

INSULATED SLEEVE FOR A CUP

PRIORITY CLAIM

[0001] This application claims priority under 35 U.S.C. § 119(e) to U.S. Provisional Applications Serial No. 61/498,415, filed June 17, 2011 and Serial No. 61/618,637, filed March 30, 2012, which are expressly incorporated by reference herein.

BACKGROUND

[0002] The present disclosure relates to containers, such as cups, and particularly to thermoformed containers. More particularly, the present disclosure relates to insulated sleeves for cups.

SUMMARY

[0002a] There is disclosed herein an insulative sleeve for surrounding and embracing an exterior surface of a hot-beverage drink cup to provide a grippable low-temperature thermal barrier that can be gripped by a consumer, the sleeve comprising:

a sheet comprising insulative cellular non-aromatic polymeric material having localized plastic deformation in the sheet and providing a plastically deformed first material segment having a first density located in a first portion of the sheet and a second material segment having a second density lower than the first density located in an adjacent second portion of the sheet, wherein the sheet has no fractures in the insulative cellular non-aromatic polymeric material so that a predetermined insulative characteristic is maintained in the sheet.

[0002b] In a preferred embodiment of the present disclosure, there is provided an insulative sleeve for embracing an exterior surface of a cup, the insulative sleeve comprising:

a sheet comprising insulative cellular non-aromatic polymeric material including a sleeve wall, a floor platform, and retainer means for securing the floor platform to the sleeve wall to define a cup-receiving space so that the floor platform of the insulative sleeve supports at least a portion of the cup when the insulative sleeve embraces the cup.

[0003] A vessel in accordance with an embodiment of the present disclosure is configured to hold a product in an interior region formed in the container. In illustrative embodiments, the container is a cup.

[0004] In illustrative embodiments, an insulative container includes a cup and an insulative sleeve. The insulative sleeve is coupled to an exterior surface of the cup to insulate a consumer holding the cup from hot or cold temperatures associated with materials or beverages stored in the cup.

[0005] In illustrative embodiments, the insulative sleeve is made of a sheet comprising an insulative cellular non-aromatic polymeric material. In some embodiments of the present disclosure, the sheet includes a strip of insulative cellular non-aromatic polymeric material and a skin coupled to the strip and configured to display artwork and text. In other embodiments of the present disclosure, such text and artwork are printed directly on an exterior surface of the strip of insulative cellular non-aromatic polymeric material. In illustrative embodiments, the floor also comprises insulative cellular non-aromatic polymeric material.

[0006] In illustrative embodiments, the insulative sleeve is arranged to surround and embrace an exterior surface of a hot-beverage drink cup to provide a grippable low-temperature thermal barrier that can be gripped by a consumer. The sleeve comprises a sheet comprising insulative cellular non-aromatic polymeric material configured to provide means for enabling localized plastic deformation in the sheet to provide a plastically deformed first material segment having a first density located in a first portion of the sheet and a second material segment having a second density lower than the first density located in an adjacent second portion of the sheet without fracturing the insulative cellular non-aromatic polymeric material so that a predetermined insulative characteristic is maintained in the sheet.

[0007] The insulative cellular non-aromatic polymeric material included in the insulative sleeve is configured in accordance with the present disclosure to provide means for enabling localized plastic deformation in the insulative sleeve to provide (1) a plastically deformed first material segment having a first density in a first portion of the insulative sleeve and (2) a second material segment having a relatively lower second density in an adjacent second portion of the insulative sleeve. In illustrative embodiments, the more dense first material segment is thinner than the second material segment.

[0008] Additional features of the present disclosure will become apparent to those skilled in the art upon consideration of illustrative embodiments exemplifying the best mode of carrying out the disclosure as presently perceived.

BRIEF DESCRIPTIONS OF THE DRAWINGS

[0009] Embodiments of the invention will be described hereinafter, by way of examples only, with reference to the accompanying drawings, wherein:

[0010] Fig. 1 is a perspective view of a first embodiment of an insulative container in accordance with the present disclosure showing that the insulative container includes a cup including a rolled brim and a base including a sleeve-shaped side wall and a floor and an insulative sleeve coupled to exterior surface of the side wall to extend around the side wall of the cup;

[0011] Fig. 2 is a partial sectional view taken along line 8-8 of Fig. 6 showing an upper portion of another embodiment of the insulative sleeve that is coupled to the side wall and that is shown in more detail in Figs. 6-8;

[0012] Fig. 3 is a sectional view taken along line 3-3 of Fig. 1 showing that the insulative sleeve is coupled to the side wall included in the base of the cup and positioned to lie between and in spaced-apart relation from each of the rolled brim and the floor;

[0013] Fig. 3A is an enlarged sectional view of a portion of the side wall included in the body of the insulative cup of Fig. 3 and a portion of the insulative sleeve and showing that the side wall is made from a sheet that includes, from left to right, a skin including a film, an ink layer, and an adhesive layer, and a strip of insulative cellular non-aromatic polymer material;

[0014] Fig. 3B is a sectional view taken along line 3B-3B of Fig. 1 showing that the insulative sleeve is formed from an insulative cellular non-aromatic polymeric material that has been plastically deformed in a localized region along overlapping first and second upright tabs included in the sleeve to provide a bridge having a reduced thickness that is similar to a thickness of the rest of the insulative sleeve;

[0015] Fig. 4 is a perspective and diagrammatic view of a sleeve-forming process in accordance with the present disclosure showing that the sleeve-forming process includes the steps of loading a laminated roll to provide a sheet including insulative cellular non-aromatic polymeric material, plastically deforming the sheet to form a deformed sheet, cutting the deformed sheet to form sleeve blanks and scrap, collecting scrap, and accumulating the sleeve blanks to form sleeve-blank stacks, storing sleeve-blank stacks for transportation or storage, loading the sleeve blanks, heating the sleeve blank, wrapping the sleeve blank around a mandrel of a sleeve-forming machine, forming the insulative sleeve by overlapping and joining the upright tabs included in the sleeve blank, accumulating insulative sleeves to form stacks of insulative sleeves, and storing stacks of insulative sleeves for use at a later time in an illustrative container-forming process suggested in Fig. 5;

[0016] Fig. 5 is a perspective and diagrammatic view of the container-forming process suggested in Fig. 4 showing that that the container-forming process includes the steps of loading stacks of cups into a container-forming machine, loading stacks of insulative sleeves into the container-forming machine, positioning the insulative sleeve on the cup, coupling the insulative sleeve to the cup to form an insulative container, and inspecting the insulative container for defects;

[0017] Fig. 6 is a perspective view of another embodiment of an insulative container in accordance with the present disclosure showing that the insulative container includes the cup and an insulative sleeve that is coupled to the side wall of the cup and arranged to extend from the rolled brim to the floor of the cup;

[0018] Fig. 7 is a partial sectional view taken along line 8-8 of Fig. 6;

[0019] Fig. 8 is a partial sectional view taken along line 8-8 of Fig. 6 showing that the insulative sleeve extends between the rolled brim and the floor of the container and that the insulative sleeve includes upright inner and outer tabs (visible on the right side of Fig. 8) arranged to overlap one another and form a bridge along a right side of the insulative container and a fence extending around the side wall and interconnecting the upright inner and outer tabs;

[0020] Fig. 8' is a dead section view taken along line 8'-8' of Fig. 1 (omitting the side wall of the insulative cup) and showing that the insulative sleeve includes a C-shaped fence, an upright outer tab coupled to one end of the C-shaped fence, and an upright inner tab coupled to an opposite end of the C-shaped fence and suggested that the first and second tabs are arranged to overlap one another to establish a bridge extending between the ends of the C-shaped fence to define the interior region therebetween.

[0021] Fig. 8A is an enlarged dead section view of a bridge in accordance with the present disclosure showing how the insulative cellular non-aromatic polymer material has been compressed in both the first and second tabs to produce a bridge having a reduced thickness that is similar to a thickness of the side wall in the C-shaped fence opposite the bridge;

[0022] Fig. 8B is an enlarged dead section view of a portion of the C-shaped fence of Fig. 8A showing that the insulative cellular non-aromatic polymer material has not been compressed;

[0023] Fig. 8C is an enlarged dead section view of the first and second tabs prior to mating to one another to establish the bridge;

[0024] Fig. 9 is a plan view of a sleeve blank used during a sleeve-forming process to form the sleeve of Fig. 6;

[0025] Fig. 10 is an exploded assembly view of the insulative container of Fig. 6 showing that the insulative container includes, from top to bottom, the cup including the rolled brim, sleeve-shaped side wall, and floor and the insulative sleeve having a height which is about equal to a height of the sleeve-shaped side wall;

[0026] Fig. 11 is a perspective view of another embodiment of an insulative sleeve in accordance with the present disclosure showing that the insulative sleeve includes a series of generally horizontal ribs formed on an inner surface of the sleeve;

[0027] Fig. 12 is a plan view of a sleeve blank used during a sleeve-forming process to form the insulative sleeve of Fig. 11;

[0028] Fig. 13 is a sectional view taken along line 13-13 of Fig. 12;

[0029] Fig. 14 is a perspective view of another embodiment of an insulative sleeve in accordance with the present disclosure showing that the insulative sleeve includes a series of generally vertical ribs formed on an inner surface of the sleeve;

[0030] Fig. 15 is a plan view of a sleeve blank used during a sleeve-forming process to form the insulative sleeve of Fig. 14;

[0031] Fig. 16 is a sectional view taken along an arc line 16-16 of Fig. 15;

[0032] Fig. 17 is a perspective view of another embodiment of an insulative sleeve in accordance with the present disclosure showing that the insulative sleeve includes a series of ribs formed on an inner surface of the insulative sleeve and arranged in a spiral to slope downwardly;

[0033] Fig. 18 is a plan view of a sleeve blank used during a sleeve-forming process to form the insulative sleeve of Fig. 17;

[0034] Fig. 19 is a sectional view taken along line 19-19 of Fig. 18;

[0035] Fig. 20 is a perspective view of another embodiment of an insulative sleeve in accordance with the present disclosure showing that the insulative sleeve includes a series of nubs formed on an inner surface of the insulative sleeve;

[0036] Fig. 21 is a plan view of a sleeve blank used during a sleeve-forming process to form the insulative sleeve of Fig. 20;

[0037] Fig. 22 is a sectional view taken along line 22-22 of Fig. 20;

[0038] Fig. 23 is a perspective view of another embodiment of an insulative sleeve in accordance with the present disclosure showing that the insulative sleeve includes a number of protruding ribs formed in the sleeve as a result of displacing portions of the sleeve;

[0039] Fig. 24 is a plan view of a sleeve blank used during a sleeve-forming process to form the insulative sleeve of Fig. 23;

[0040] Fig. 25 is a sectional view taken along line 25-25 of Fig. 23;

[0041] Fig. 26 is an enlarged portion of Fig. 25 showing that material has been displaced in the sleeve to form the protruding ribs;

[0042] Fig. 27 is a perspective view of another embodiment of an insulative sleeve in accordance with the present disclosure showing that the insulative sleeve includes a sleeve wall and a sleeve floor coupled to the sleeve wall to define a cup-receiving space therebetween;

[0043] Fig. 28 is a plan view of a sleeve blank used during a sleeve-forming process to form the insulative sleeve of Fig. 27;

[0044] Fig. 29 is a perspective view of another embodiment of an insulative sleeve in accordance with the present disclosure showing that the insulative sleeve includes a sleeve wall and a sleeve floor coupled to the sleeve wall to define a cup-receiving space therebetween;

[0045] Fig. 30 is a plan view of a sleeve-wall blank used during a sleeve-forming process to form the sleeve wall;

[0046] Fig. 31 is a plan view of a sleeve-floor blank used during the sleeve-forming process to form the sleeve floor which is coupled to the sleeve wall to establish the insulative sleeve;

[0047] Fig. 32 is a perspective view of another embodiment of an insulative sleeve in accordance with the present disclosure showing that the insulative sleeve includes a sleeve wall having a first bridge on a left side of the insulative sleeve and a second bridge opposite the first bridge on a right side of the insulative sleeve and a sleeve floor coupled to the sleeve wall to define a cup-receiving space therebetween;

[0048] Fig. 33 is a plan view of a sleeve blank used during a sleeve-forming process to form the insulative sleeve of Fig. 27 showing that the sleeve blank includes, from left to right, a first wall panel, a sleeve floor, and a second wall panel;

[0049] Fig. 34 is a perspective view of another embodiment of an insulative container in accordance with the present disclosure showing that the insulative container includes a cup and an insulative sleeve that includes a fence having a fence thickness and a bridge having a bridge thickness that is about twice the fence thickness;

[0050] Fig. 35 is a sectional view taken along line 35-35 of Fig. 34;

[0051] Figs. 36-40 are a series of views showing another embodiment of an insulative sleeve in accordance with the present disclosure and showing assembly of the insulative sleeve in the field;

[0052] Fig. 36 is a perspective view of another embodiment of an insulative sleeve in accordance with the present disclosure showing that the insulative sleeve is in a dis-assembled state that includes a sleeve wall having first and second panels connected together by a connecting web along a fold line and a sleeve-wall retainer including an upright tab, an adhesive layer applied to the upright tab, and a release liner coupled to the adhesive layer;

[0053] Figs. 37-40 are a series of views showing an illustrative method of applying the insulative sleeve of Fig 36 to a cup in the field;

[0054] Fig. 37 is a perspective view showing a cup and the insulative sleeve of Fig. 36 in the disassembled state;

[0055] Fig. 38 is a view similar to Fig. 37 with the second panel of the sleeve wall folded back away from the first panel of the sleeve wall along the connecting web to expose the sleeve-wall retainer and suggesting that the release liner is peeled away from the adhesive layer to expose the adhesive layer;

[0056] Fig. 39 is a view similar to Fig. 38 showing the release liner removed from the adhesive layer and suggesting that the sleeve-wall retainer is arranged to overlap a distal end of the second panel as suggested in Fig. 40; and

[0057] Fig. 40 is a view similar to Fig. 39 showing that the sleeve-wall retainer has been arranged to overlap the distal end of the second panel to cause the insulative sleeve to be established with a cup-receiving space formed therebetween.

DETAILED DESCRIPTION

[0058] An insulative container 110 in accordance with a first embodiment of the present disclosure is shown, for example, in Figs. 1-3. As an example, insulative container 110 includes a cup 11 and a first embodiment of an insulative sleeve 113 as shown in Figs. 1-3. A container-forming process 46, 47 used to make the insulative container 110 is shown in Figs. 4 and 5. Another embodiment of an insulative container 210 in accordance with the present disclosure is illustrated in Figs. 6-10. Other embodiments of insulative sleeves 313, 413, 513, 613, 713, 813, 913, 1013, 1113, 1213, and 1313 that are in accordance with the present disclosure are shown in Figs. 11-36.

[0059] An insulative container 110 in accordance with the present disclosure includes a cup 11 and an insulative sleeve 113 as shown in Figs. 1, 3, and 4. Cup 11 includes body 12 formed to include an interior region 14 and a rolled brim 16 coupled to

body 12 as shown, for example, in Fig. 1. Body 12 includes a side wall 18 and a floor 20 coupled to side wall 18 to define an interior region 14 therebetween. In one illustrative example, cup 11 may be formed of polypropylene using a thermoforming process.

[0060] Insulative sleeve 113 illustratively comprises a strip 82 of insulative cellular non-aromatic polymeric material. Strip 82 of insulative cellular non-aromatic polymeric material is configured to provide means for insulating a beverage, dessert or other substance placed in interior region 14 of cup 11 while providing resistance to deformation and puncture and for providing an exterior surface that is suitable for printing graphics and other information thereon.

[0061] Insulative sleeve 113 includes a region 101 having localized plastic deformation that provides segments of insulative sleeve 113 that exhibit higher material density than neighboring segments of insulative sleeve 113 in accordance with the present disclosure is shown in Figs. 1 and 3. As an example, insulative sleeve 113 is made using an illustrative sleeve-forming process 46 suggested in Fig. 4. Insulative container 110 is made using an illustrative container-forming process 47 using a sleeve blank 300 as shown, for example, in Fig. 5. Strip 82 of insulative cellular non-aromatic polymeric material used to form insulative sleeve 113 is shown in Figs. 3A and 3B.

