction for an individual section to be, as an example, half open while maintaining usable capacity. As previously noted, one easy way to manipulate the flexure zones is to 'ratchet' the container, one side at a time to a partial or fully open position.

**[0044]** The unique structure of the invention allows the container to remain flat when in the closed or collapsed position and remain expanded when in any open or partially open position. Because of the two 'natural' states for the flexure zones, the container prefers to remain closed when collapsed flat and prefers to remain open when expanded. With the independent activation of the flexure zones in the network, the container is capable of opening to fixed partial capacities, because the container prefers to remain open in these partial configurations. This is of particular value in maximizing and optimizing storage space as in a refrigerator, and dishwasher space when washing.

**[0045]** The collapsible container of the present invention has been described in the preferred embodiments as comprising one of molded plastic, i.e. synthetic polymers, having 'separate entities' comprising a base, top ring and folding wall. The 'separate entities' in a preferred molding method may, for example, be realized by utilization of molding apparatus that enables multiple stage molding of the base, top ring and folding wall, and wherein selection of polymers of varying degrees of substantial rigidity and/or general rigidity may be utilized. This also enables the varying of the color or light transmissivity of the base, top ring and folding wall.

**[0046]** It will be appreciated that as described in connection with the embodiment of Figures 5A and 6A, the container of the present invention may be molded as a unitary structure in essentially a single molding step. In addition, the described preferred difference in relative rigidity, or general, but more flexible, rigidity of the base and ring vis-a-vis the folding wall, may be achieved in a single molding step by selection of appropriate thicknesses of the several portions. The possibility also exists to provide molding apparatus wherein a mold is configured to provide selected areas of the mold interior with polymers of varying degrees of rigidity or flexibility for the base, top ring and wall.

**[0047]** It will be appreciated that a mold suitable for injection molding of the wall portion in a collapsed condition will require a plurality of concentric annular interdigitated generally triangular, or V-shaped mold elements, carried by mold halves, corresponding to the number of wall sections folded on each other.

**[0048]** The foregoing is considered illustrative of the principles of the invention. As modifications and changes may occur to those skilled in the art, it is not desired to limit the invention to the exact construction and manner of use as shown and described. Rather, all suitable modifications and equivalents may be resorted to as falling within the scope of the invention as claimed.

## Claims

1. A collapsible container [10,110] comprising a base [12,112], a top ring [14,114] and a wall [16,116] peripherally fixed to said base and top ring and extending there between said container [10,110] being adjustable between an expanded position with the top ring [14,114] spaced upward from said base [12,112] and forming a container interior, and a collapsed position with said top ring [14,114] surrounding said base [12,112] in outwardly spaced substantially concentric relation thereto, said wall [16,116] comprising multiple upwardly extending peripherally continuous sections [34,134] which, in the expanded position of said container [10, 110], angle alternately outward and inward relative to the container interior, said sections [34,134], in the collapsed position of said container [10, 110], being folded on each other and concentrically received generally between the base [12,112] and the top ring [14,114] with the sections [34,134] encircling the base [12, 112] and in turn being encircled by said top ring [14, 114], **characterised in that** the container includes flexure zones [40,140] joining adjacent sections [34,134], the adjacent sections [34,134] being of limited flexibility relative to the flexure zones [40,140], and wherein each flexure zone is independently activatable for movement between a first, open natural state, in which respective adjacent sections are unfolded, and a second, closed natural state in which the respective adjacent sections are folded, whereby the container is adjustable to a fixed, partially expanded position between said expanded position and said collapsed position.
2. The container of claim 1 wherein each said section [34,134], in the collapsed position of said container [10,110], is at an angle of divergence from 8° to 40° to adjacent sections [34,134].
3. The container of claim 2 wherein said sections [34,134] are at an angle of 10° to 16° to adjacent sections [34,134] in said collapsed position.
4. The container of claim 3 wherein said sections [34,134] are at an angle of 10° to adjacent sections [34,134] in said collapsed position.
5. The container of claim 4 wherein, in said collapsed position, adjacent sections [34,134] form oppositely facing V-shaped openings, each said opening having a centre line perpendicular to said base [12,112].
6. The container of claim 1 wherein said base [12,112] has a bottom surface [18,118] defining a support plane, said folded sections [34,134] in the collapsed position of the container [10,110] being positioned above said defined support plane.
7. The container of claim 1 wherein said top ring [14,114] includes a circumferential outwardly extending flange [30,130] defining means for grasping the top ring as pressure is applied to the base [12,112].
8. The container of claim 7 wherein said top ring [14,114] includes a peripheral upstanding wall [28,128], said outwardly extending flange [30, 130] being peripherally about said ring wall [12, 128], a generally rigid collar [137] joined to said uppermost wall sections [134] by one of said flexure zones [40,140], said collar including an upwardly directing locking bead [139], said top ring including a downwardly directed recess formed therein and receiving said collar [137] and locking bead [139] for a fixed joiner of said container wall [16,116] to said top ring [14,114].
9. The container of claim 8 wherein said top ring flange [130] includes an outer periphery with a downwardly directed gripping bead [131] integral therewith and depending therefrom.
10. The container of claim 1 wherein said top ring [14,114] includes an upwardly extending ring wall, and a separate seal [42,142] positionable over said top ring [14,114] and being releasably fixed to said ring wall in both the expanded and collapsed position

of said container [10,110]

11. The container of claim 1, molded in said collapsed position.

#### Patentansprüche

1. Zusammenlegbarer Behälter (10, 110) umfassend eine Basis (12, 112), einen oberen Ring (14, 114) und eine Wand (16, 116), die peripher an der Basis und dem oberen Ring befestigt ist und sich zwischen diesen erstreckt, wobei der Behälter (10, 110) zwischen einer expandierten Position, bei der der obere Ring (14, 114) von der Basis (12, 112) nach oben beabstandet ist und einen Behälterinnenraum bildet, und einer zusammengelegten Position einstellbar ist, bei der der obere Ring (14, 114) die Basis (12, 112) in einer nach außen beabstandeten, im wesentlichen konzentrischen Beziehung zu dieser umgibt, wobei die Wand (16, 116) mehrere, sich nach oben erstreckende, peripher kontinuierliche Abschnitte (34, 134) umfaßt, die, in der expandierten Position des Behälters (10, 110), sich alternierend nach außen und nach innen relativ zum Behälterinnenraum ausrichten, wobei die Abschnitte (34, 134) in der zusammengelegten Position des Behälters (10, 110) aufeinander gefaltet sind und konzentrisch im allgemeinen zwischen der Basis (12, 112) und dem oberen Ring (14, 114) aufgenommen sind, wobei die Abschnitte (34, 134) die Basis (12, 112) umgeben und wiederum vom oberen Ring (14, 114) umgeben sind, **dadurch gekennzeichnet, daß** der Behälter Biegunzonen (40, 140) einschließt, die benachbarte Abschnitte (34, 134) aneinanderfügen, wobei die benachbarten Abschnitte (34, 134) von begrenzter Flexibilität in bezug auf die Biegunzonen (40, 140) sind, und wobei jede Biegunzonen unabhängig zur Bewegung zwischen einem ersten, offenen, natürlichen Zustand, in dem entsprechende benachbarte Abschnitte nicht gefaltet sind, und einem zweiten, geschlossenen, natürlichen Zustand, in dem die entsprechenden benachbarten Abschnitte gefaltet sind, aktivierbar ist, wodurch der Behälter zu einer fixierten, teilweise expandierten Position zwischen der expandierten Position und der zusammengelegten Position einstellbar ist.
2. Behälter nach Anspruch 1, wobei jeder besagte Abschnitt (34, 134) in der zusammengelegten Position des Behälters (10, 110) in einem Divergenzwinkel von 8° bis 40° zu benachbarten Abschnitten (34, 134) ist.
3. Behälter nach Anspruch 2, wobei die Abschnitte (34, 134) in einem Winkel von 10° bis 16° zu benachbarten Abschnitten (34, 134) in der zusammengelegten Position sind.

4. Behälter nach Anspruch 3, wobei die Abschnitte (34, 134) in einem Winkel von 10° zu benachbarten Abschnitten (34, 134) in der zusammengelegten Position sind.

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5. Behälter nach Anspruch 4, wobei, in der zusammengelegten Position, benachbarte Abschnitte (34, 134) gegenüberliegend zugewandte V-förmige Öffnungen bilden, wobei jede besagte Öffnung eine Mittellinie senkrecht zur Basis (12, 112) aufweist.

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6. Behälter nach Anspruch 1, wobei die Basis (12, 112) eine Bodenfläche (18, 118), die eine Unterstüzungsebene definiert, aufweist, wobei die gefalteten Abschnitte (34, 134) in der zusammengelegten Position des Behälters (10, 110) oberhalb der definierten Unterstüzungsebene positioniert sind.

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7. Behälter nach Anspruch 1, wobei der obere Ring (14, 114) einen umfänglichen, sich nach außen erstreckenden Flansch (30, 130) einschließt, der ein Mittel zum Greifen des oberen Rings definiert, wenn Druck auf die Basis (12, 112) beaufschlagt wird.

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8. Behälter nach Anspruch 7, wobei der obere Ring (14, 114) eine periphere aufrechtstehende Wand (28, 128) einschließt, wobei der sich nach außen erstreckende Flansch (30, 130) peripher um die Ringwand (12, 128) ist, ein im allgemeinen starrer Kragen (137) mit den obersten Wandabschnitten (134) durch eine der Biegunzonen (40, 140) aneinandergefügt ist, wobei der Kragen einen nach oben gerichtete Verschlusswulst (139) einschließt, wobei der obere Ring eine darin gebildete, nach unten gerichtete Ausnehmung einschließt und den Kragen (137) und den Verschlusswulst (139) für eine feste Verbindung der Behälterwand (16, 116) mit dem oberen Ring (14, 114) aufnimmt.

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9. Behälter nach Anspruch 8, wobei der obere Ringflansch (130) eine äußere Peripherie mit einem nach unten gerichteten Greifwulst (131) einschließt, der integral mit dieser ist und von dieser herabsteht.

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10. Behälter nach Anspruch 1, wobei der obere Ring (14, 114) eine sich aufrecht erstreckende Ringwand und eine separate Abdichtung (42, 142) einschließt, die über dem oberen Ring (14, 114) positionierbar ist und wieder lösbar an der Ringwand in sowohl der expandierten als auch der zusammengelegten Position des Behälters (10, 110) befestigt ist.

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11. Behälter nach Anspruch 1, der in der zusammengelegten Position spritzgußgeformt ist.

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## Revendications

1. Conteneur pliable (10, 110) comprenant une base (12, 112), un anneau supérieur (14, 114) et une paroi (16, 116) fixée sur la périphérie de ladite base et dudit anneau supérieur et s'étendant là entre eux-ci, ledit conteneur (10, 110) étant ajustable entre une position étendue avec l'anneau supérieur (14, 114) espacé vers le haut de ladite base (12, 112) et formant un intérieur de conteneur, et une position pliée avec ledit anneau supérieur (14, 114) entourant ladite base (12, 112) en relation espacée vers l'extérieur sensiblement concentrique par rapport à celle-ci, ladite paroi (16, 116) comprenant de multiples sections continues sur la périphérie s'étendant vers le haut (34, 134) qui, dans la position étendue dudit conteneur (10, 110), forment des angles alternativement vers l'extérieur et vers l'intérieur par rapport à l'intérieur du conteneur, lesdites sections (34, 134), dans la position pliée dudit conteneur (10, 110), étant pliées les unes sur les autres et logées concentriquement généralement entre la base (12, 112) et l'anneau supérieur (14, 114), avec les sections (34, 134) encerclant la base (12, 112) et étant elles-mêmes encerclées par ledit anneau supérieur (14, 114), **caractérisé en ce que** le conteneur comprend des zones de flexion (40, 140) joignant des sections adjacentes (34, 134), les sections adjacentes (34, 134) ayant une flexibilité limitée par rapport aux zones de flexion (40, 140) et dans lequel chaque zone de flexion peut être activée indépendamment pour effectuer un mouvement entre un premier état naturel ouvert dans lequel les zones adjacentes respectives sont dépliées et un second état naturel fermé dans lequel les zones adjacentes respectives sont pliées, dans lequel le conteneur est ajustable dans une position fixe partiellement étendue entre ladite position étendue et ladite position pliée.
2. Conteneur selon la revendication 1, dans lequel chaque dite section (34, 134) dans la position pliée dudit conteneur (10, 110) est placée selon un angle de divergence de 8° à 40° par rapport aux sections adjacentes (34, 134).
3. Conteneur selon la revendication 2, dans lequel lesdites sections (34, 134) sont placées selon un angle de 10° à 16° par rapport aux sections adjacentes (34, 134) dans ladite position pliée.
4. Conteneur selon la revendication 3, dans lequel lesdites sections (34, 134) sont placées selon un angle de 10° par rapport aux sections adjacentes (34, 134) dans ladite position pliée.
5. Conteneur selon la revendication 4, dans lequel, dans ladite position pliée, les sections adjacentes (34, 134) forment des ouvertures en forme de V placées à l'opposé les unes des autres, chaque dite ouverture comportant une ligne médiane perpendiculaire à ladite base (12, 112).
6. Conteneur selon la revendication 1, dans lequel ladite base (12, 112) comporte une surface de fond (18, 118) définissant un plan de support, lesdites sections pliées (34, 134) dans la position pliée du conteneur (10, 110) étant positionnées au-dessus dudit plan de support défini.
7. Conteneur selon la revendication 1, dans lequel ledit anneau supérieur (14, 114) comprend une bride circconférentielle s'étendant à l'extérieur (30, 130) qui définit un moyen pour saisir l'anneau supérieur lorsqu'une pression est appliquée sur la base (12, 112).
8. Conteneur selon la revendication 7, dans lequel ledit anneau supérieur (14, 114) comprend une paroi périphérique droite (28, 128), ladite bride s'étendant à l'extérieur (30, 130) étant placée autour de la périphérie de ladite paroi annulaire (12, 128), un collier généralement rigide (137) joint auxdites sections de paroi supérieures (134) par l'une desdites zones de flexion (40, 140), ledit collier comprenant un bourrelet de fermeture (139) dirigé vers le haut, ledit anneau supérieur comprenant un creux dirigé vers le bas formé dans celui-ci et recevant ledit collier (137) et ledit bourrelet de fermeture (139) pour un assemblage fixe de ladite paroi de conteneur (16, 116) audit anneau supérieur (14, 114).
9. Conteneur selon la revendication 8, dans lequel ladite bride d'anneau supérieur (130) comporte une périphérie externe avec un bourrelet de prise dirigé vers le bas (131) solidaire de celle-ci et dépendant de celle-ci.
10. Conteneur selon la revendication 1, dans lequel ledit anneau supérieur (14, 114) comporte une paroi annulaire s'étendant vers le haut et un joint d'étanchéité séparé (42, 142) positionnable au-dessus dudit anneau supérieur (14, 114) et fixé de manière détachable à ladite paroi annulaire aussi bien dans la position étendue que dans la position pliée dudit conteneur (10, 110).
11. Conteneur selon la revendication 1, moulé dans ladite position pliée.