[0062] Insulative sleeve 113 includes an upright inner tab 114, an upright outer tab 112, and an upright fence 111 extending between inner and outer tabs 114, 112 as suggested in Fig. 8'. Upright inner tab 114 is configured to provide the first material segment having the higher first density in the region 101 of sleeve 113. Upright outer tab 112 is arranged to mate with upright inner tab 114 along an interface I therebetween as suggested in Fig. 8'. Upright fence 111 is arranged to interconnect upright inner and outer tabs 114, 112 and surround interior region 14. Upright fence 111 is configured to provide the second material segment having the lower second density in the region 101 insulative sleeve 113 and cooperate with upright inner and outer tabs 114, 112 to form insulative sleeve 113 as suggested in Fig. 8'. Region 101 of insulative sleeve 113 in which localized plastic deformation is enabled by the insulative cellular non-aromatic polymeric material is where upright inner and outer tabs 114, 112 overlap along interface I as suggested in Fig. 8'.

[0063] Upright fence 111 of insulative sleeve 113 is C-shaped in a horizontal cross-section and each of upright inner and outer tabs 114, 112 has an arcuate shape in a

horizontal cross-section as suggested in Fig. 8'. Upright fence 111 includes an upright left side edge 111L and an upright right side edge 111R that is arranged to lie in spaced-apart confronting relation to upright left side edge 111L. Upright outer tab 112 is configured to have the higher first density and mate with upright inner tab 114 also characterized by the higher first density to establish a bridge 112, 114 arranged to interconnect upright left and right side edges 111L, 111R of upright fence 111. Bridge 112, 114 is formed of plastically deformed material having the higher first density.

[0064] As shown, for example, in Fig. 1, upright fence 111 of insulative sleeve 113 has a sleeve height H1. Cup 11 has a cup height D1. As shown in Fig. 1, sleeve height H1 is less than cup height D1.

[0065] Insulative sleeve 113 includes a pair of tabs 114, 112 that mate to provide insulative sleeve 113 with a frustoconical shape in the illustrative embodiment shown in Figs. 8', 8A, and 8C. Upright inner tab 114 includes an inner surface 114i bounding a portion of interior region 14 and an outer surface 114o facing toward upright outer tab 112 as shown in Figs. 8' and 8C. Upright outer tab 112 includes an inner surface 112i facing toward interior region 14 and mating with outer surface 114o of upright inner tab 114 to define the interface **I** between upright inner and outer tabs 114, 112. Upright outer tab 112 further includes an outer face 112o facing away from upright inner tab 114. Each of inner and outer surfaces of upright inner and outer tabs 114, 112 has an arcuate shape in a horizontal cross-section as suggested in Fig. 8C and subtends an acute angle of less than 20° as suggested in Fig. 8'.

[0066] Upright fence 111 is C-shaped in a horizontal cross-section and each of upright inner and outer tabs 114, 112 has an arcuate shape in a horizontal cross-section as suggested in Fig. 8'. Upright fence 111 includes an upright left side edge 111L and an upright right side edge 111R that is arranged to lie in spaced-apart confronting relation to upright left side edge 111L in Fig. 8C. Upright outer tab 112 is configured to have the higher first density and mate with upright inner tab 114 also characterized by the higher first density to establish a bridge 112, 114 arranged to interconnect upright left and right side edges 111L, 111R of upright fence 111. Bridge 112, 114 is formed of plastically deformed material having the higher first density.

[0067] Upright fence 111 has an inner surface 111i bounding a portion of interior region 14 and an outer surface 111o facing away from interior region 14 and surrounding

inner surface 111i of upright fence 111 as shown, or example, in Fig. 8'. Outer surface 111o cooperates with inner surface 111i of upright fence 111 to define a first thickness T1 therebetween. Upright inner tab 114 includes an inner surface 114i bounding a portion of interior region 14 and an outer surface 114o facing toward upright outer tab 112. Upright outer tab 112 includes an inner surface 112i facing toward interior region 14 and mating with outer surface 114o of upright inner tab 114 to define the interface I between upright inner and outer tabs 114, 112. Upright outer tab 112 further includes an outer face 112o facing away from upright inner tab 114. Inner and outer surfaces of upright inner tab 114 cooperate to define a second thickness T2I therebetween that is less than the first thickness T1. Inner and outer surfaces of upright outer tab 112 cooperate to define a third thickness T2O that is less than the first thickness T1.

[0068] Insulative sleeve 113 is made from a strip 82 of insulative cellular non-aromatic polymeric material. Insulative cellular non-aromatic polymeric material comprises, for example, a polypropylene base resin having a high melt strength, one or both of a polypropylene copolymer and homopolymer resin, and one or more cell-forming agents. As an example, cell-forming agents may include a primary nucleation agent, a secondary nucleation agent, and a blowing agent defined by gas means for expanding the resins and to reduce density. In one example, the gas means comprises carbon dioxide. In another example, the base resin comprises broadly distributed molecular weight polypropylene characterized by a distribution that is unimodal and not bimodal. Reference is hereby made to U.S. Application No. 13/491,327 filed June 7, 2012 and titled POLYMERIC MATERIAL FOR AN INSULATIVE CONTAINER for disclosure relating to such insulative cellular non-aromatic polymeric material, which application is hereby incorporated in its entirety herein.

[0069] An insulating sleeve in accordance with the present disclosure may optionally include, as shown in Figs. 11-26, vertical, horizontal, spiral or other configuration of ribs or rib segments, hoops, bumps, nubs, or other projections, or grooves, slots, channels, depressions or the like on the inner surface of the sleeve that creates an air gap between side wall 18 of cup 11 and the insulating sleeve. This air gap forms an insulating barrier to minimize transfer of heat from a hot beverage through cup 11 and/or the insulating sleeve to a user's hand (and, conversely, transfer of heat from a user's hand through insulative sleeve 113 and side wall 18 to the beverage). As shown in Figs. 4 and 5, insulative container 110 is formed in an illustrative container-forming process 46, 47.

[0070] As shown in Figs. 2 and 3, insulative sleeve 113 is formed during sleeve-forming process 46. Upright fence 111 has a first thickness T1 and first and second upright tabs 114, 112 each have a second thickness T2. As suggested in Fig. 1, second thickness T2 is about half to first thickness T1. As a result, bridge 114, 112 formed by overlapping and coupling upright tabs 114, 112 has a third thickness T3 which about equal to first thickness T1. In one exemplary embodiment the insulative sleeve 113 may be formed in the forming apparatus and coupled with cup 11. Insulative sleeve 113 may be manufactured, stored, shipped, and/or sold separately with a self-locking die cut feature. The self-locking feature may have various shapes to promote retention.

[0071] Insulative sleeve 113 is made using sleeve-forming process 46 as shown, for example, in Fig. 4. Sleeve-forming process 46 includes a laminated-roll loading step 461A, a compressing step 462A, a cutting step 463A, an accumulating sleeve blanks step 464A, a storing sleeve blanks step 465A, a loading sleeve blank step 461B, heating sleeve blanks step 462B, wrapping sleeve blanks step 463B, forming sleeve step 464B, accumulating sleeves step 465B, and storing stacks of sleeves step 466B as shown in Fig. 4.

[0072] Laminated-roll loading step 461A loads laminated roll 86 onto a cutting machine such as a die cutting machine or metal-on-metal stamping machine. As a result, laminated sheet 80 is drawn into the cutting machine for processing. Compressing step 462A compresses portions of laminated sheet 80 to form a compressed sheet. Cutting step 463A cuts compressed sheet to cause sleeve blank 300 to be cut from a blank-carrier sheet 80. As an example, cutting step 463A and compressing step 462A may be combined such that they are performed generally at the same time on the same piece of equipment. Accumulating sleeve blanks step 464A accumulates sleeve blanks 300 into a stack 95 of sleeve blanks. Storing sleeve blanks step 465A stores stack 95 of sleeve blanks until ready for use in loading sleeve blanks step 461B. Loading sleeve blanks step 461B loads stack 95 of sleeve blanks for processing by a sleeve-forming machine. Heating sleeve blanks step 462B applies heat 102 to sleeve blank 300. Wrapping sleeve blanks step 463B wraps heated sleeve blank 300 around a mandrel included in sleeve-forming machine. Forming sleeve step 464B forms bridge 114, 112 by overlapping and

compressing upright tabs 112, 114 with primary and auxiliary clamps included in sleeve-forming machine. Accumulating sleeves step 465B accumulates sleeves 113 into a stack 97 of sleeves. Storing stacks of sleeves step 466B stores stack 97 of sleeves for use in later container-forming process 47.

[0073] Insulative container 110 is made using a container-forming process 47 as shown in Fig. 5. Container-forming process 47 includes a loading cups step 471, a loading sleeves step 472, a positioning sleeve on cup step 473, a sleeve coupling step 474, and an inspecting step 475 as shown in Fig. 5. Loading containers step 471 loads container stack 124 onto a container-forming machine. Loading sleeves step 472 loads a stack 97 of sleeves onto the container-forming machine. Positioning sleeve on cup step 473 positions sleeve 113 on cup 11. Sleeve coupling step 474 couples sleeve 113 to cup 11 using heat for example to establish insulative container 110. However, sleeve 113 may be coupled by adhesive, friction fit, or any other suitable alternative. Inspecting step 475 inspects insulative container 110 for defects before passing good containers onto container-packaging stage 48 as suggested in Fig. 5.

[0074] As shown in Fig. 3A, insulative sleeve 113 is made from a sheet 80. Sheet 80 includes a skin 81 and strip 82 of insulative cellular polymeric material. Skin 81, includes, for example, a film layer 811, an ink layer 812, and an adhesive layer 810 as shown in Fig. 3A. Adhesive layer 810 is used, for example, to laminate skin 81 to strip 82 so that ink layer 812 is trapped between film layer 811 and adhesive layer 810.

[0075] In another exemplary embodiment of a sleeve-forming process, sleeve-forming process 46 is modified by not laminating a skin 81 to strip 82 of insulative cellular non-aromatic polymeric material. As a result, the skin is entirely omitted and printing may be done directly on strip 82 of insulative cellular non-aromatic polymeric material.

[0076] Side wall 18 of cup 11 extends between rolled brim 16 and floor 20 as shown in Fig. 3. Side wall 18 includes a top portion 22 of body 12 that is coupled to rolled brim 16 and a bottom portion 24 arranged to interconnect floor 20 and top portion 22. Top portion 22 is arranged to extend in a downward direction toward floor 20 and is coupled to bottom portion 24 that is arranged to extend in an opposite upward direction toward rolled brim 16. Top portion 22 and rolled brim 16 cooperate to form a mouth 32 that is arranged to open into interior region 14 as shown in Fig. 1.

[0077] Insulative sleeve 113 is arranged to surround and embrace an exterior surface of a hot-beverage drink cup 11 to provide a grippable low-temperature thermal barrier that can be gripped by a consumer. Insulative sleeve 113 comprises a sheet 80 comprising insulative cellular non-aromatic polymeric material configured to provide means for enabling localized plastic deformation in sheet 80 to provide a plastically deformed first material segment having a first density located in a first portion of sheet 80 and a second material segment having a second density lower than the first density located in an adjacent second portion of sheet 80 without fracturing the insulative cellular non-aromatic polymeric material so that a predetermined insulative characteristic is maintained in sheet 80.

[0078] Sheet 80 is arranged to surround a vertical central axis 113A as suggested in Figs. 1 and 3. Sheet 80 includes an upright inner tab 114 arranged to extend upwardly along and in spaced-apart relation to vertical central axis 113A and configured to provide the first material segment having the first density. Sheet 80 also includes an upright outer tab 112 arranged to extend upwardly along and in spaced-apart relation to vertical central axis 113A and to mate with upright inner tab 114 along an interface I therebetween, and an upright fence 111 arranged to interconnect the upright inner and outer tabs 114, 112 and surround vertical central axis 113A and configured to provide the second material segment having the second density and cooperate with upright inner and outer tabs 114, 112 to form sleeve-shaped side wall 18. Fence 111 has a substantially frustoconical shape as suggested in Figs. 1 and 3. Each of upright inner and outer tabs 114, 112 has an arcuate shape.

[0079] Upright inner tab 114 includes an inner surface providing means for mating with a hot-beverage drink cup 11 and an outer surface facing toward upright outer tab 112 as suggested in Figs. 8' and 8C. Upright outer tab 112 includes an inner surface mating with the outer surface of upright inner tab 114 to define the interface I between upright inner and outer tabs 114, 112. Upright outer tab 112 further includes an outer face facing away from upright inner tab 114. Each of the inner and outer surfaces of upright inner and outer tabs 114, 112 has an arcuate shape in a horizontal cross-section and subtends an acute angle of less than 20°. Upright fence 111 is C-shaped in a horizontal cross-section. Each of upright inner and outer tabs 114, 112 has an arcuate shape in a horizontal cross-section.

[0080] Upright fence 111 includes an upright left side edge 111L and an upright right side edge 111R arranged to lie in spaced-apart confronting relation to upright left side edge 111L. Upright outer tab 112 is configured to have the first density and mate with the upright inner tab to establish a bridge arranged to interconnect upright left and right side edges 111L, 111R of the upright fence and formed of plastically deformed material having the first density.

[0081] Upright fence 111 has an inner surface facing toward vertical central axis 113A and providing means for mating with a hot-beverage drink cup 11. Upright fence 111 also has an outer surface facing away from central vertical axis 113A from interior region 14 and surrounding the inner surface of upright fence 111 and cooperating with the inner surface of upright fence 111 to define a first thickness therebetween.

[0082] Upright inner tab 114 includes an inner surface facing toward vertical central axis 113A and providing means for mating with hot-beverage drink cup 11 and an outer surface facing toward upright outer tab 112. Upright outer tab 112 includes an inner surface facing toward vertical central axis 113A and mating with the outer surface of upright inner tab 114 to define interface **I** between upright inner and outer tabs 114, 112.

[0083] Upright outer tab 112 further includes an outer face facing away from the upright inner tab 114. The inner and outer surfaces of upright inner tab 114 cooperate to define a second thickness therebetween that is about half of the first thickness as suggested in Fig. 8'. Inner and outer surfaces of upright outer tab 112 cooperate to define a third thickness that is about half of the first thickness as suggested in Fig. 8'.

[0084] Another embodiment of an insulative container 210 in accordance with the present disclosure is shown in Figs. 6-10. Insulative container 210 includes cup 11 and insulative sleeve 213 as shown in Fig. 6. Insulative sleeve 213 is similar to sleeve 113 except that insulative sleeve 213 has a sleeve height H1 that about equal to a cup height D 1 as shown in Fig. 6.

[0085] As an example, insulative sleeve 213 is formed using sleeve blank 300 during sleeve-forming process 46 as shown, for example, in Fig. 4. Blank 300 includes a first side 302 and an opposite second side (not shown). Blank 300 has a first arcuate edge 306 that coincides with a radius 308 centered on an axis 310. A second arcuate edge 312 coincides with a radius 314 centered on axis 310. A first linear edge 316 coincides with a first ray emanating from the axis

310 and a second linear edge 318 coincides with a second ray emanating from the axis 310. When the blank 300 is wrapped such that first linear edge 316 overlaps in juxtaposition with second linear edge 318, the insulative sleeve 213 defines a frustoconical surface 320 shown in Fig. 6. The overlapped linear edges 316 and 318 may be secured in any of a number of ways including a mechanical connection created by heating the edges 316 and 318 to bonding of the insulative cellular non-aromatic polymeric material. The edges 316 and 318 may be treated with an adhesive to secure the edges 316 and 318 to one another.