FIG.1

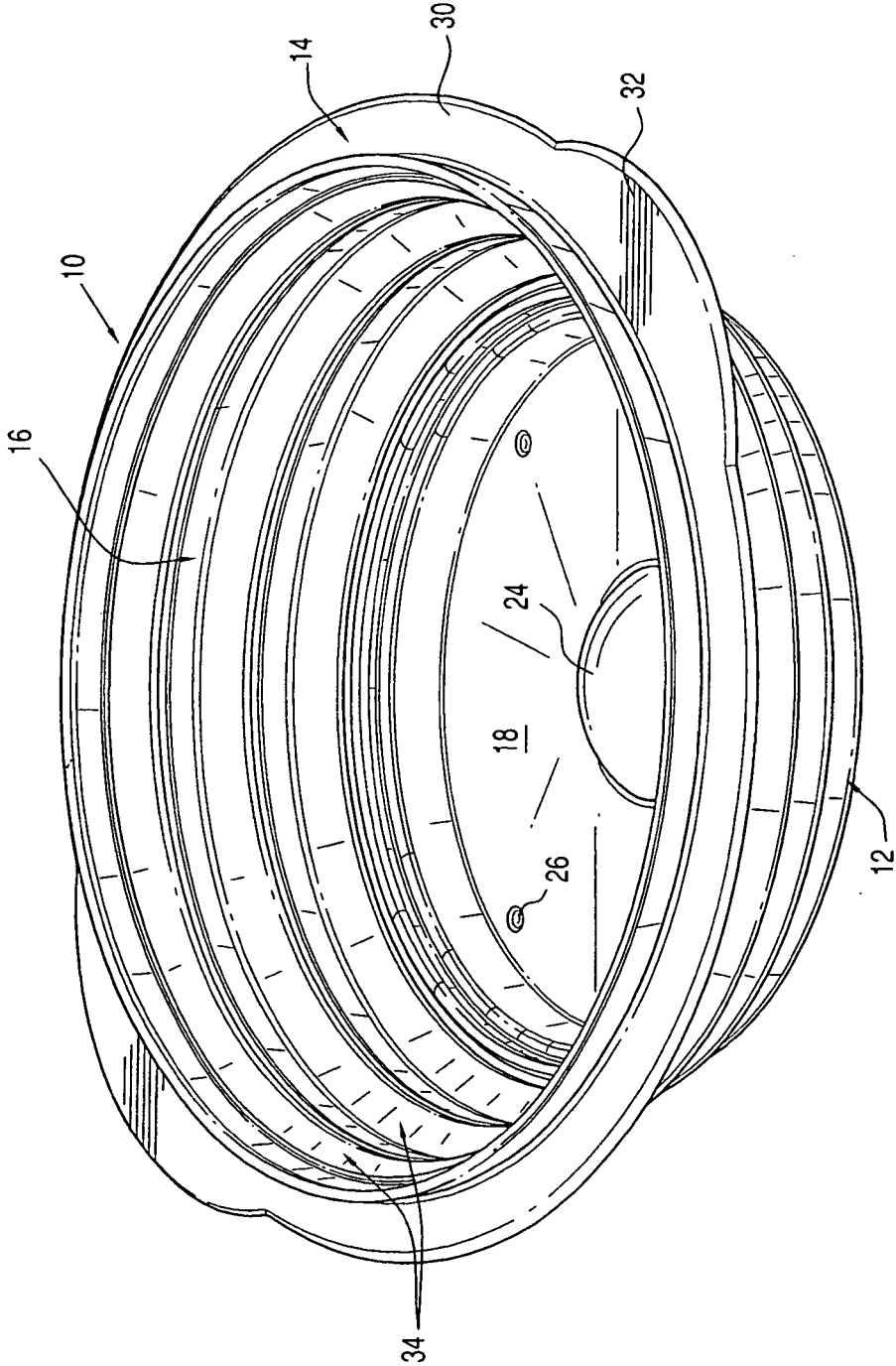
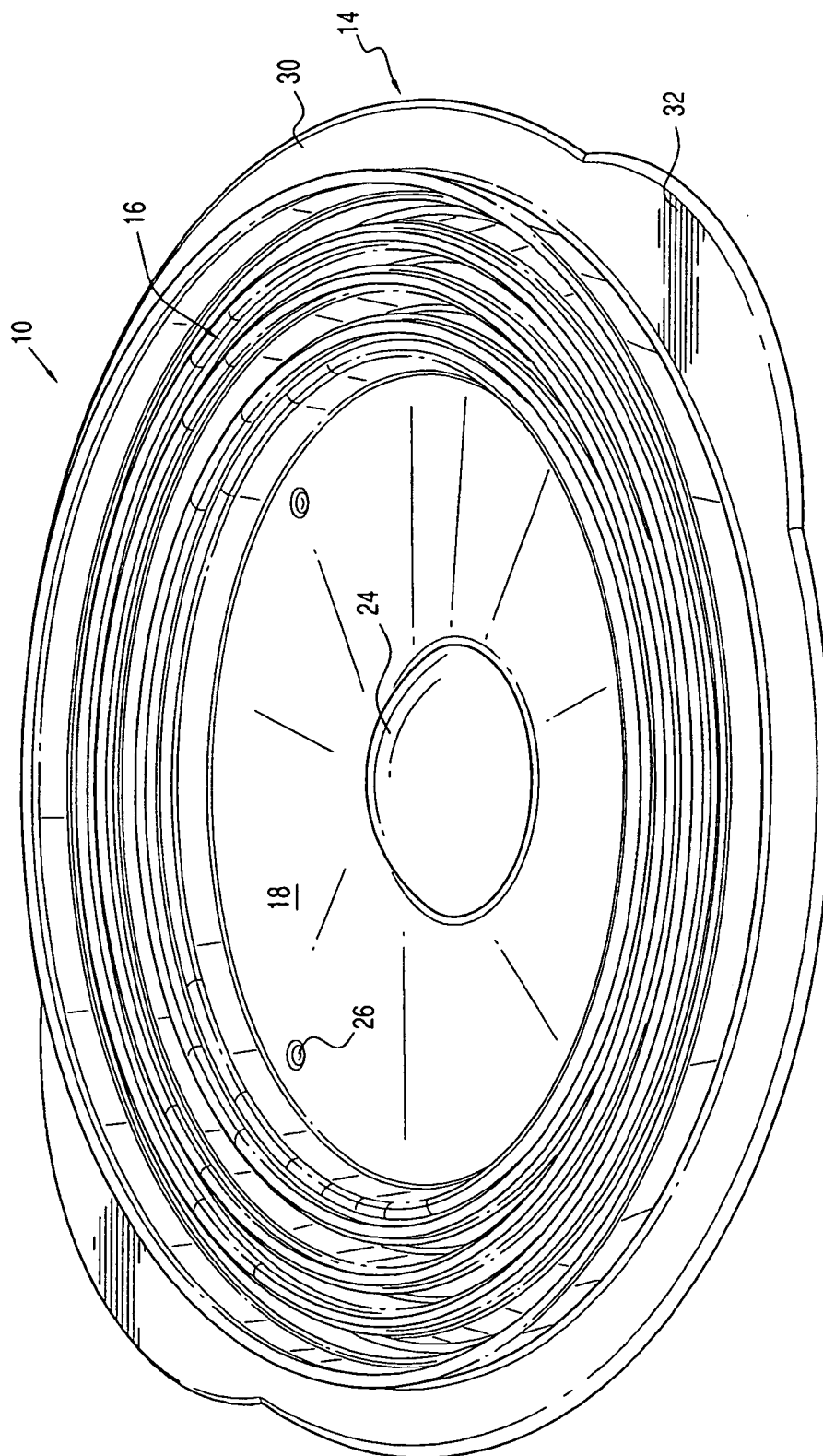