[0086] In yet another embodiment of an insulative sleeve 313 formed from a sleeve blank 322, insulative sleeve 313 includes a plurality of generally horizontal ribs 328 on an inner surface 326 of an assembled insulative sleeve 313 as shown in Figs. 11-13. Sleeve blank 322 is formed with a first thickness 322T1 and in a compressing material sheet step of a sleeve forming process, depressions 324 are formed by reducing the thickness to 322T2 as shown in Fig. 13. Upon completion of the compressing material sheet step, blank 322 includes a number of areas of localized plastic deformation that form depression 324 with thickness 322T2 and ribs 328 which have no deformation and thickness 322T1. As shown diagrammatically in Fig. 11, depressions 324 and ribs 328 cooperate to form an air gap 301 between inner surface 326 of insulative sleeve 313, an exterior surface 102 of cup 11, and a pair of neighboring ribs 328A, 328B.

[0087] Blank 322 is formed with a first linear edge 330 and a second linear edge 334. Ribs 328 are formed to abut second linear edge 334 at a first end and are spaced apart from first linear edge 330 by a distance 332 so that when first linear edge 330 overlaps second linear edge 334 during the wrapping sleeve blank step of the sleeve-forming process, the first and second ends of ribs 328 do not overlap. This reduces the amount of material that must be compressed during the wrapping sleeve blank step. Ribs 328 are positioned to engage an outer surface of a cup, such as cup 11, such that the inner surface 326 of depressions 324 are spaced apart from the outer surface of the cup to provide an air gap with only the ribs 328 engaging the outer surface of the cup. The air gap is insulative so that when a user grips an outer surface 338 of insulative sleeve 313, heat transfer from the cup to a user's hand is impeded.

[0088] In still yet another embodiment of an insulative sleeve 413 formed from a sleeve blank 422, insulative sleeve 413 includes a plurality of vertical ribs 428 on an inner surface 426 of an assembled insulative sleeve 413 as shown in Figs. 14-16. Sleeve blank 422 is formed with a

first thickness 422T1 and in a compressing material sheet step of a sleeve forming process, depressions 424 are formed by reducing the thickness to 422T2 as shown in Fig. 16. Upon completion of the compressing material sheet step, blank 422 includes a number of areas of localized plastic deformation that form depression 424 with thickness 422T2 and ribs 428 which have no deformation and thickness 422T1.

[0089] Blank 422 is formed with a first linear edge 430, a first arcuate edge 440, a second linear edge 434, and a second arcuate edge 442. Ribs 428 are formed to extend from first arcuate edge 440 to second arcuate edge 442. First linear edge 430 and second linear edge 434 each lie along a ray that emanates from a common axis that defines the center of curvature of both first arcuate edge 440 and second arcuate edge 442. Each rib 428 also lies along a ray that extends from the common axis 444. Ribs 428 are positioned to engage an outer surface of a cup, such as cup 11, such that the inner surface 426 of depressions 424 are spaced apart from the outer surface of the cup to provide an air gap with only the ribs 428 engaging the outer surface of the cup. The air gap is insulative so that when a user grips an outer surface of insulative sleeve 413, heat transfer from the cup to a user's hand is impeded.

[0090] In yet another embodiment of an insulative sleeve 513 formed from a sleeve blank 522, insulative sleeve 513 includes a plurality of helical ribs 528 on an inner surface 526 of an assembled insulative sleeve 513 as shown in Figs. 17-19. Sleeve blank 522 is extruded with a first thickness 522T1 and in a compressing material sheet step of a sleeve forming process, depressions 524 are formed by reducing the thickness to 522T2 as shown in Fig. 19. Upon completion of the compressing material sheet step, blank 522 includes a number of areas of localized plastic deformation that form depression 524 with thickness 522T2 and ribs 528 which have no deformation and thickness 522T1.

[0091] Blank 522 is formed with a first linear edge 530, a first arcuate edge 540, a second linear edge 534, and a second arcuate edge 542. Ribs 528 are formed to extend along axes that are perpendicular to second linear edge 534. Ribs 528 extend to abut either second arcuate edge 542 or first linear edge 530. Ribs 528 are positioned to engage an outer surface of a cup, such as cup 11, such that the inner surface 526 of depressions 524 are spaced apart from the outer surface of cup to provide an air gap with only the ribs 528 engaging the outer surface of cup 11. The air gap is insulative so that when a user grips an outer surface of insulative sleeve 513, heat transfer from the cup to a user's hand is impeded.

[0092] In another embodiment of an insulative sleeve 613 formed from a sleeve blank 622, insulative sleeve 613 includes a plurality of nubs or protrusions 628 on an inner surface 626 of an assembled insulative sleeve 613 as shown in Figs. 20-22. Sleeve blank 622 is extruded with a first thickness 622T1 and in a compressing material sheet step of a sleeve forming process, protrusions 628 remain after reducing the remainder of blank 622 to thickness to 622T2 as shown in Fig. 22. Upon completion of the compressing material sheet step, blank 622 includes a number of protrusions 628 which have no deformation and thickness 622T1.

[0093] Blank 622 is formed with a first linear edge 630, a first arcuate edge 640, a second linear edge 634, and a second arcuate edge 642. Protrusions 628 are spaced in rows 624 with each row 624 lying along an arc that is parallel to the first arcuate edge 640 and second arcuate edge 642. Protrusions 628 are positioned to engage an outer surface of a cup, such as cup 11, such that the inner surface 626 of insulative sleeve 613 is spaced apart from the outer surface of the cup to provide an air gap with only the protrusions 628 engaging the outer surface of the cup. The air gap is insulative so that when a user grips an outer surface of insulative sleeve 613, heat transfer from the cup to a user's hand is impeded.

[0094] In yet another embodiment of an insulative sleeve 713 formed from a sleeve blank, insulative sleeve 713 includes a plurality of generally horizontal ribs 728 on an inner surface 736 of an assembled insulative sleeve 713 as shown in Figs. 23-26. Sleeve blank 722 is extruded with a first thickness 722T1 and in a displacing material sheet step of a sleeve forming process, ribs 728 are formed by displacing material. Upon completion of the displacing material sheet step, blank 722 includes a number of areas of localized plastic deformation that form ribs 728 which have thickness 722T1, but with portions of the blank 722 offset to define ribs 728. Portions of blank 722 are reduced to a thickness 722T2 due to plastic deformation and elongations as the material is displaced.

[0095] The displacing material sheet step may be performed by a thermoforming process in which blank 722 is thermoformed. As a result, thicknesses 722T1 and 722T2 are maximized so that the insulative properties of insulative sleeve 713 are maximized.

[0096] Blank 722 is formed with a first linear edge 730 and a second linear edge 734. Ribs 728 are formed to abut second linear edge 734 at a first end and are spaced apart from first linear edge 730 by a distance 732 so that when first linear edge 730 overlaps second linear edge 734 during a wrapping sleeve blank step of the sleeve forming process, the first and second ends of ribs 728 do not overlap. This reduces the amount of material that must be compressed during wrapping sleeve blank process. Ribs 728 are positioned to engage an outer surface of a cup, such as cup 11, such that the inner surface 736 of depressions 724 are spaced apart from the outer surface of the cup to provide an air gap with only the ribs 728 engaging the outer surface of the cup. The air gap is insulative so that when a user grips an outer surface 738 of insulative sleeve 713, heat transfer from the cup to a user's hand is impeded.

[0097] Another embodiment of an insulative sleeve 813 in accordance with the present disclosure is shown in Figs. 27 and 28. Insulative sleeve 813 includes an upright sleeve wall 818 and a sleeve floor 820 as shown in Fig. 27. Sleeve blank 822 is extruded with a first thickness and in a compressing material sheet step of a sleeve forming process, a fold line 828 is formed by compressing material to a relatively thinner second thickness. Sleeve floor 820 includes a floor platform 821 and a floor-retention tab 822 that is coupled to sleeve wall 818 during sleeve forming as shown in Fig. 27. After sleeve forming, sleeve floor 820 and sleeve wall 818 cooperate to define a cup-receiving space 814 therebetween.

[0098] Still yet another embodiment of an insulative sleeve 913 in accordance with the present disclosure is shown in Figs. 29-31. Insulative sleeve 913 includes an upright sleeve wall 918 and a sleeve floor 920 as shown in Figs. 29-31. Sleeve-wall blank 922 and sleeve-floor blank 924 are extruded with a first thickness and in a compressing material sheet step of a sleeve forming process, fold lines 928 are formed by compressing material to a relatively thinner second thickness in sleeve-floor blank 924 as shown in Fig. 31. Sleeve floor 920 includes a floor platform 921 and four floor-retention tabs 922A, 922B, 922C, 922D that are coupled to sleeve wall 918 during sleeve

forming as shown in Fig. 29. After sleeve forming, sleeve floor 920 and sleeve wall 918 cooperate to define a cup-receiving space 914 therebetween.

[0099] In another embodiment, an insulative sleeve 1013 has a generally cylindrical shape with a lower tab 1002 as shown in Fig. 32. The lower tab 1002 is used to support a cylindrical drinking vessel, such as an aluminum can, for example, while insulative sleeve 1013 is positioned on the cylindrical drinking vessel. Insulative sleeve 1013 includes an opening into which the vessel is positioned and lower tab 1002 provides a stop so that the vessel is supported on lower tab 1002 to position insulative sleeve 1013. Insulative sleeve 1013 differs from sleeves 213 and 113 in that insulative sleeve 1013 has two joints 1006 and 1008 where material is joined to form the insulative sleeve 1013.

[00100] A blank 1022 for insulative sleeve 1013 includes two generally rectangular shaped portions 1012, 1014 interconnected by lower tab 1002 as shown in Fig. 33. A first linear edge 1016 of portion 1012 mates with a first linear edge 1018 of portion 1014 and the edges are overlapped in juxtaposition so that they can be joined to form joint 1006. Similarly, a second linear edge 1020 of portion 1012 mates with a second linear edge 1021 of portion 1014 overlapped and juxtaposed therewith to form joint 1008. The joints 1006 and 1008 are formed by heating the material and positioning the edges so that the insulative cellular non-aromatic polymeric material is coupled together. In other embodiments, the joints may be formed by applying adhesive to the respective edges. In either approach, pressure may be applied to assist with the joining. In other embodiments, the joints may be formed by forming a slit along one edge and forming a tab along the opposite edge and causing the tab to be inserted into the slit and retained therein.

[00101] In other embodiments, joints 1006 and 1008 may be secured by using a hook and loop fastening system, such as VELCRO®, for example. The insulative cellular non-aromatic polymeric material has sufficient flexibility to allow the insulative sleeve 1013 to be formed as a blank in a flat condition and assembled by a consumer. Similarly, sleeves 213 and 113 may use hook and loop fastening systems in some embodiments, such that the sleeves 213 and 113 can be shipped to a consumer as flat blanks and assembled by a consumer or at a point of sale. It should be understood that

insulative sleeve 1013 may be formed with various surface discontinuities, including those discussed with regard to sleeves 313, 413, 513, 613, and 713 above.

[00102] Another embodiment of an insulative sleeve 1113 in accordance with the present disclosure is shown in Figs. 34 and 35. Insulative sleeve 1113 includes an upright inner tab 1114, an upright outer tab 1112, and an upright fence 1111 extending between inner and outer tabs 1114, 1112 as suggested in Figs. 34 and 35. Upright inner tab 1114 is arranged to extend upwardly from floor 20 of cup 11. Upright outer tab 1112 is arranged to extend upwardly from floor 20 and to mate with upright inner tab 1114 along an interface I therebetween as suggested in Fig. 35. Upright fence 1111 is arranged to interconnect upright inner and outer tabs 1114, 1112 and surround cup-receiving space 1115.

[00103] Upright fence 1111 of insulative sleeve 1113 is C-shaped in a horizontal cross-section and each of upright inner and outer tabs 1114, 1112 has an arcuate shape in a horizontal cross-section. Upright fence 1111 has a first thickness 11T1 and first and second upright tabs 1114, 1112 each have a second thickness 11T2. As suggested in Fig. 34 and shown in Fig. 35, second thickness 11T2 is about equal to first thickness 11T1. As a result, bridge 1114, 1112 formed by overlapping and coupling upright tabs 1114, 1112 has a third thickness 11T3 which about twice first and second thicknesses 11T1, 11T2.

[00104] Another embodiment of an insulative sleeve 1213 in accordance with the present disclosure is shown in Figs. 36-40. Insulative sleeve 1213 includes a sleeve wall 1218 and a sleeve-wall retainer 1220 as shown, for example in Fig. 36. Sleeve wall 1218 includes a first sleeve panel 1218A, a second sleeve panel 1218B spaced-apart from first sleeve panel 1218A, and a connecting web 1218C positioned to lie between and interconnect first and second sleeve panels 1218A, 1218B as shown in Figs. 36 and 38.

[00105] Sleeve-wall retainer 1220 includes an upright tab 1220A, an adhesive layer 1220B, and a release liner 1220C as shown in Fig. 36. Upright tab 1220A is coupled to a free end of first sleeve panel 1218A opposite connecting web 1218C. Adhesive layer 1220B is placed on upright tab 1220A and release liner 1220C is placed on adhesive layer 1220B to locate adhesive layer 1220B between release line 1220C and upright tab 1220 until assembly of insulative sleeve 1213 in the field.

[00106] In example of use, insulative sleeve 1213 may be assembled and coupled to a cup 11 in the field. As shown in Fig. 37, insulative sleeve 1213 is in a dis-assembled state in spaced-apart relation to cup 11. Second sleeve panel 1218B is folded back away from first sleeve panel 1218A about connecting web 1218C to expose sleeve retainer 1220 as suggested in Fig. 38. Release liner 1220C is pulled away from adhesive layer 1220B to expose adhesive layer 1220B as shown in Fig. 39. Upright tab 1220A and adhesive 1220B are arranged to overlap a free end of second sleeve panel 1218B to for insulative sleeve 1213 as shown in Fig. 40. Cup 11 is inserted into and coupled to insulative sleeve 1213 as suggested in Fig. 40. As an example, insulative sleeve 1213 may be coupled to cup 11 by friction interference or any other suitable method.

[00107] The insulative cellular non-aromatic polymeric material used to produce the insulative sleeves 213 and 113 and the variants of those sleeves is somewhat flexible and capable of expanding slightly under load to allow a properly sized sleeve to grip a vessel with some level of bias.

[00108] It is within the scope of the present disclosure to form insulative sleeves 813, 913, 1013, 1113, and 1213 with various patterns, including those discussed with regard to sleeves 313, 413, 513, 613, and 713 above. The various patterns may be formed by forming localized areas of plastic deformation in each insulative sleeve. An example, the patterns may be formed by compression portions of the sleeve such that the pattern is made from uncompressed portions. As another example, the patterns may be formed by compressing portions of the sleeve such that the pattern is made from the compressed portions. In still yet another example, the patterns may be formed by deforming portions of the sleeve so that thicknesses throughout the sleeve are maximized. In yet another example, combinations of deformation and compression may be used.

[00109] The insulative sleeve as described hereinabove provides the cup with strength and insulation. A feature of the thermoformed cup with an insulative sleeve of the present disclosure is that the thermoformed cup is seamless, yet the insulating sleeve provides desired strength, insulation, and a printable surface. The thermoformed cup has a brim without a seam, thereby providing a lid seal which reduces potential leakage compared to expanded polystyrene cups (which have seams). Another feature of the thermoformed cup and insulative sleeve of the present disclosure is that the desired

strength and insulation levels are attained, but the cup side walls have a desirable level of puncture resistance. The present disclosure also provides for an insulative sleeve which can be provided separate from the cup.

[00110] The insulative sleeve made of insulative cellular non-aromatic polymeric material as described in the present disclosure can also be used or adapted for use with structures other than containers. As an example, the insulative cellular non-aromatic polymeric material may be used as, but not limited to, a window sill seal, pipe wrap, or other applications where a low density, light weight, thin, material with good insulation is desired.

[00111] In an alternative exemplary embodiment, the cup, base, or body may be made of a material other than a thermoformed material. As an example, the cup, base, or body may be made of an injection molded material or any other suitable alternative.

I/WE CLAIM:

1. An insulative sleeve for surrounding and embracing an exterior surface of a hot-beverage drink cup to provide a grippable low-temperature thermal barrier that can be gripped by a consumer, the sleeve comprising:

a sheet comprising insulative cellular non-aromatic polymeric material having localized plastic deformation in the sheet and providing a plastically deformed first material segment having a first density located in a first portion of the sheet and a second material segment having a second density lower than the first density located in an adjacent second portion of the sheet, wherein the sheet has no fractures in the insulative cellular non-aromatic polymeric material so that a predetermined insulative characteristic is maintained in the sheet.

2. The insulative sleeve of claim 1, wherein the sheet is arranged to surround a vertical central axis and the sheet includes an upright inner tab arranged to extend upwardly along and in spaced-apart relation to the vertical central axis and configured to provide the first material segment having the first density, an upright outer tab arranged to extend upwardly along and in spaced-apart relation to the vertical central axis and to mate with the upright inner tab along an interface therebetween, and an upright fence arranged to interconnect the upright inner and outer tabs and surround the vertical central axis and configured to provide the second material segment having the second density and cooperate with the upright inner and outer tabs to form the sleeve-shaped side wall.

3. The insulative sleeve of claim 2, wherein the fence has a substantially frustoconical shape and each of the upright inner and outer tabs has an arcuate shape.

4. The insulative sleeve of claim 2, wherein the upright inner tab includes an inner surface providing means for mating with a hot-beverage drink cup and an outer surface facing toward the upright outer tab, the upright outer tab includes an inner surface mating with the outer surface of the upright inner tab to define the interface between the upright inner and outer tabs, and the upright outer tab further includes an outer face facing away from the upright inner tab.

5. The insulative sleeve of claim 4, wherein each of the inner and outer surfaces of the upright inner and outer tabs has an arcuate shape in a horizontal cross-section and subtends an acute angle of less than 20°.

6. The insulative sleeve of claim 2, wherein the upright fence is C-shaped in a horizontal cross-section and each of the upright inner and outer tabs has an arcuate shape in a horizontal cross-section.

7. The insulative sleeve of claim 2, wherein the upright fence includes an upright left side edge and an upright right side edge arranged to lie in spaced-apart confronting relation to the upright left side edge and the upright outer tab is configured to have the first density and mate with the upright inner tab to establish a bridge arranged to interconnect the upright left and right side edges of the upright fence and formed of plastically deformed material having the first density.

8. The insulative sleeve of claim 7, wherein the upright fence has an inner surface facing toward the vertical central axis and providing means for mating with a hot-beverage drink cup and an outer surface facing away from the central vertical axis from the interior region and surrounding the inner surface of the upright fence and cooperating with the inner surface of the upright fence to define a first thickness therebetween, the upright inner tab includes an inner surface facing toward the vertical central axis and providing means for mating with the hot-beverage drink cup and an outer surface facing toward the upright outer tab, the upright outer tab includes an inner surface facing toward the vertical central axis and mating with the outer surface of the upright inner tab to define the interface between the upright inner and outer tabs, and the upright outer tab further includes an outer face facing away from the upright inner tab, the inner and outer surfaces of the upright inner tab cooperate to define a second thickness therebetween that is about half of the first thickness, and the inner and outer surfaces of the upright outer tab cooperate to define a third thickness that is about half of the first thickness.

9. The insulative sleeve of claim 1, wherein the first material segment in the sheet of insulative cellular non-aromatic polymeric material has a relatively thin first thickness and the second material segment in the sheet of insulative cellular non-aromatic polymeric material has a relatively thicker second thickness.

10. The insulative sleeve of claim 9, further comprising a cellular non-aromatic skin comprising a biaxially oriented polypropylene film adhered to the insulative cellular non-aromatic polymeric material.

11. The insulative sleeve of claim 1, further comprising a graphics skin coupled to an exterior surface of the insulative cellular non-aromatic polymeric material and configured to include a film, an adhesive interposed between the film and the exterior surface, and an ink printed on the film to provide a graphics design.
12. The insulative sleeve of claim 11, wherein the film is biaxially oriented polypropylene.
13. The insulative sleeve of claim 1, wherein the insulative cellular non-aromatic polymeric material comprises a polypropylene base resin having a high melt strength, a polypropylene copolymer resin, at least one nucleation agent, and gas means for expanding the resins to reduce density.
14. The insulative sleeve of claim 13, wherein the gas means comprises carbon dioxide.
15. The insulative sleeve of claim 13, wherein the polypropylene base resin comprises broadly distributed molecular weight polypropylene having a distribution that is unimodal.
16. The insulative sleeve of claim 13, wherein the polypropylene base resin further includes a polypropylene homopolymer resin.
17. The insulative sleeve of claim 1, wherein the insulative cellular non-aromatic polymeric materials comprises a polypropylene base resin having a high melt strength, a polypropylene homopolymer resin, at least one nucleation agent, and gas means for expanding the resins to reduce density.
18. The insulative sleeve of claim 17, wherein the gas means comprises carbon dioxide.
19. The insulative sleeve of claim 17, wherein the polypropylene base resin comprises a broadly distributed molecular weight polypropylene having a distribution that is unimodal.
20. The insulative sleeve of claim 1, wherein the insulative cellular non-aromatic polymeric material comprises a broadly distributed molecular weight polypropylene having a distribution that is unimodal.

21. The insulative sleeve of claim 1, wherein the first density is about 0.350 g/cm^3 and the second density is about 0.175 g/cm^3 .
22. The insulative sleeve of claim 1, wherein the insulative cellular non-aromatic polymeric material is formed to include cells filled with gas and each cell is bounded by a cell wall provided in the insulative cellular non-aromatic polymeric material and configured to be inelastically deformable during exposure to localized plastic deformation.
23. The insulative sleeve of claim 1, wherein the insulative cellular non-aromatic polymeric material comprises a high melt strength polypropylene having long-chain branching to provide a predetermined balance of processability and high melt elasticity.
24. The insulative sleeve of claim 1, wherein the sheet is formed to include air-gap means for separating portions of the sheet from the exterior surface of the cup to cause an outer surface of the insulative sleeve to be spaced apart from the exterior surface of the cup.
25. The insulative sleeve of claim 24, wherein the air-gap means comprises a pattern formed on the portion of the sheet that engages the exterior surface of the cup.
26. The insulative sleeve of claim 25, wherein the pattern formed comprises a plurality of ribs.
27. The insulative sleeve of claim 26, wherein the ribs are generally horizontal when the sleeve embraces the cup.
28. The insulative sleeve of claim 26, wherein the ribs are generally vertical when the sleeve embraces the cup.
29. The insulative sleeve of claim 26, wherein the sheet includes an inner surface arranged to face the exterior surface of the cup and an opposite outer surface arranged to face away from the exterior surface of the cup and the plurality of ribs are appended to the inner surface to extend from the inner surface of the insulative sleeve to the exterior surface of the cup to engage the exterior surface of the cup and define an air gap between the exterior surface of the cup, the inner surface of the insulative sleeve and two neighboring ribs.

30. The insulative sleeve of claim 25, wherein the pattern formed comprises a plurality of nubs.
31. The insulative sleeve of claim 30, wherein the nubs are arranged in rows.
32. The insulative sleeve of claim 31, wherein the rows are generally horizontal when the sleeve embraces the cup.
33. The insulative sleeve of claim 25, wherein the pattern is formed by compressing portions of the sheet to cause plastic deformation of localized areas of the sheet to increase the density of the sheet in the localized areas of plastic deformation.
34. The insulative sleeve of claim 33, wherein areas of the sheet that are not deformed maintain a first density, lower than the density of the sheet in the localized areas of plastic deformation, the areas of the first density defining the pattern.
35. The insulative sleeve of claim 34, wherein the pattern formed comprises a plurality of ribs.
36. The insulative sleeve of claim 35, wherein the ribs are generally horizontal when the sleeve embraces the cup.
37. The insulative sleeve of claim 35, wherein the ribs are generally vertical when the sleeve embraces the cup.
38. The insulative sleeve of claim 35, wherein the ribs are helical when the sleeve embraces the cup.
39. The insulative sleeve of claim 34, wherein the pattern formed comprises a plurality of nubs.
40. The insulative sleeve of claim 39, wherein the nubs are arranged in rows.
41. The insulative sleeve of claim 40, wherein the rows are generally horizontal when the sleeve embraces the beverage container.

42. The insulative sleeve of claim 25, wherein the pattern is formed by compressing portions of the sheet to induce plastic deformation of localized areas of the sheet to reduce the thickness of the sheet in the localized areas of plastic deformation with areas that are not deformed having a thickness greater than the reduced thickness.
43. The insulative sleeve of claim 42, wherein the areas that are not deformed define features of the pattern.
44. The insulative sleeve of claim 43, wherein the pattern formed comprises a plurality of ribs.
45. The insulative sleeve of claim 44, wherein the ribs are generally horizontal when the sleeve embraces the cup.
46. The insulative sleeve of claim 44, wherein the ribs are generally vertical when the sleeve embraces the cup.
47. The insulative sleeve of claim 44, wherein the ribs are helical when the sleeve embraces the cup.
48. The insulative sleeve of claim 42, wherein the pattern formed comprises a plurality of nubs.
49. The insulative sleeve of claim 39, wherein the nubs are arranged in rows.
50. The insulative sleeve of claim 40, wherein the rows are generally horizontal when the sleeve embraces the cup.
51. The insulative sleeve of claim 1, wherein the sleeve includes a sleeve wall, a floor platform, and retainer means for securing the floor platform to the sleeve wall to define a cup-receiving space so that the floor platform of the insulative sleeve supports at least a portion of the cup when the insulative sleeve embraces the cup.
52. The insulative sleeve of claim 51, wherein the retainer means comprises a single floor-retention tab.

53. The insulative sleeve of claim 52, wherein the floor retention tab, floor platform, and sleeve wall are formed in a monolithic sheet of insulative cellular non-aromatic polymeric material.
54. The insulative sleeve of claim 53, wherein the floor platform and sleeve wall are coupled together along a fold line.
55. The insulative sleeve of claim 54, wherein the fold line is formed by compressing the sheet of insulative cellular non-aromatic polymeric material to form an area of localized plastic deformation.
56. The insulative sleeve of claim 55, wherein the area of localized plastic deformation has a density that is greater than the density of the remainder of the sheet of insulative cellular non-aromatic polymeric material.
57. The insulative sleeve of claim 56, wherein the insulative sleeve includes a pattern formed on a portion of the sheet that engages the exterior surface of the cup.
58. The insulative sleeve of claim 57, wherein the pattern formed comprises a plurality of ribs.
59. The insulative sleeve of claim 58, wherein the ribs are generally horizontal when the sleeve embraces the cup.
60. The insulative sleeve of claim 58, wherein the ribs are generally vertical when the sleeve embraces the cup.
61. The insulative sleeve of claim 58, wherein the ribs are helical when the sleeve embraces the cup.
62. The insulative sleeve of claim 57, wherein the pattern formed comprises a plurality of nubs.
63. The insulative sleeve of claim 62, wherein the nubs are arranged in rows.

64. The insulative sleeve of claim 63, wherein the rows are generally horizontal when the sleeve embraces the cup.
65. The insulative sleeve of claim 57, wherein the pattern is formed by compressing portions of the sheet to form localized areas of plastic deformation in the sheet to increase the density of the sheet in the localized areas of plastic deformation.
66. The insulative sleeve of claim 65, wherein areas of the sheet that are not deformed maintain a first density, lower than the density of the sheet in the localized areas of plastic deformation, the areas of first density defining the pattern.
67. The insulative sleeve of claim 51, wherein the retainer means comprises a plurality of floor-retention tabs.
68. The insulative sleeve of claim 67, wherein the floor retention tabs and floor platform are formed in a monolithic sheet of insulative cellular non-aromatic polymeric material.
69. The insulative sleeve of claim 68, wherein the insulative sleeve includes a pattern formed on a portion of the sheet that engages the exterior surface of the beverage container.
70. The insulative sleeve of claim 69, wherein the pattern formed comprises a plurality of ribs.
71. The insulative sleeve of claim 70, wherein the ribs are generally horizontal when the sleeve embraces the cup.
72. The insulative sleeve of claim 70, wherein the ribs are generally vertical when the sleeve embraces the cup.
73. The insulative sleeve of claim 70, wherein the ribs are helical when the sleeve embraces the cup.
74. The insulative sleeve of claim 69, wherein the pattern formed comprises a plurality of nubs.
75. The insulative sleeve of claim 74, wherein the nubs are arranged in rows.

76. The insulative sleeve of claim 75, wherein the rows are generally horizontal when the sleeve embraces the beverage container.

Berry Plastics Corporation
By the Attorneys for the Applicant
SPRUSON & FERGUSON

A handwritten signature in black ink, consisting of a stylized, cursive script that appears to be the initials 'SF' followed by a long horizontal stroke.

Per:

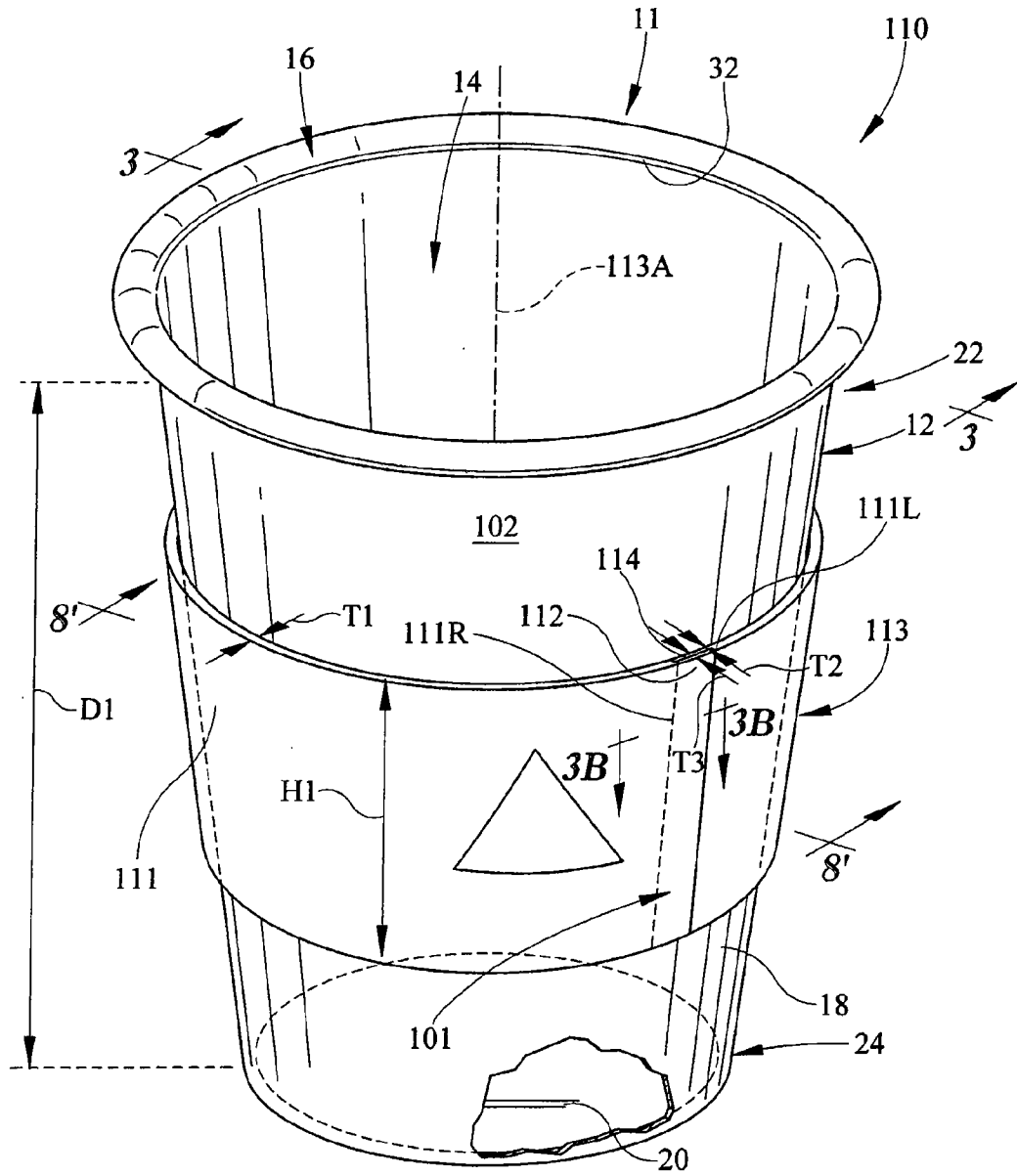


FIG. 1

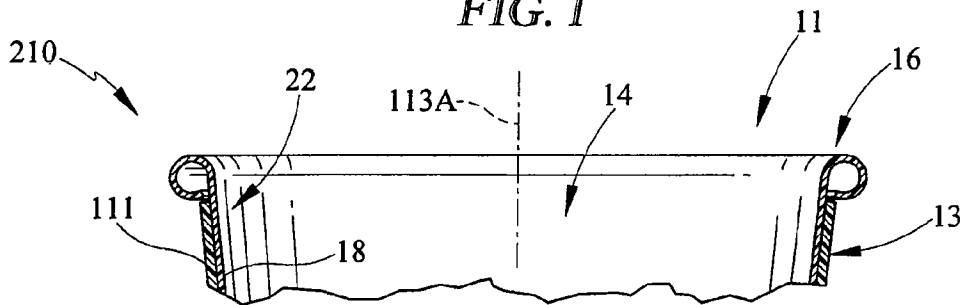


FIG. 2

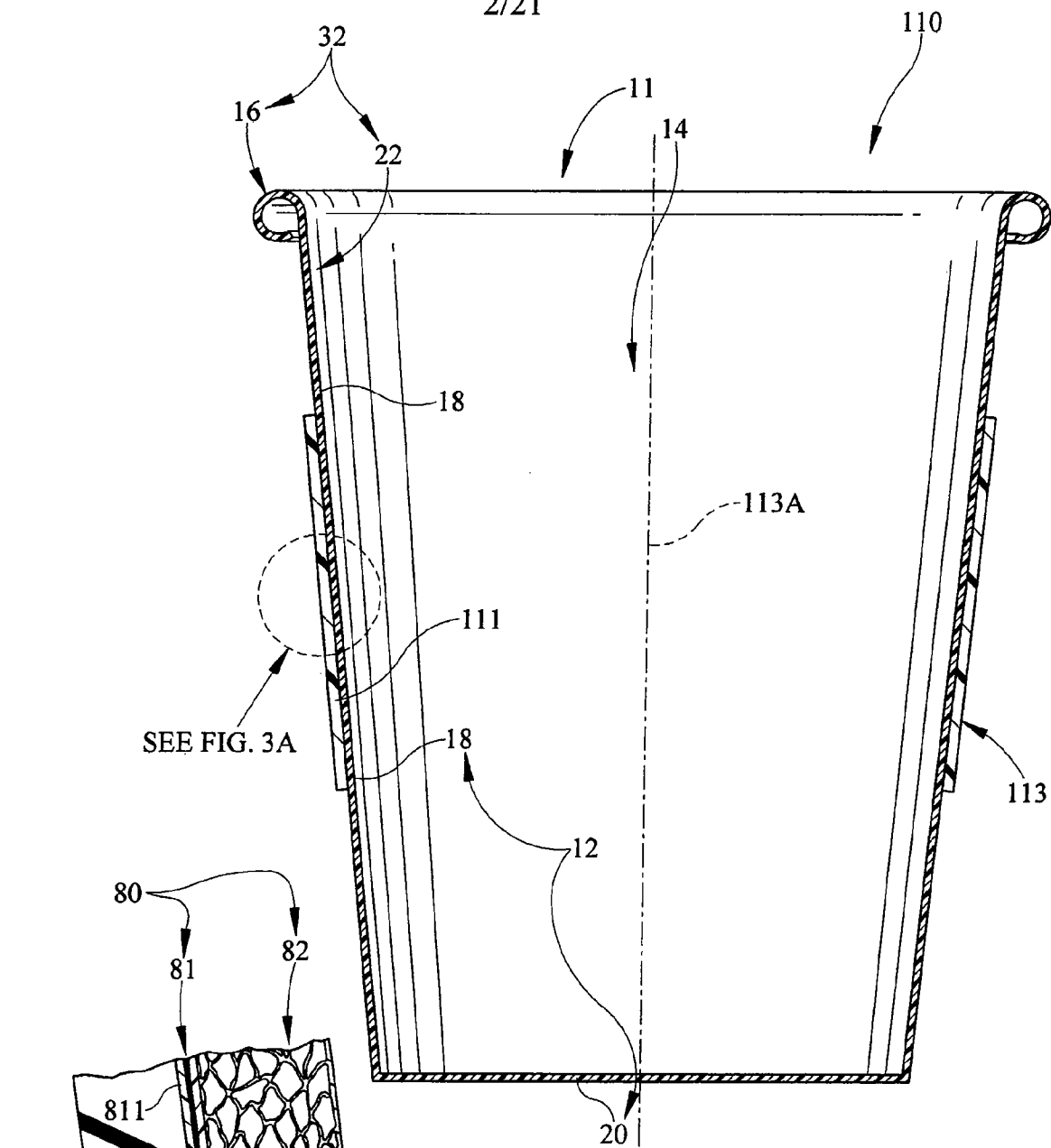


FIG. 3

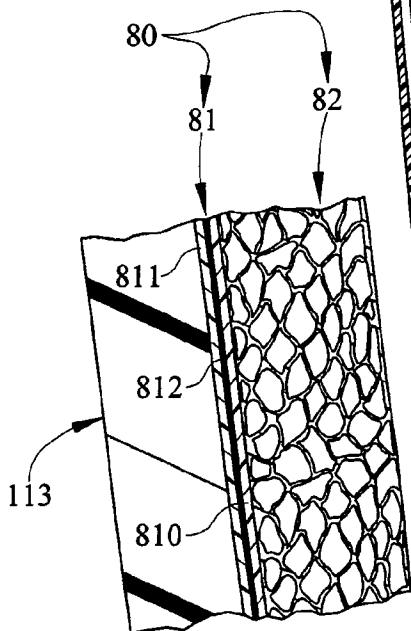


FIG. 3A

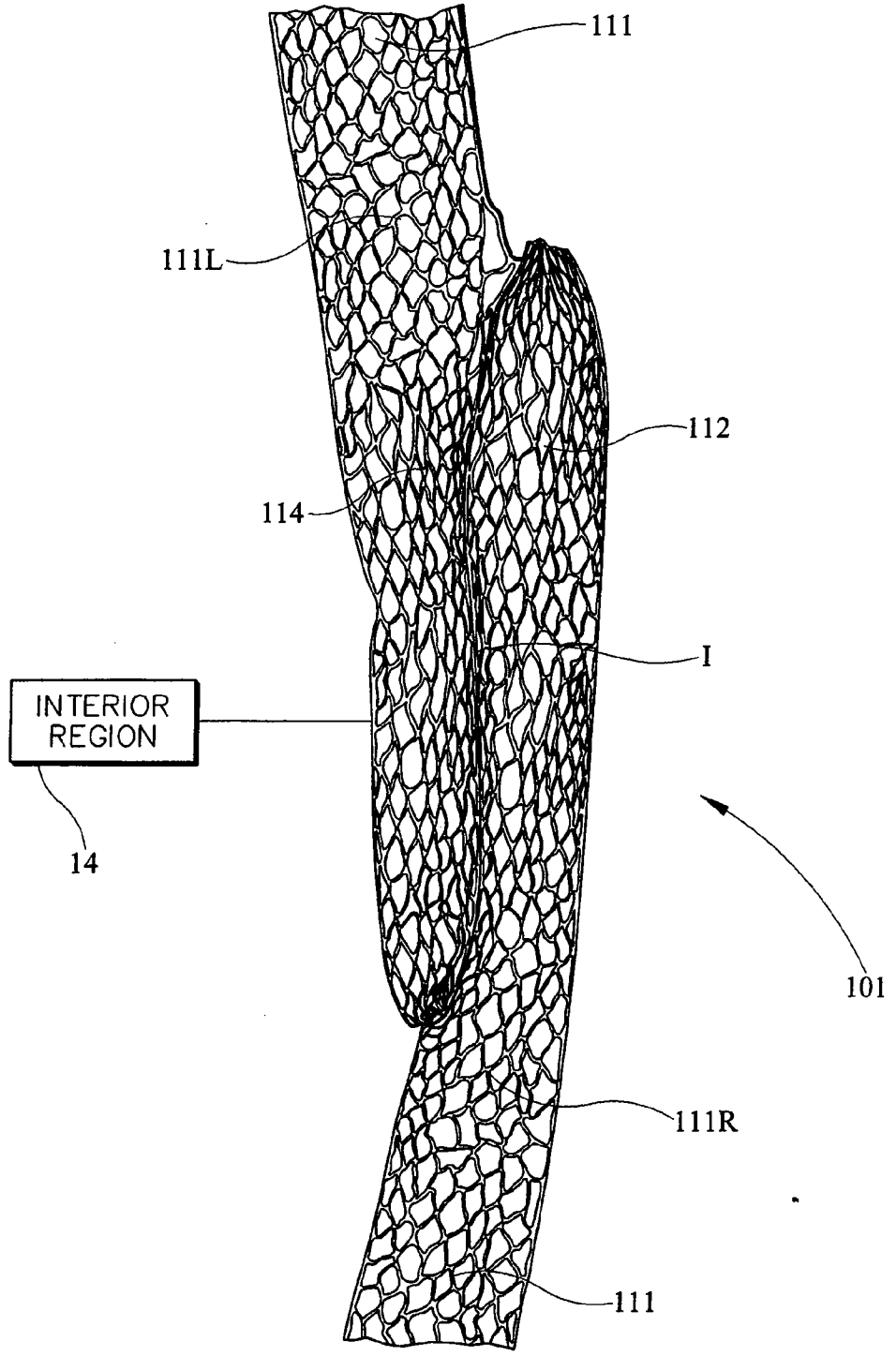


FIG. 3B

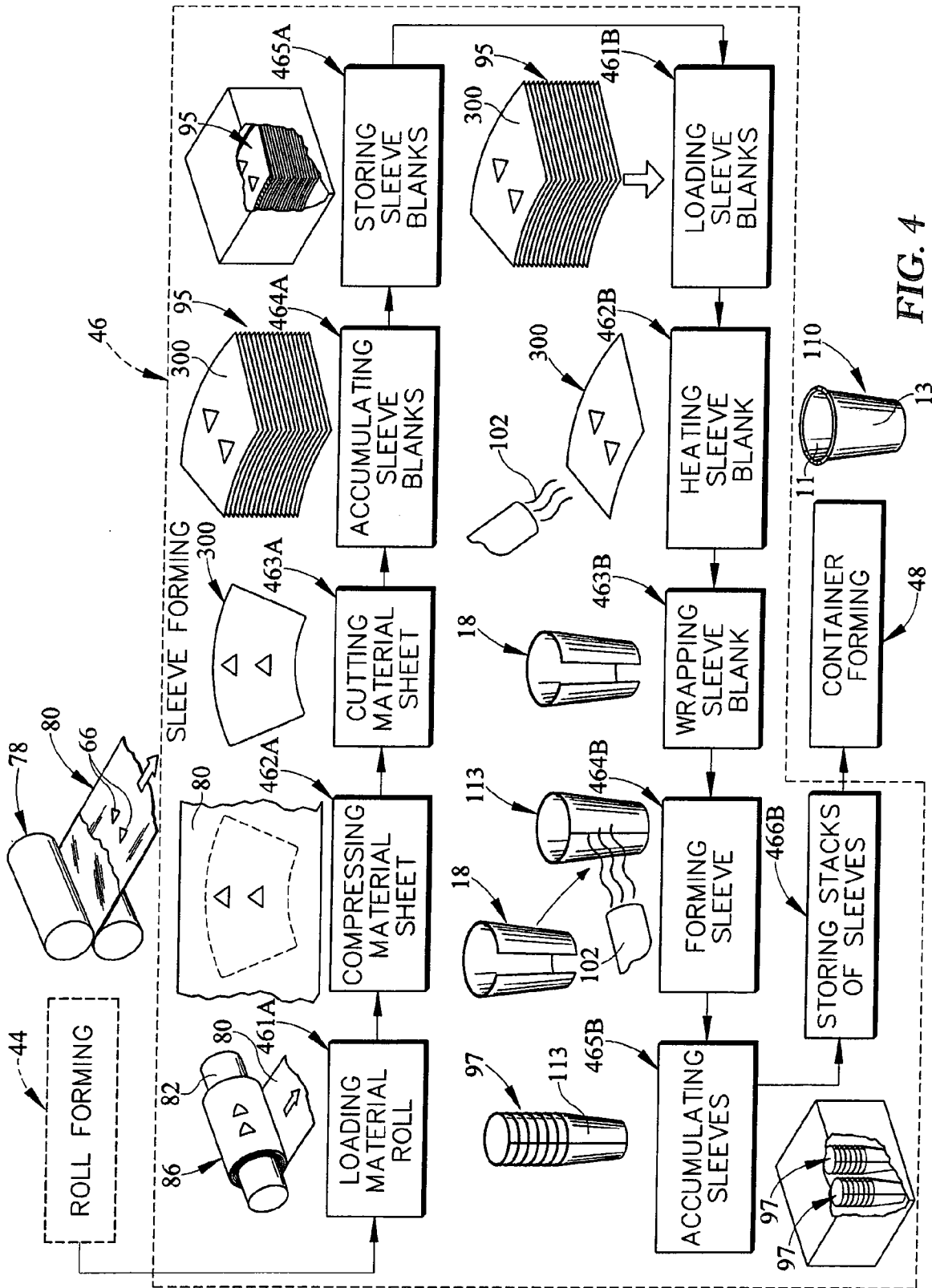


FIG. 4