FIG.2



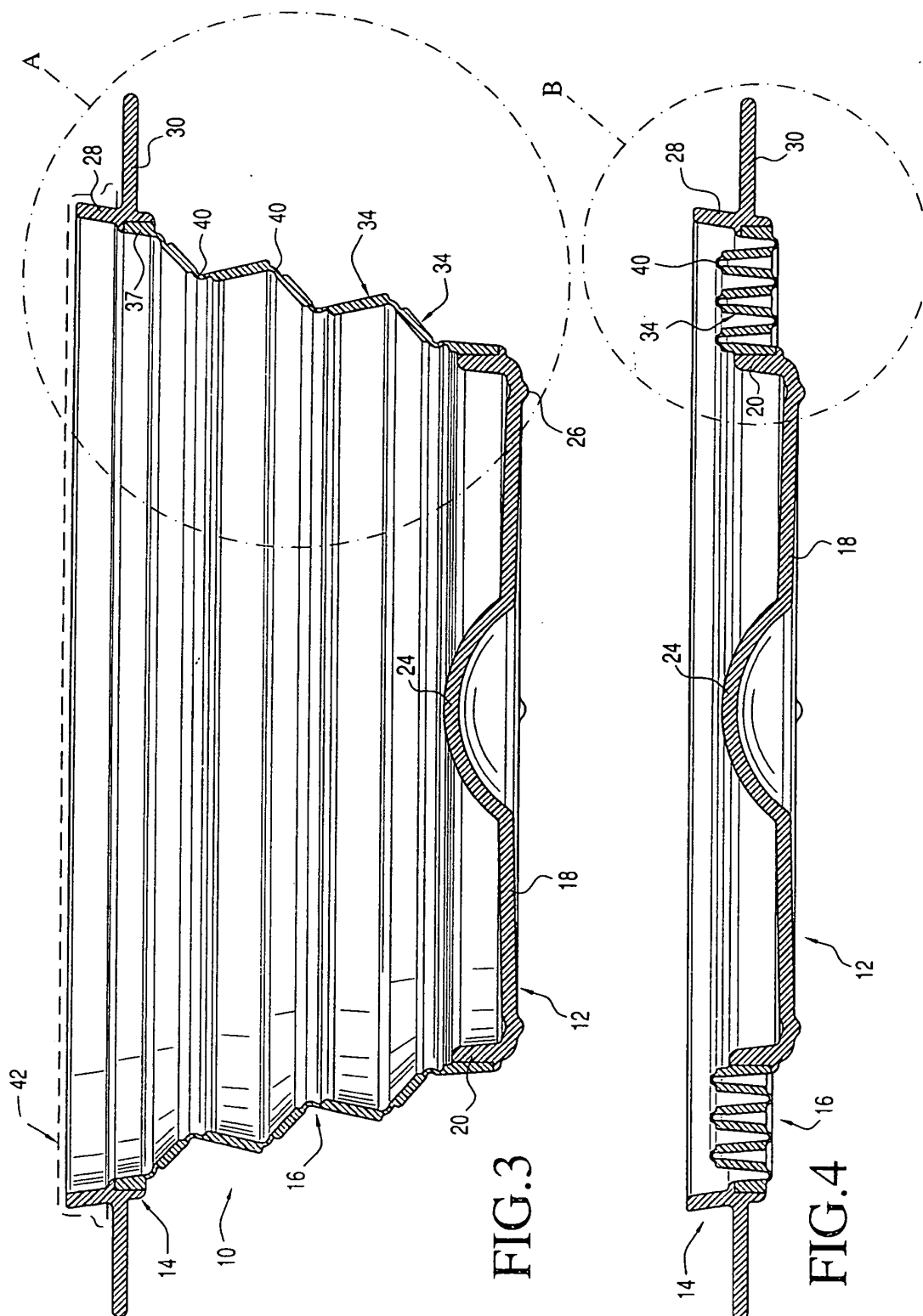
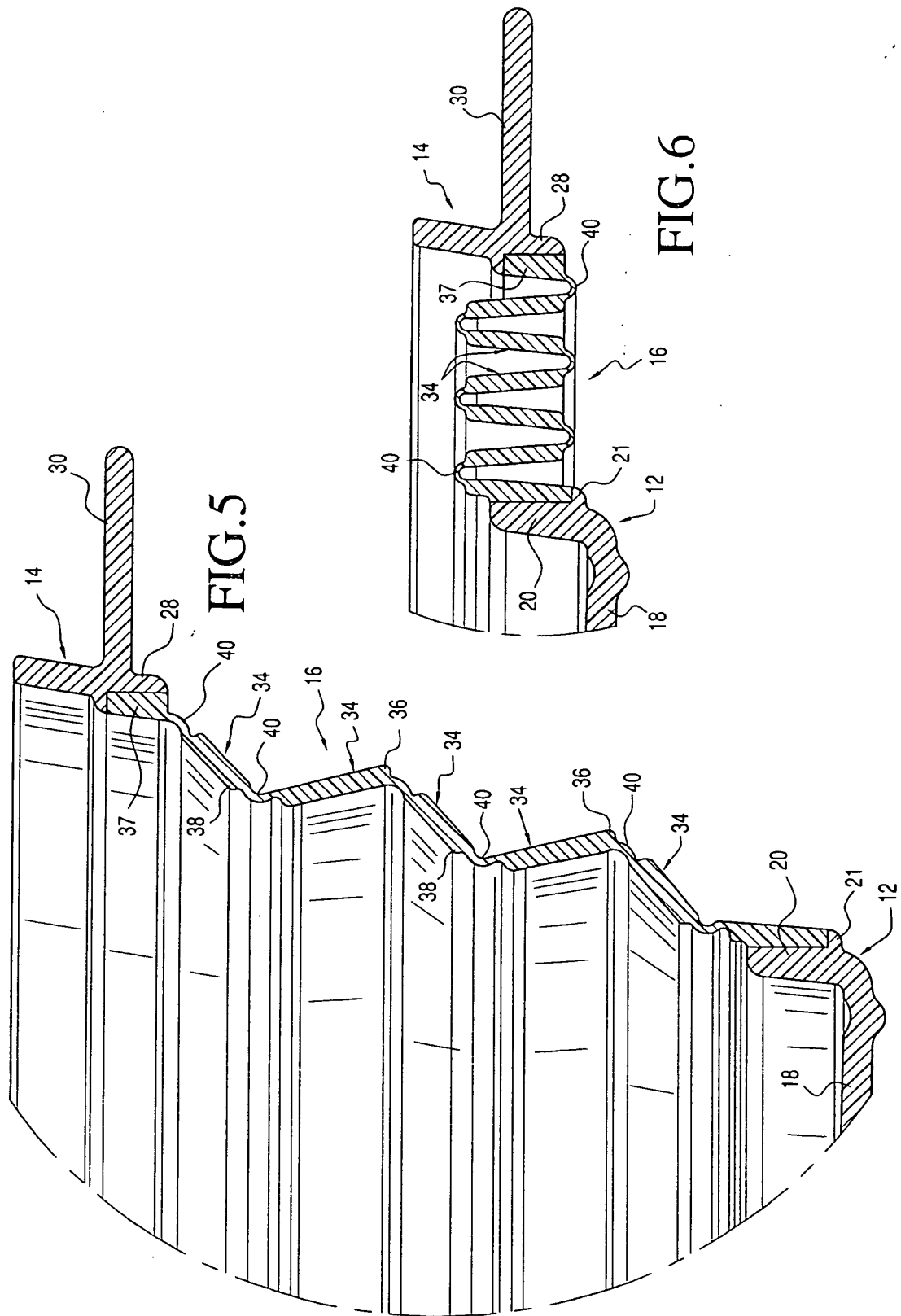
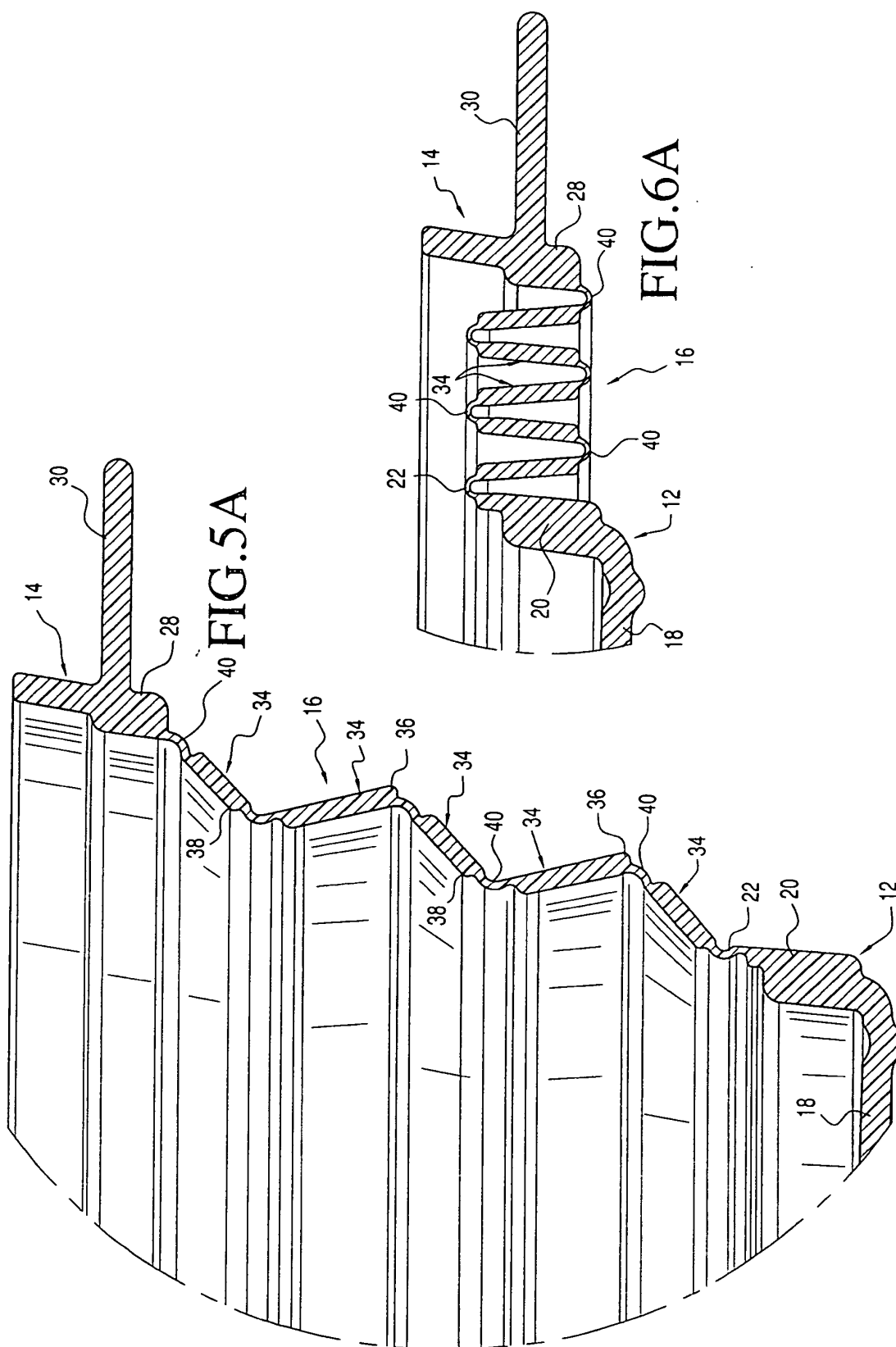