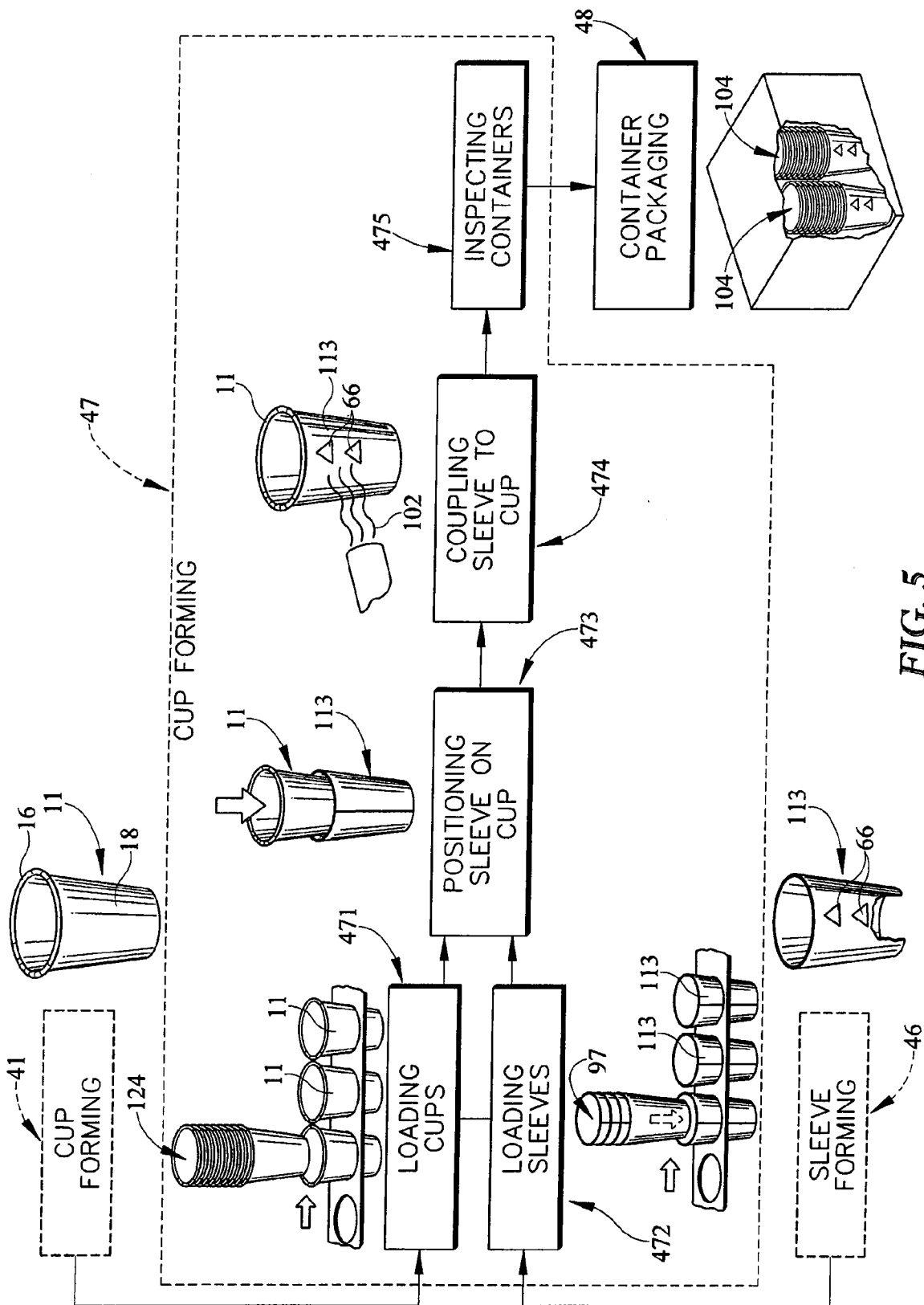


FIG. 5

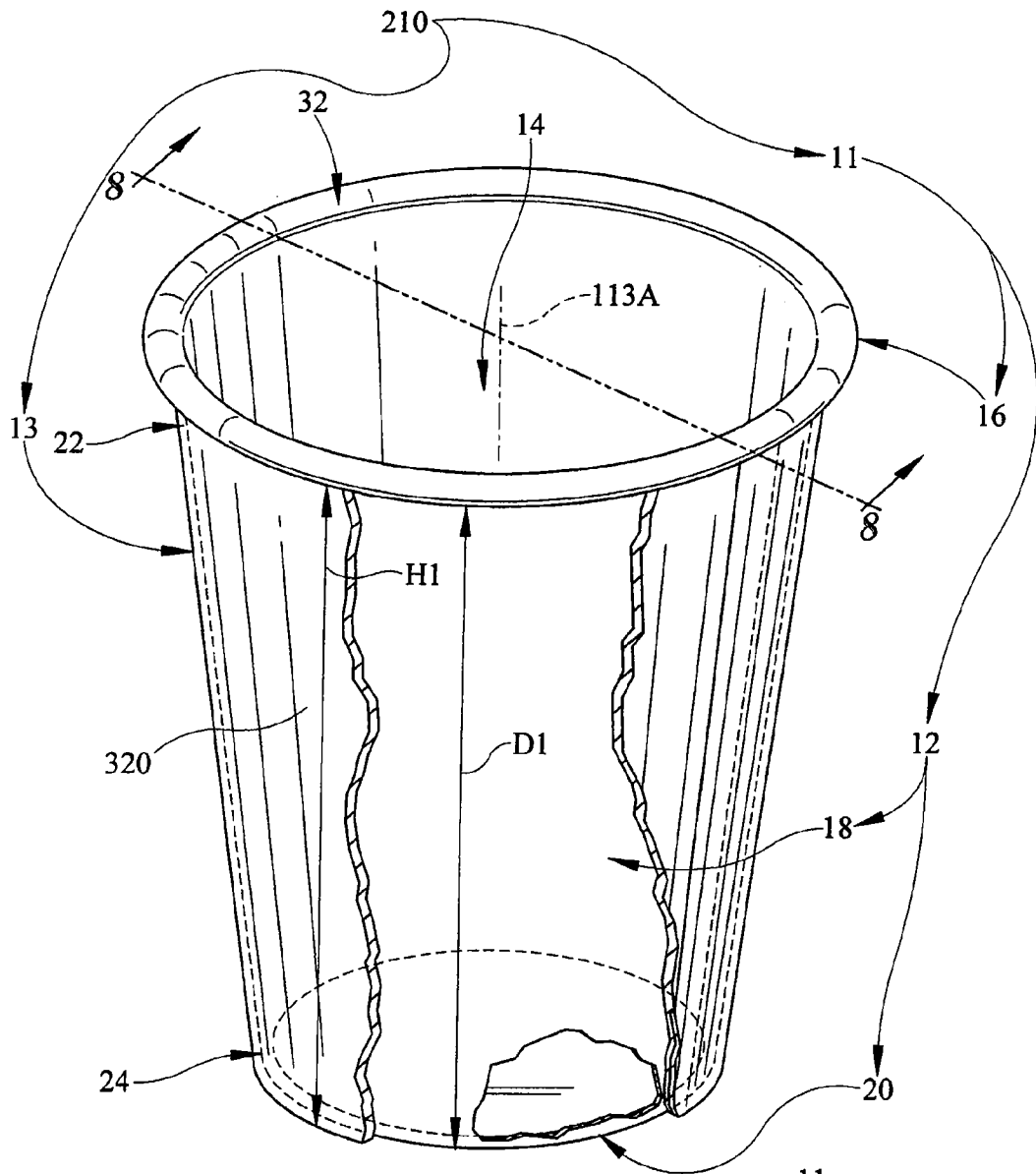


FIG. 6

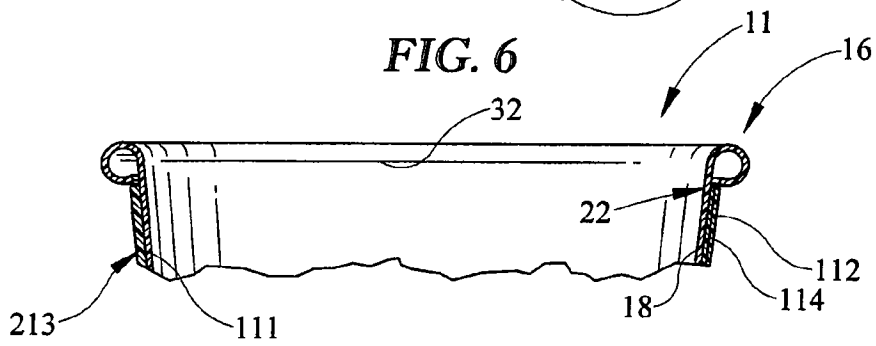


FIG. 7

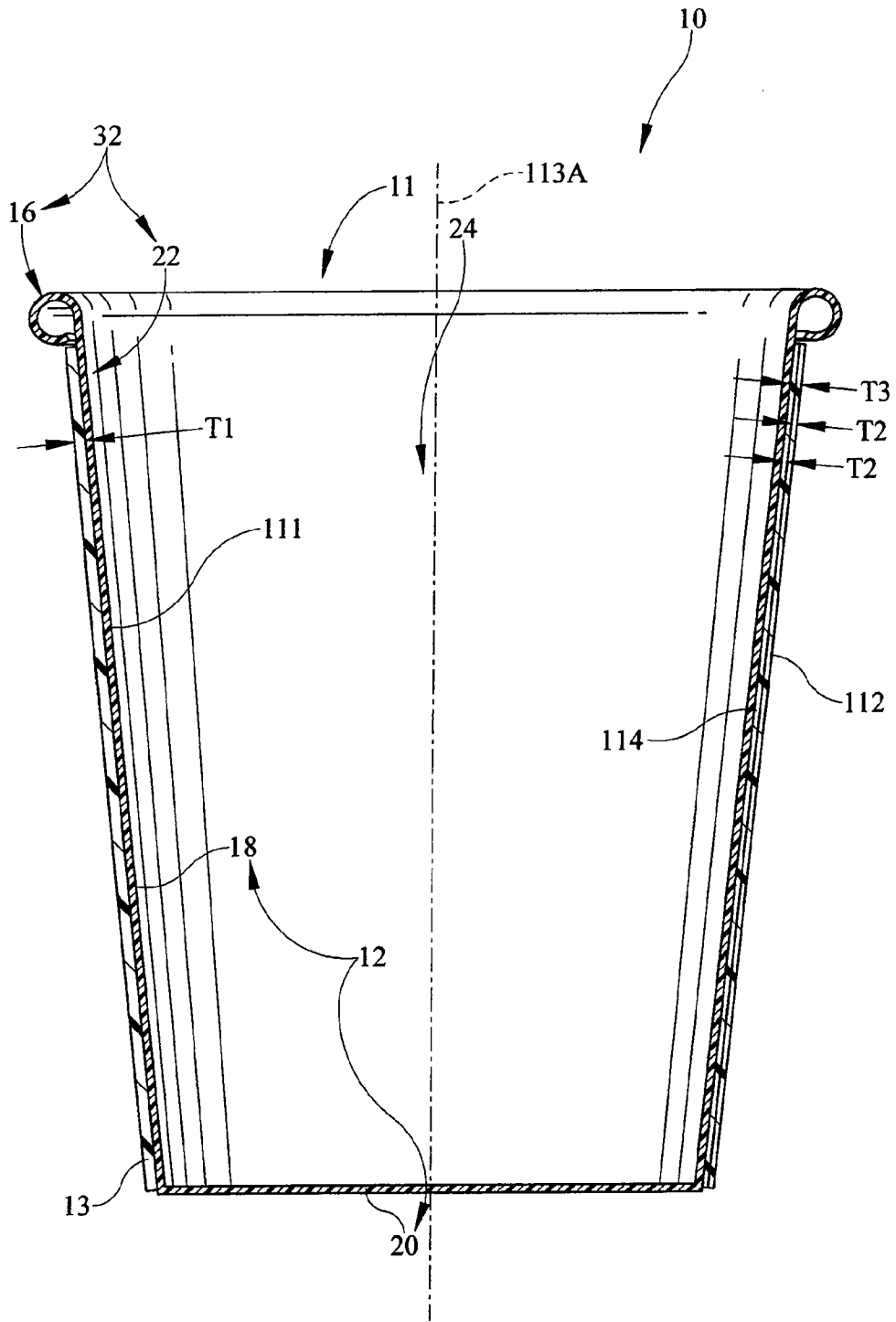


FIG. 8

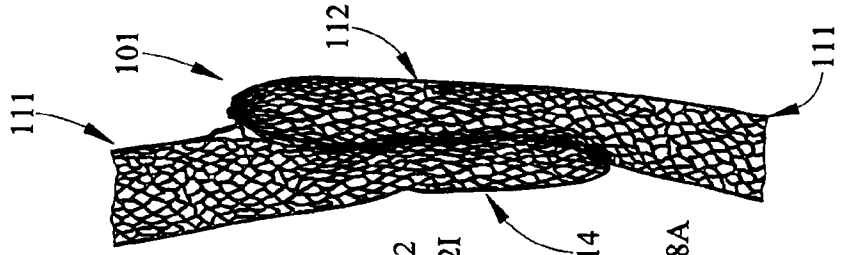


FIG. 8A

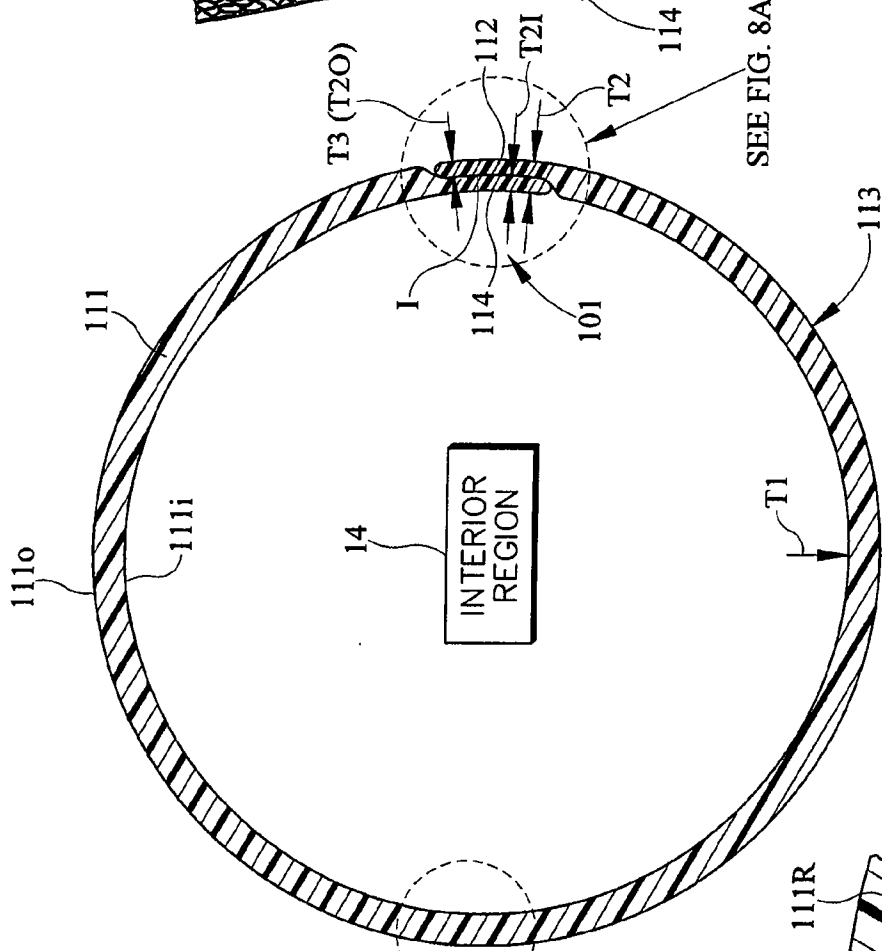


FIG. 8'

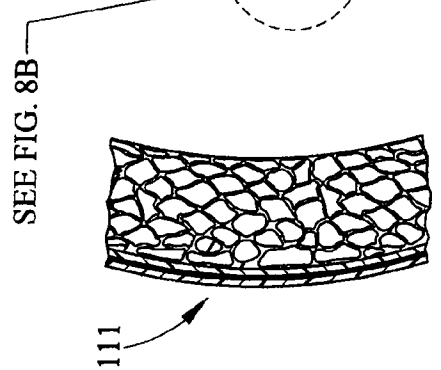


FIG. 8B

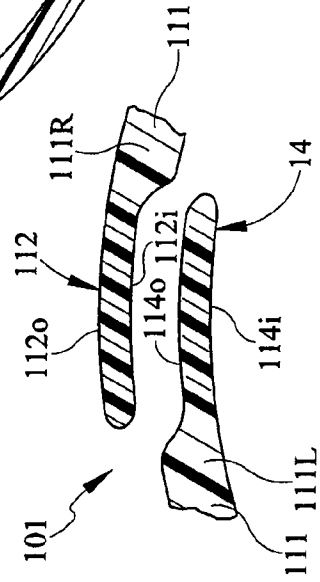


FIG. 8C

SEE FIG. 8B

SEE FIG. 8A

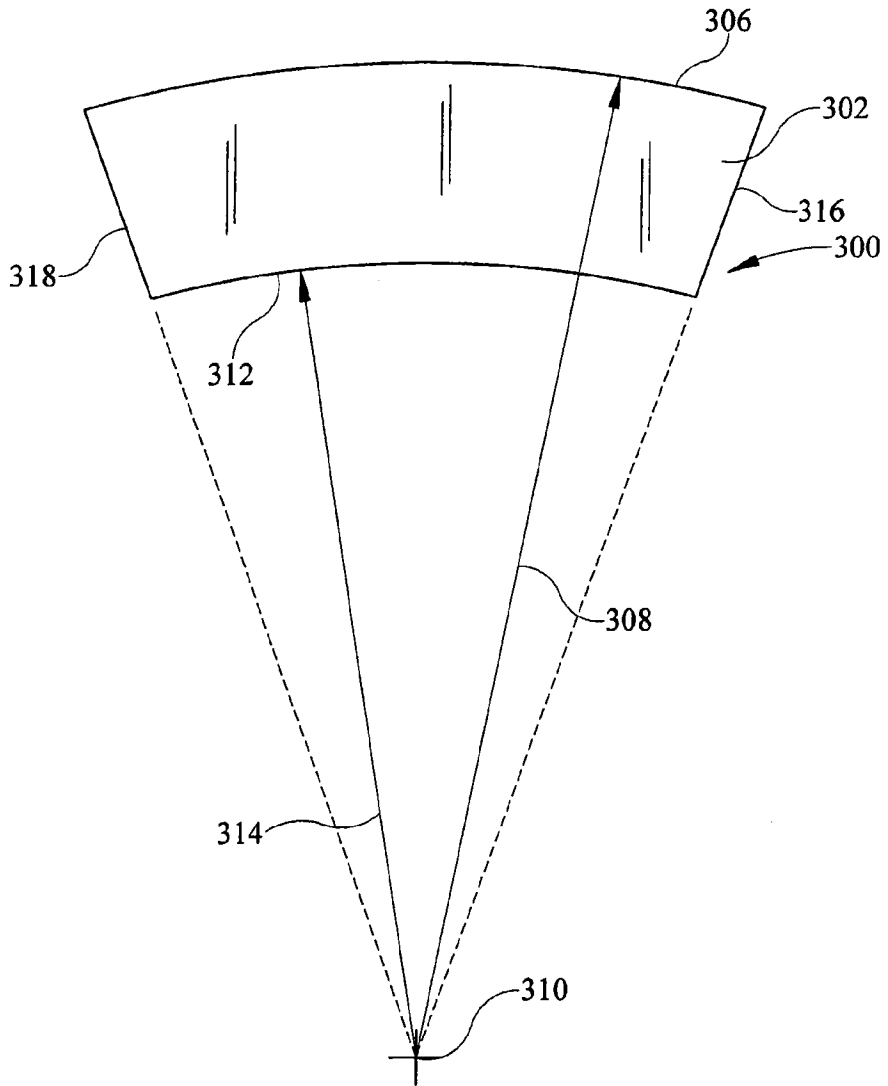


FIG. 9

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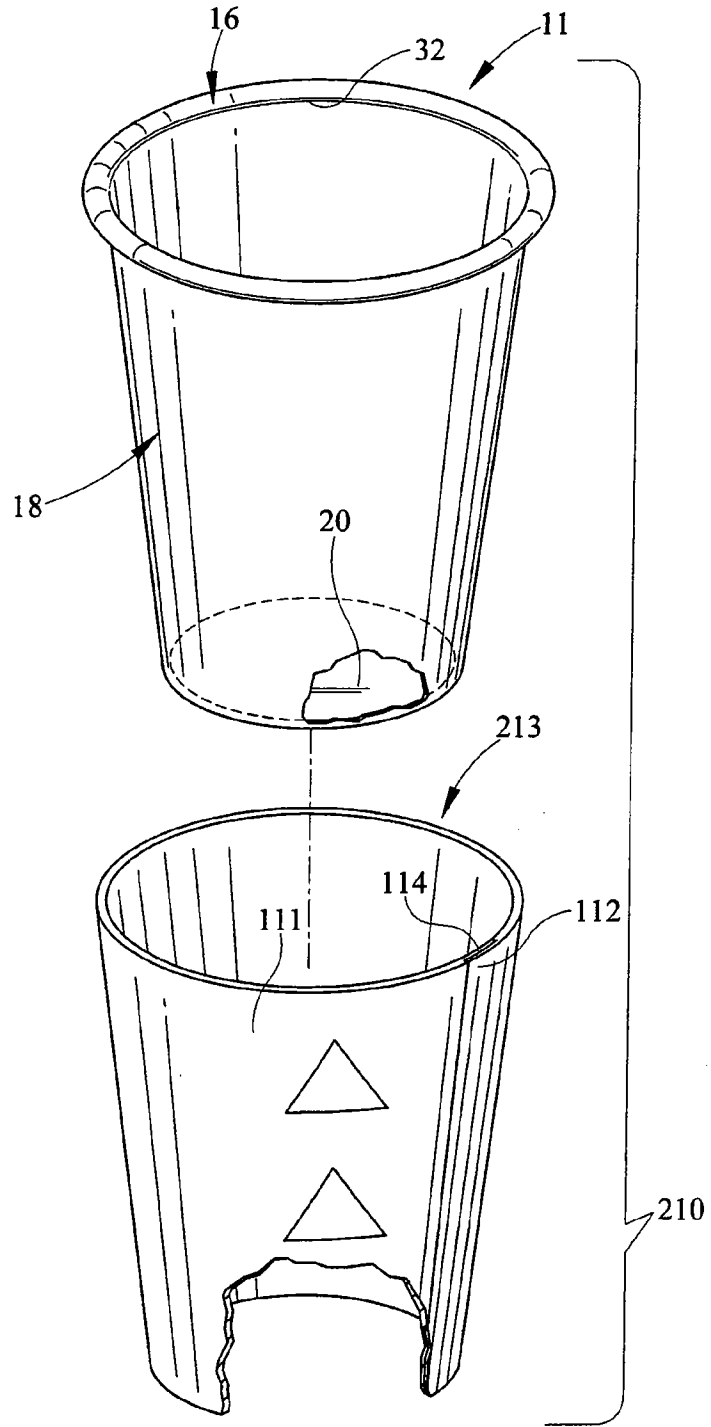


FIG. 10

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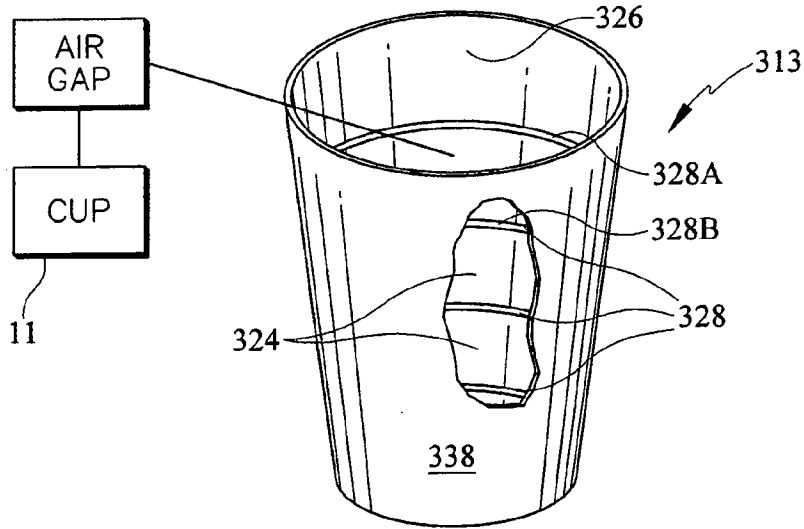


FIG. 11

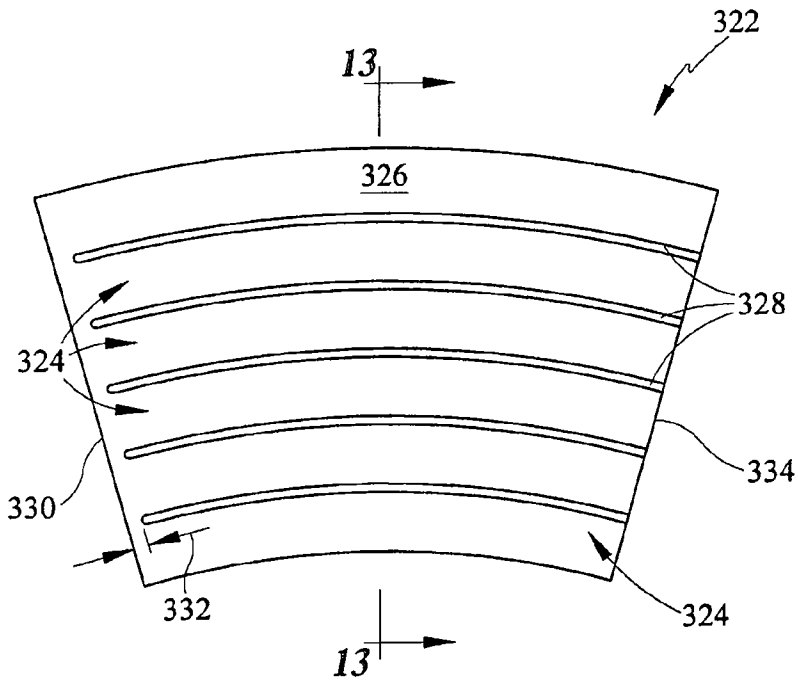


FIG. 12

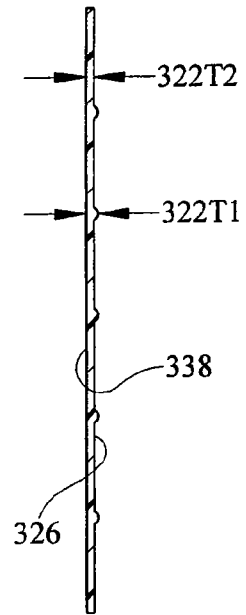


FIG. 13

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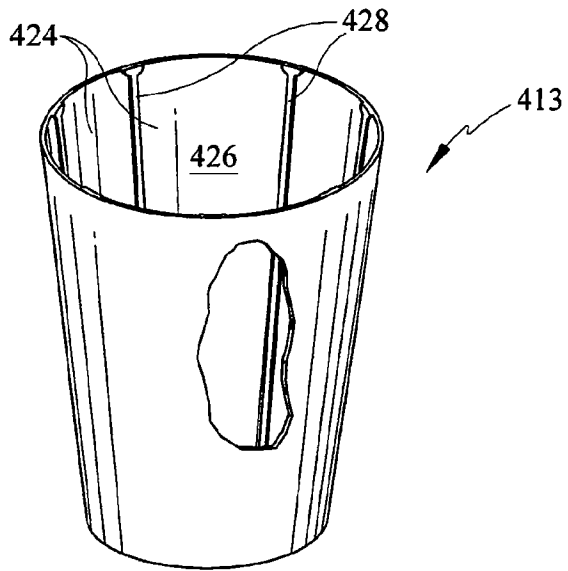