FIG. 3

FIG. 4





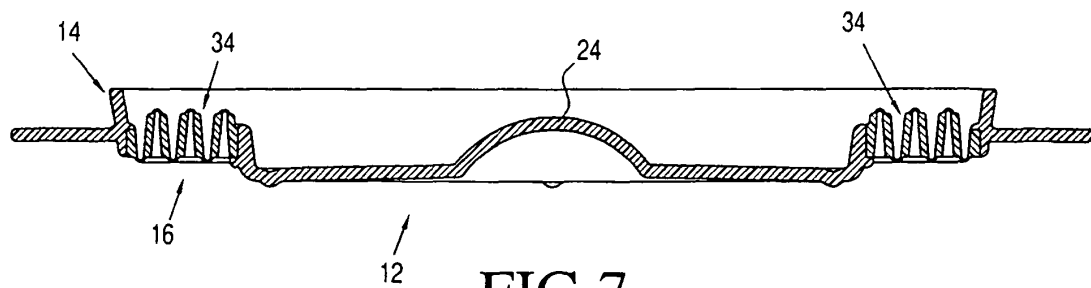


FIG. 7

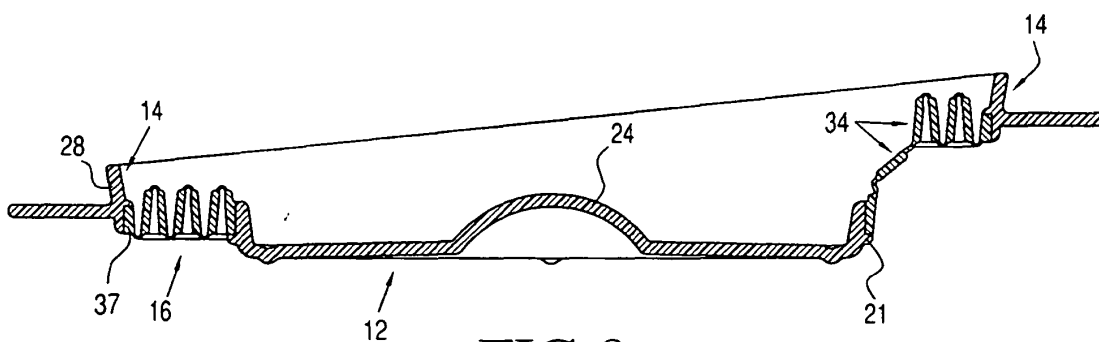


FIG. 8

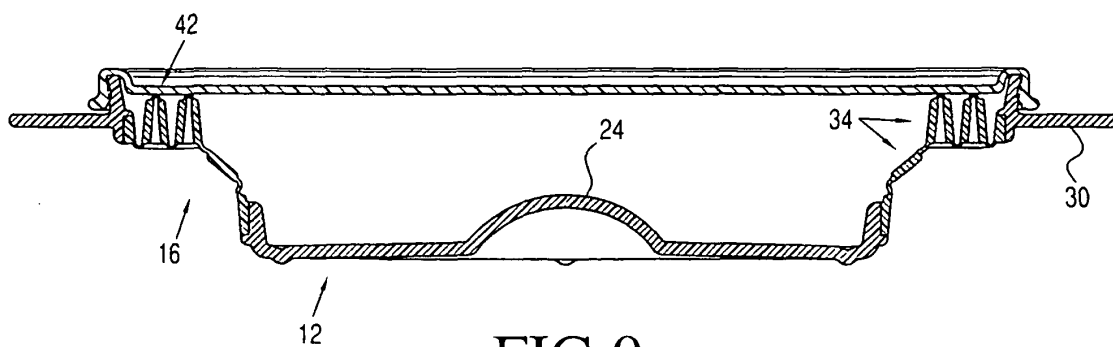
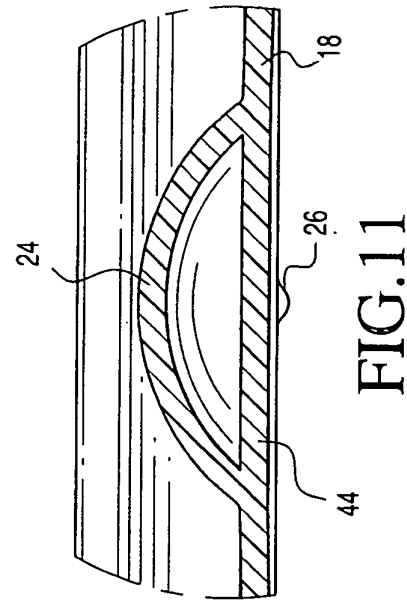
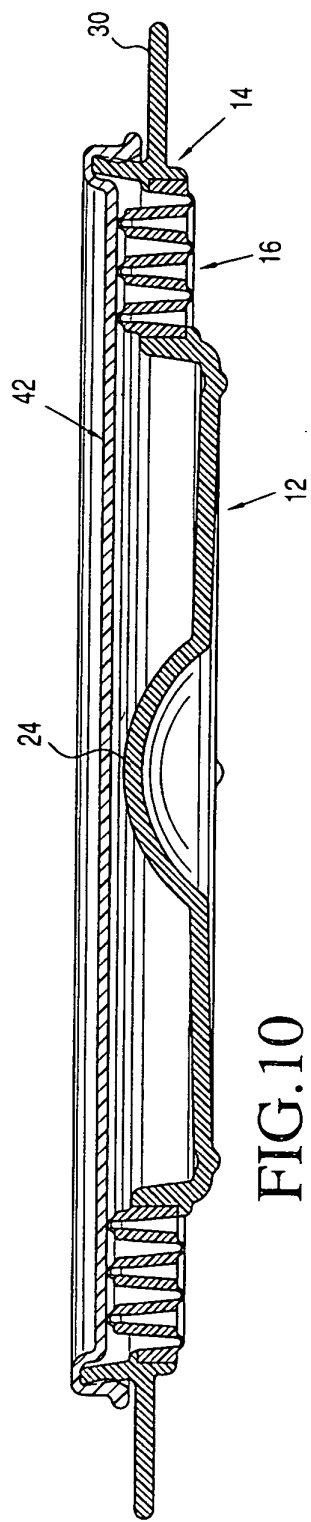


FIG. 9



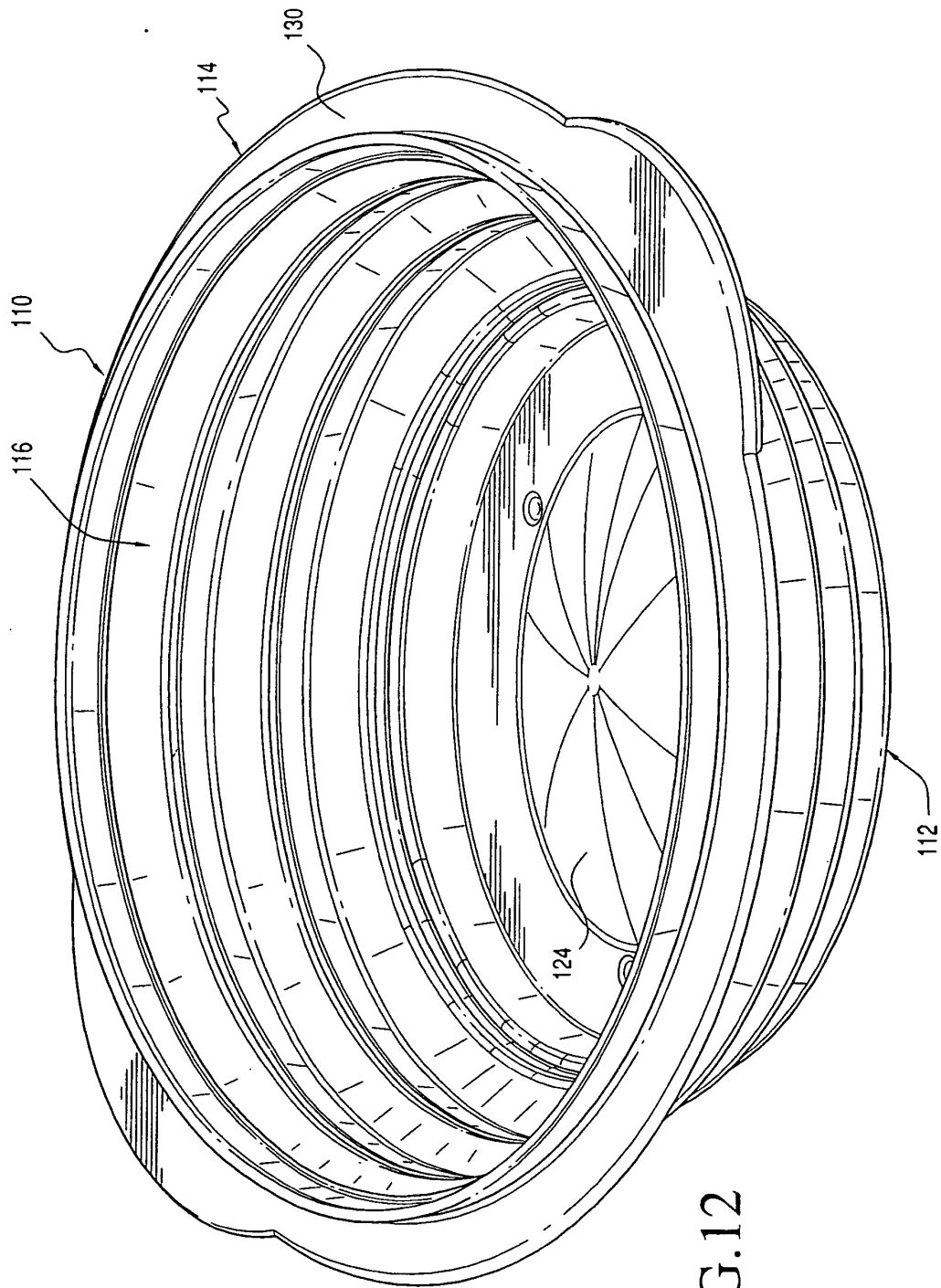
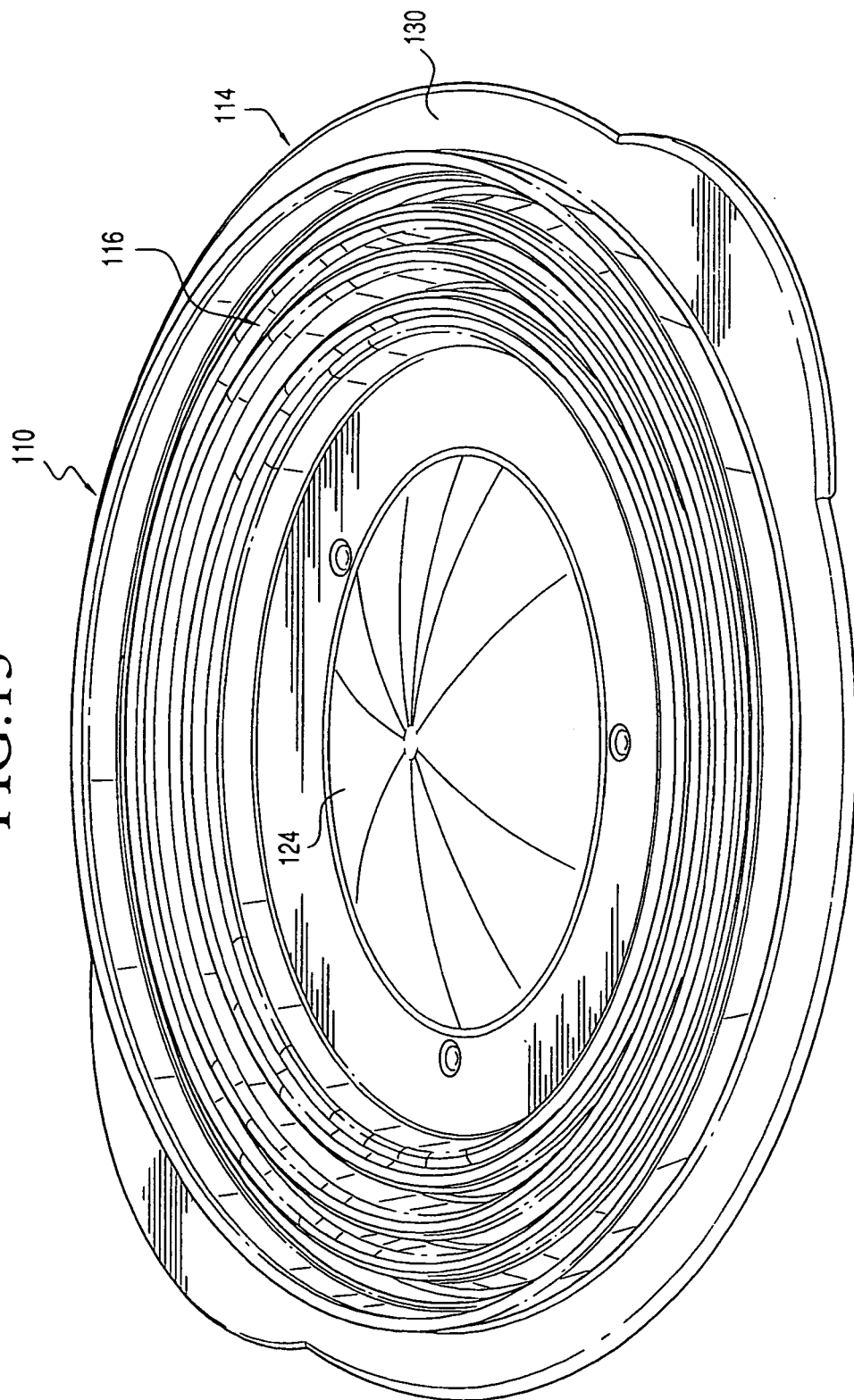


FIG. 12

FIG.13



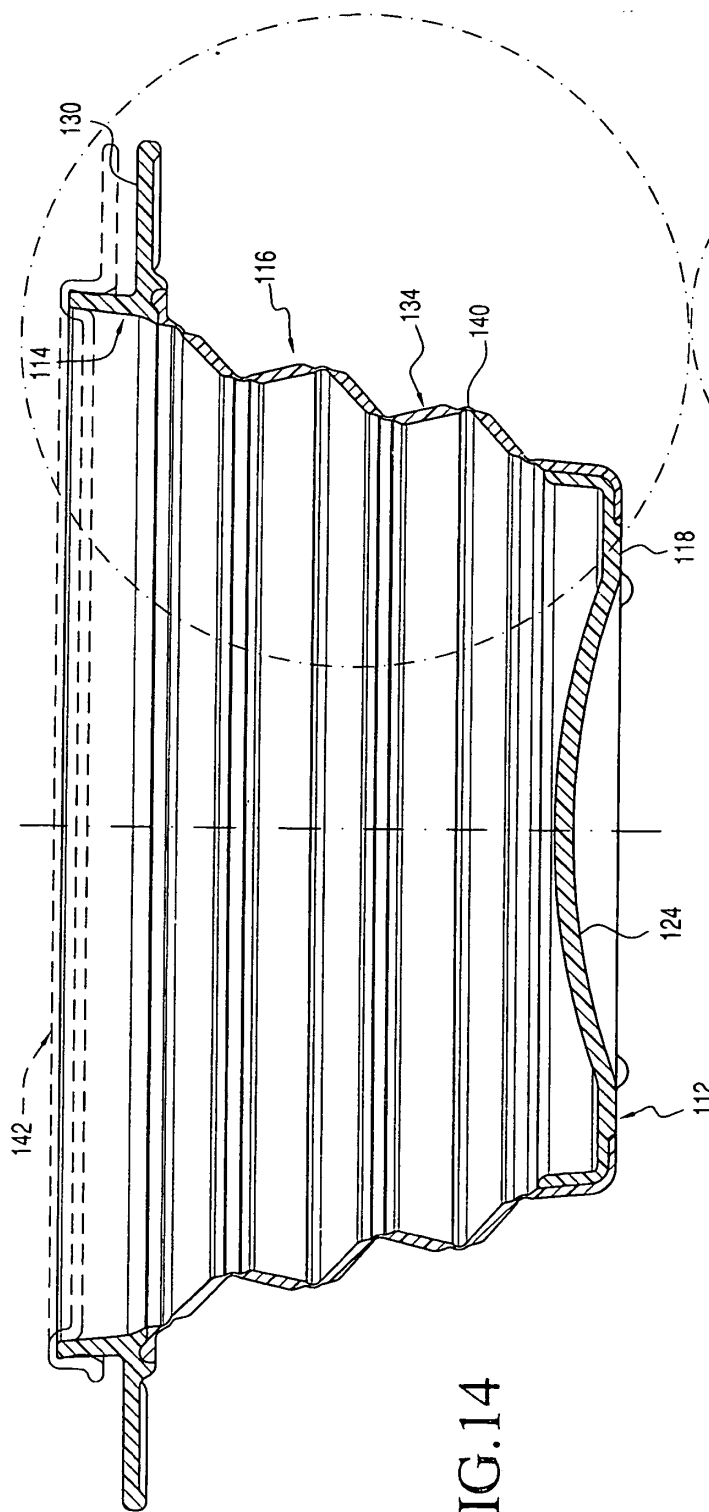


FIG. 14

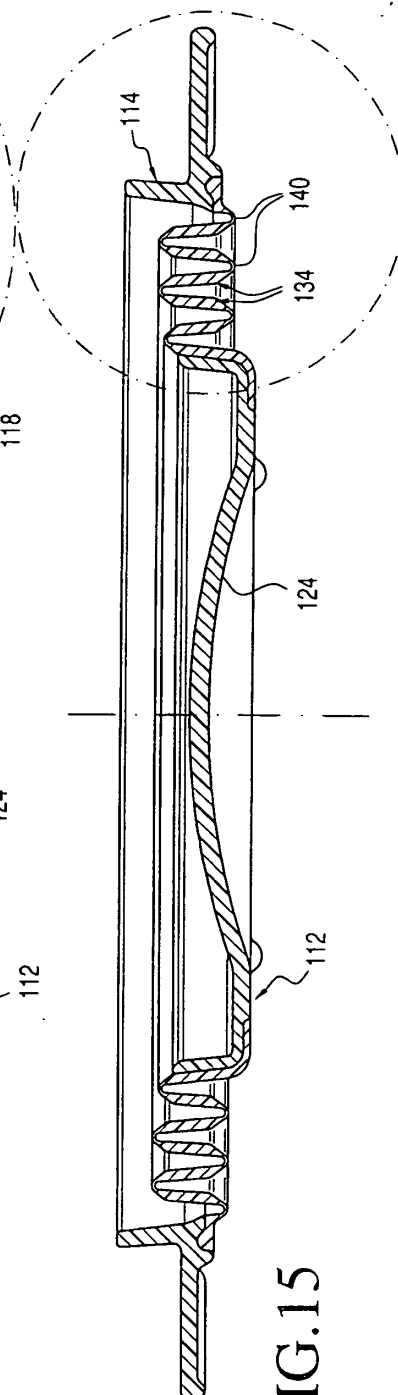
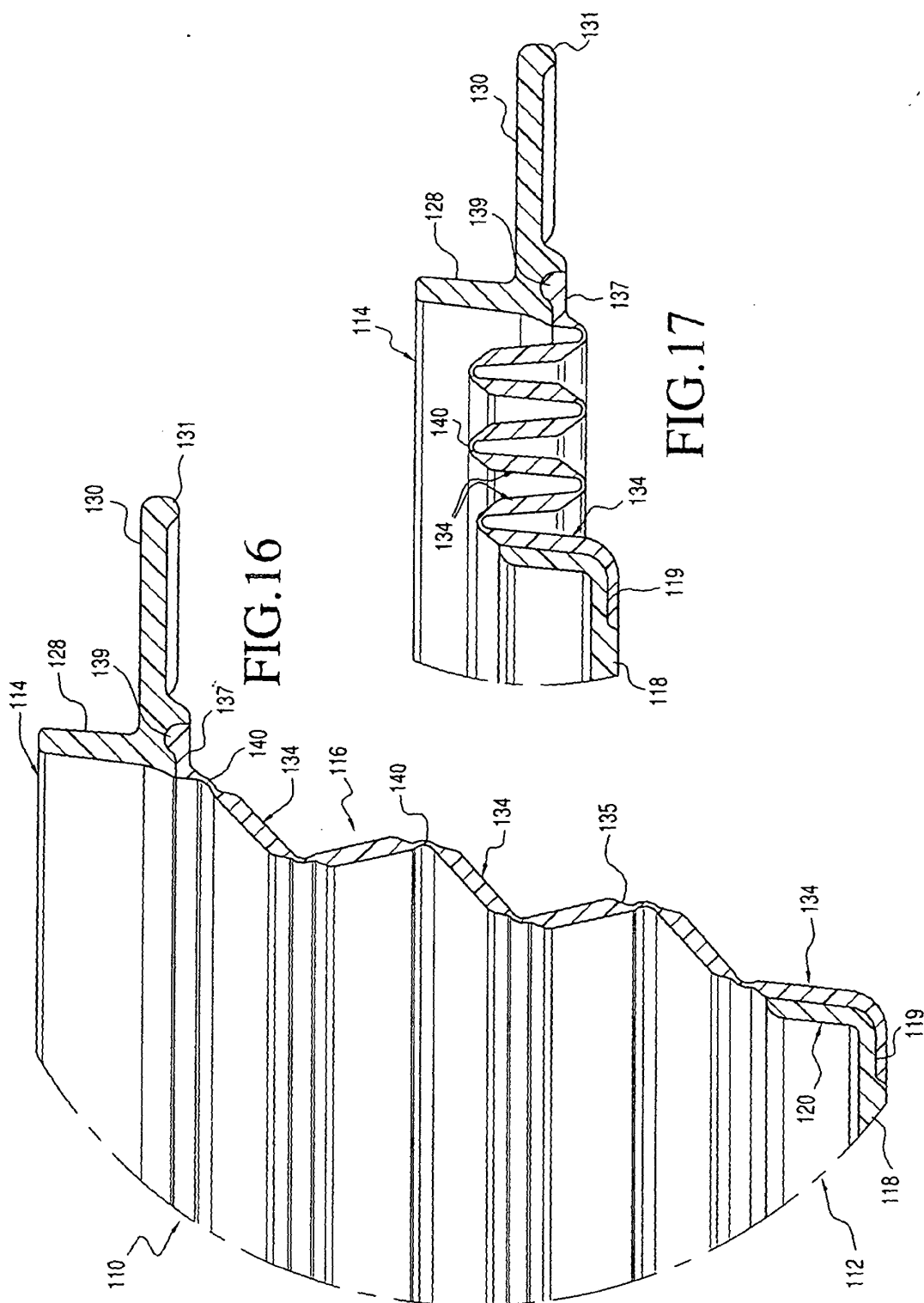


FIG. 15



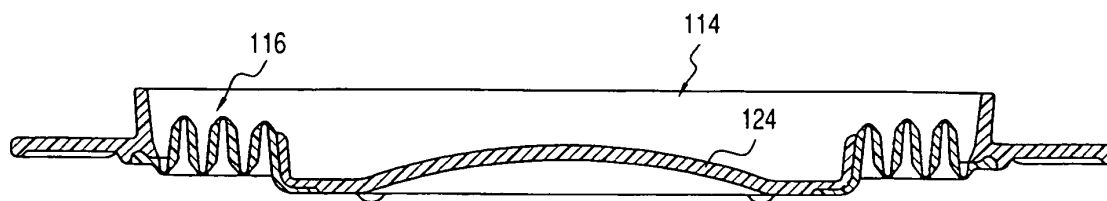


FIG. 18

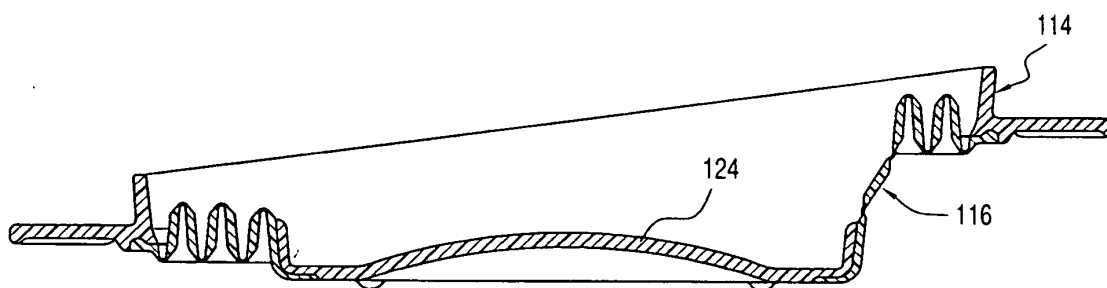


FIG. 19

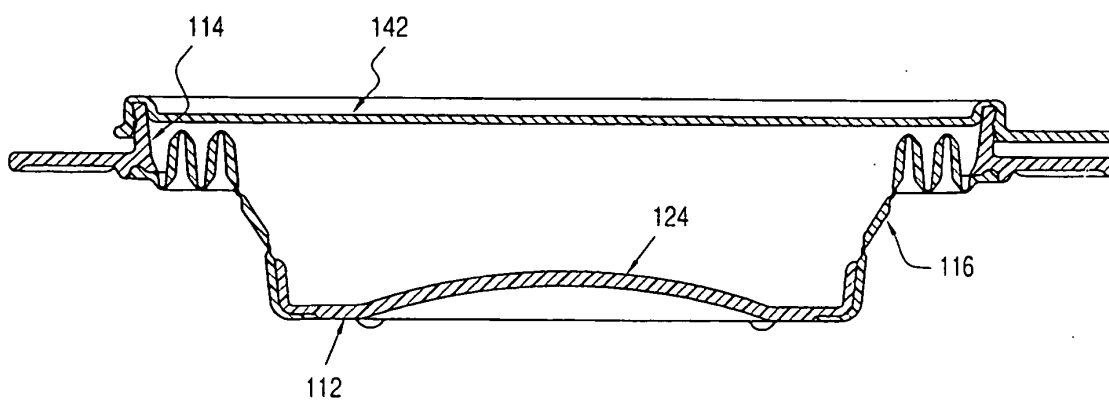
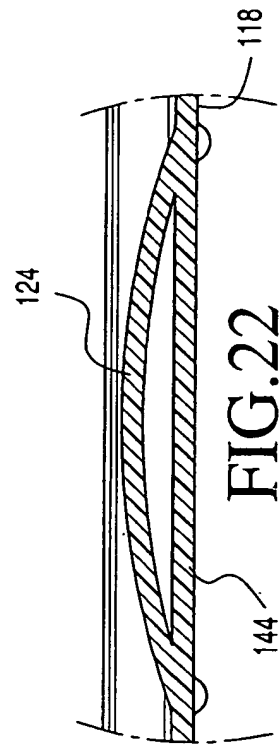
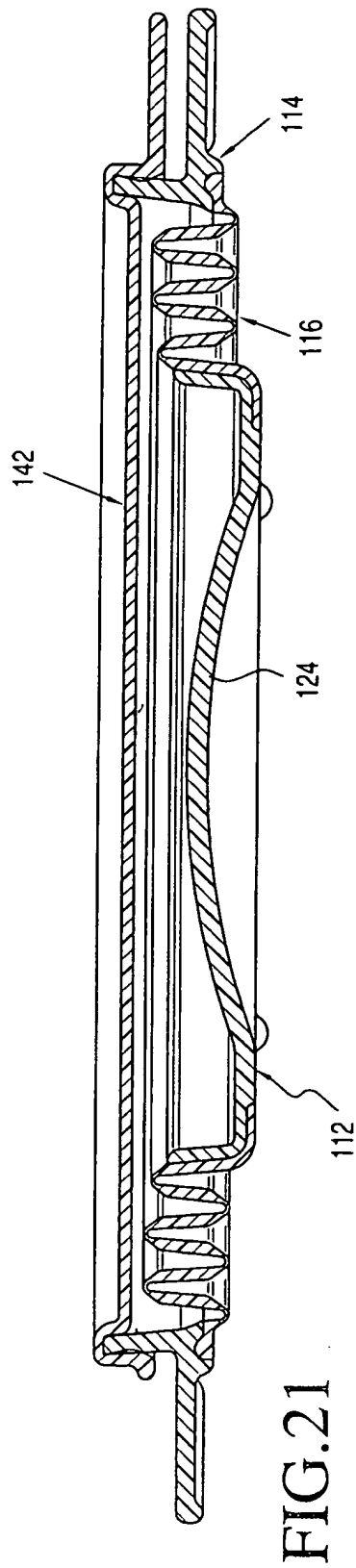


FIG. 20



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- WO 5439128 A, Fishman [0002]
- WO 9424002 A [0003]
- US 3220544 A [0004]