FIG. 14

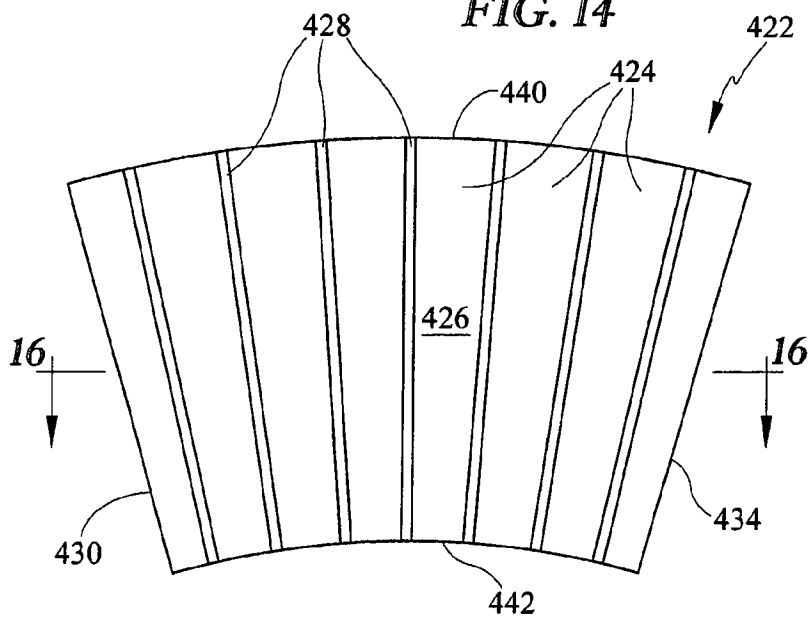


FIG. 15

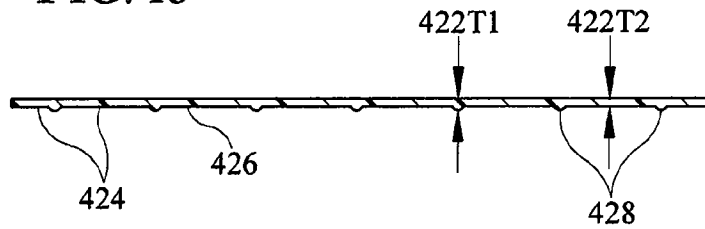


FIG. 16

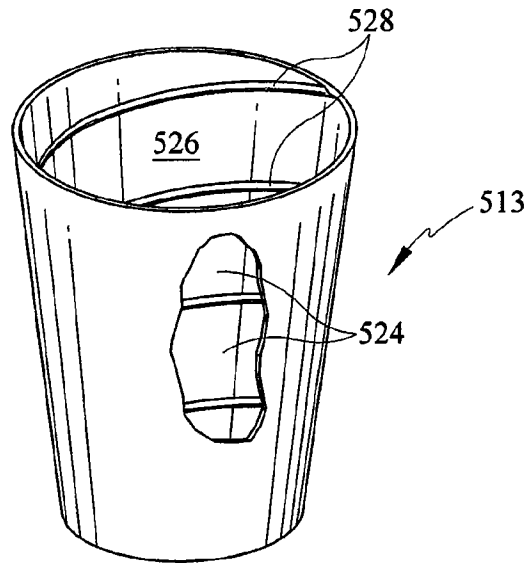


FIG. 17

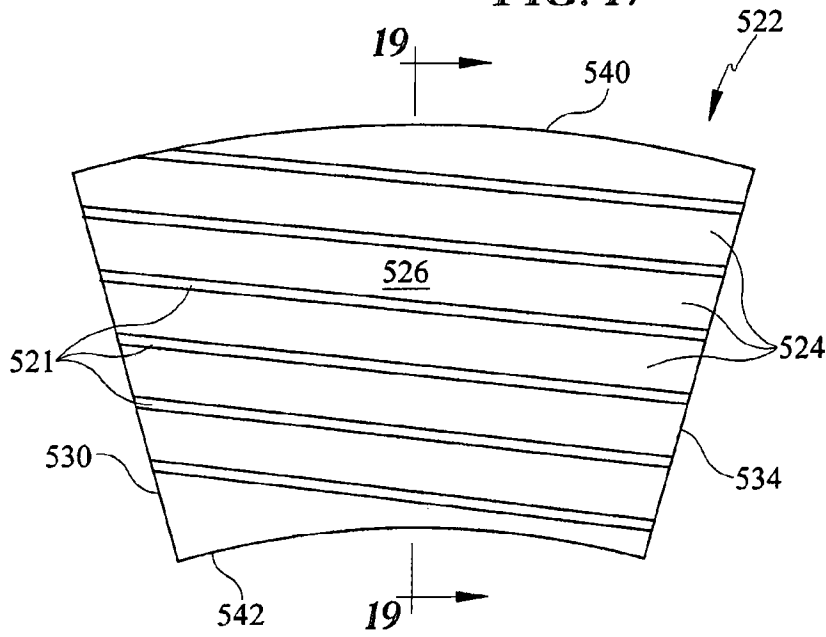


FIG. 18

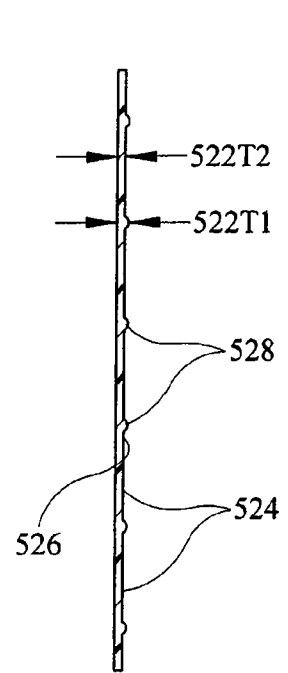


FIG. 19

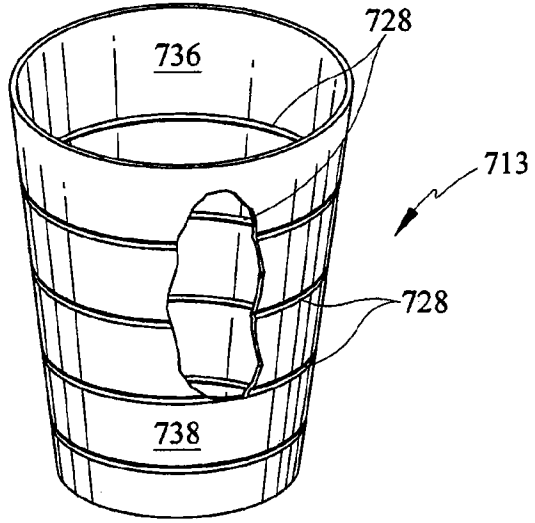


FIG. 23

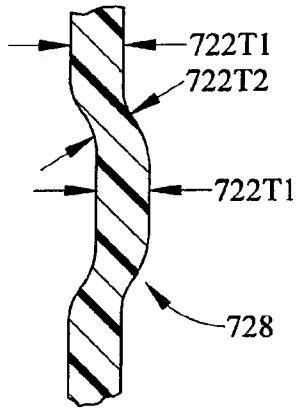


FIG. 26

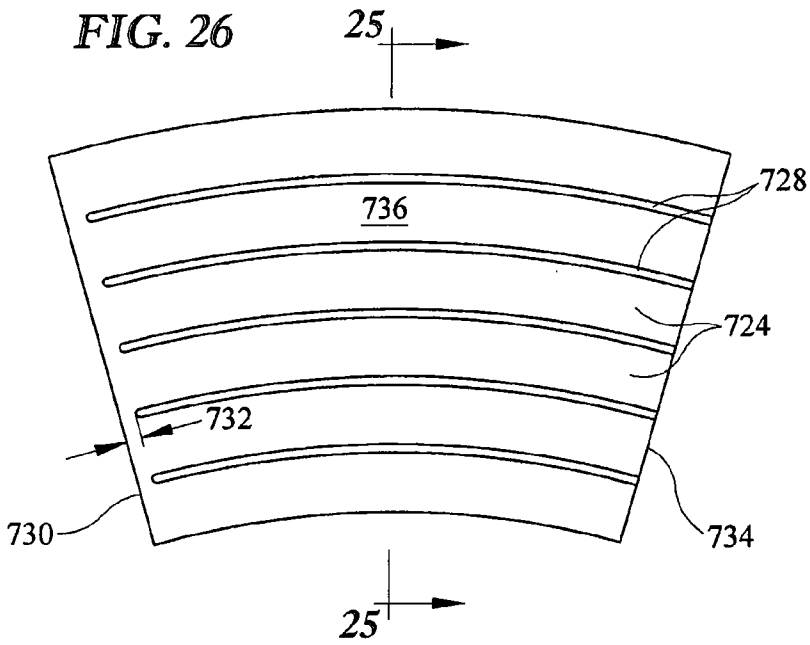


FIG. 24

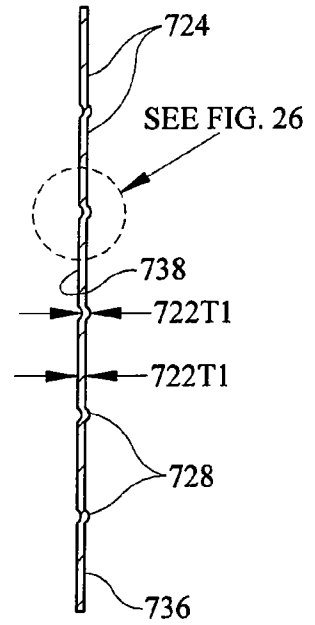


FIG. 25

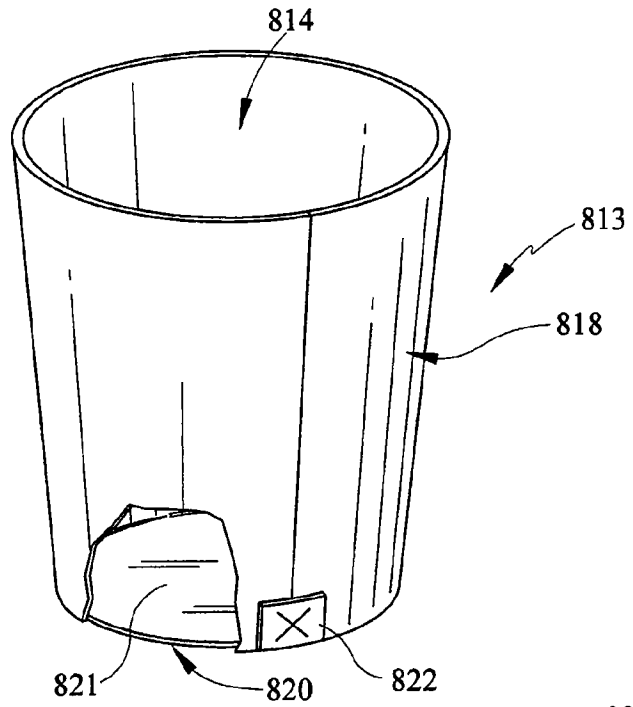


FIG. 27

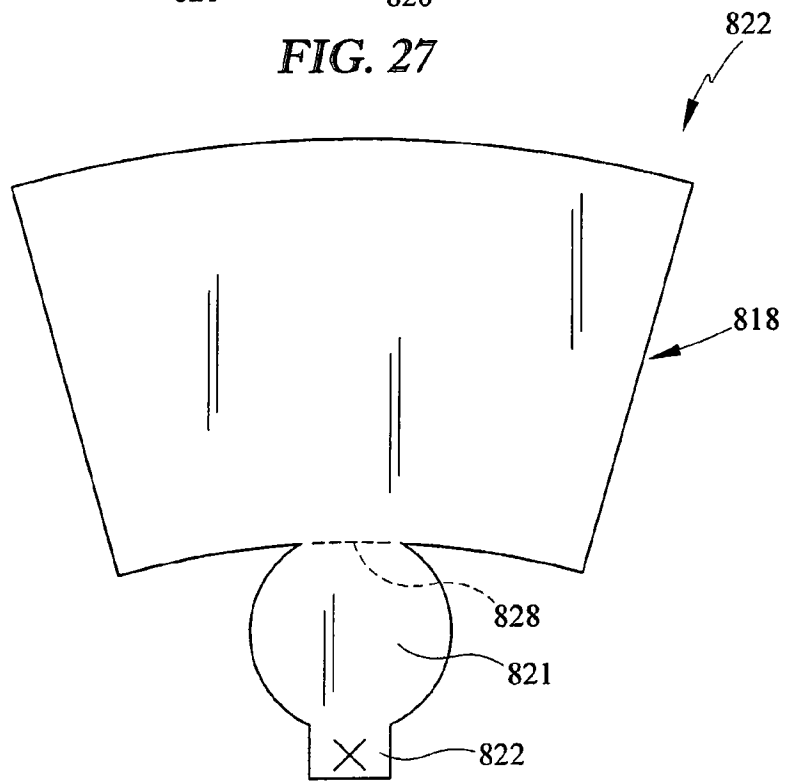


FIG. 28

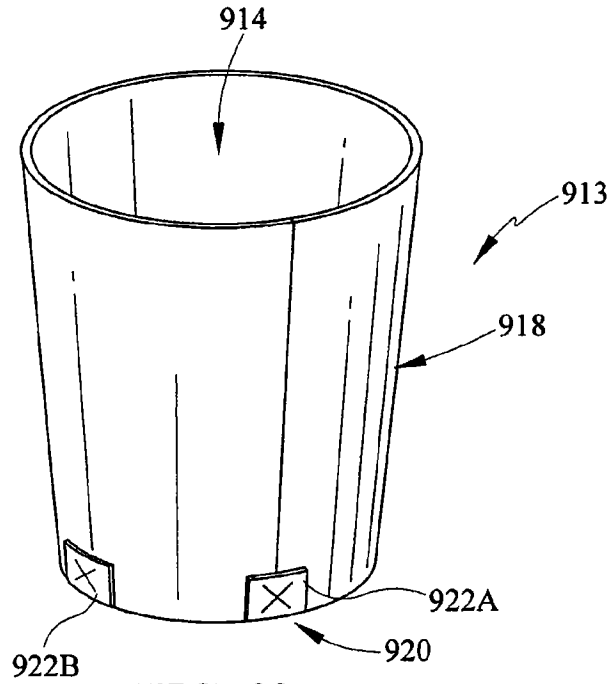


FIG. 29

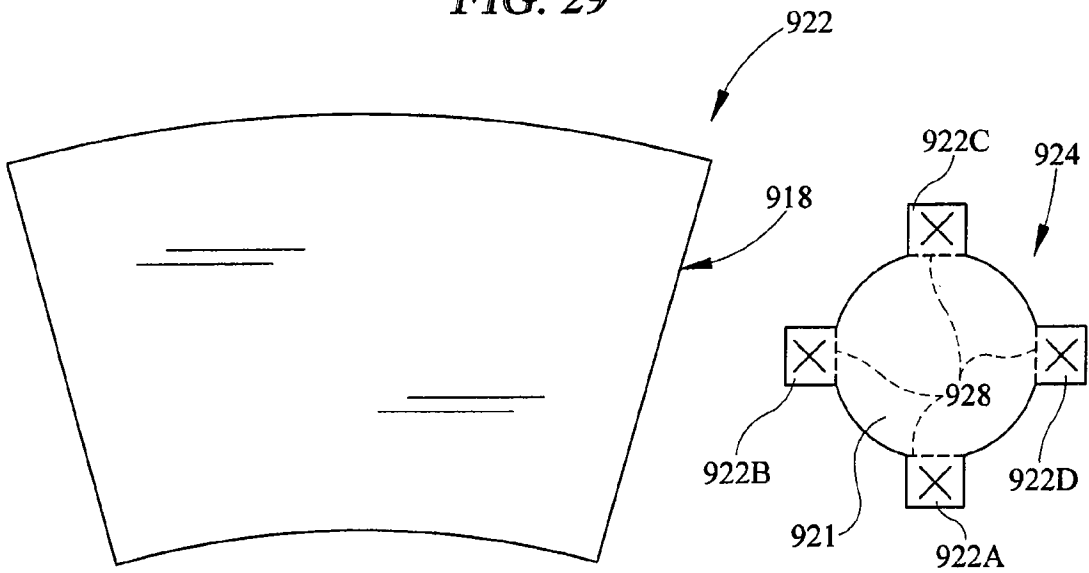


FIG. 30

FIG. 31

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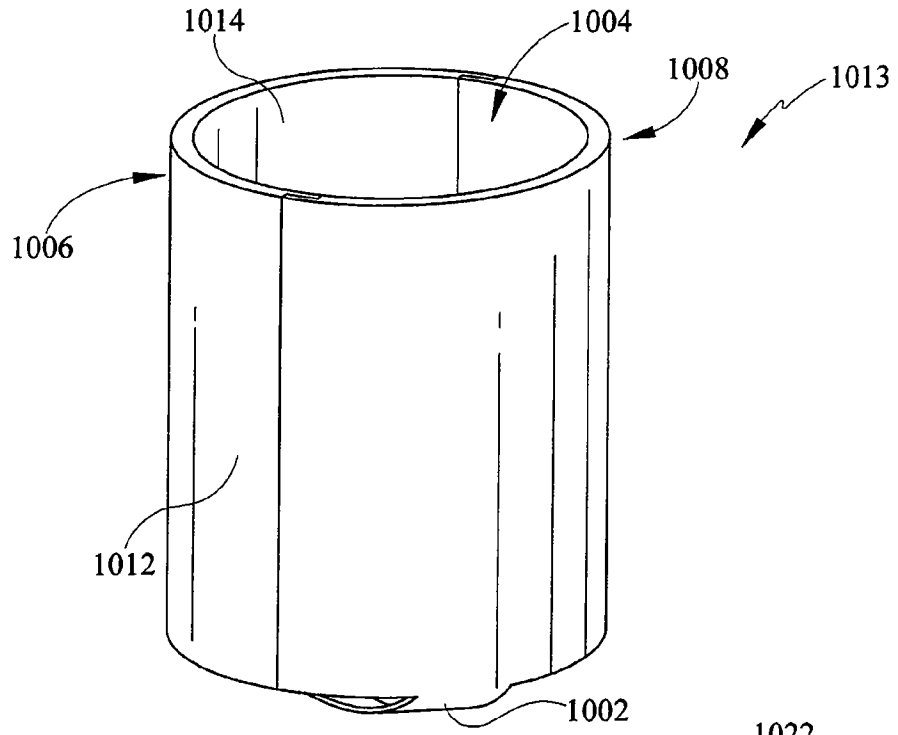


FIG. 32

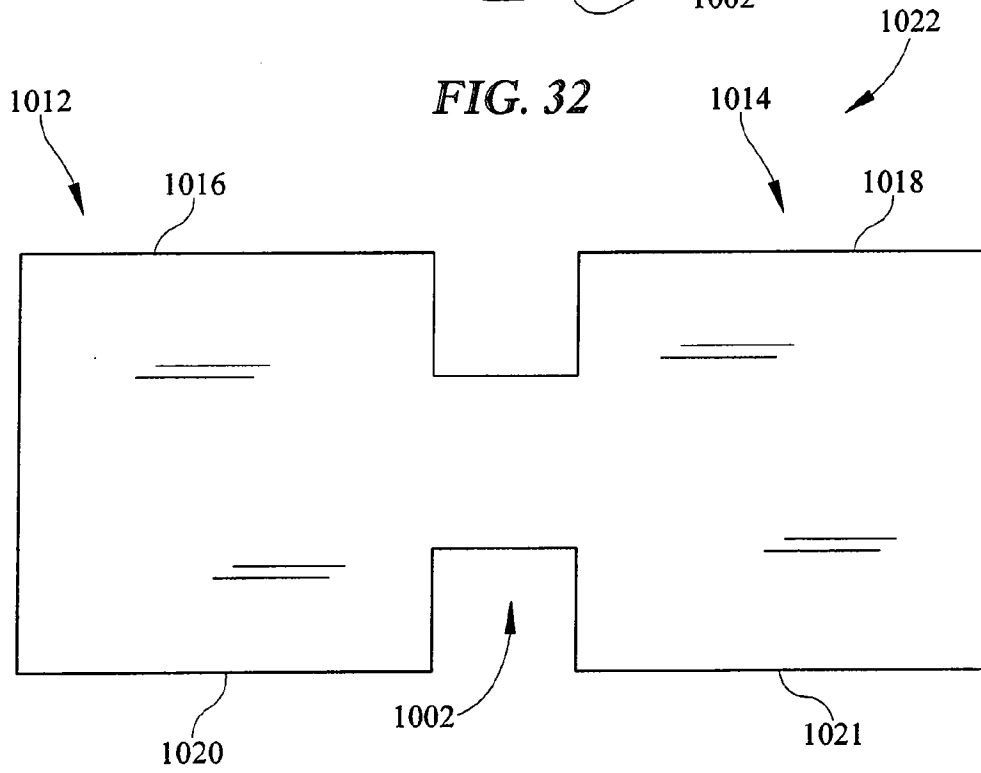


FIG. 33

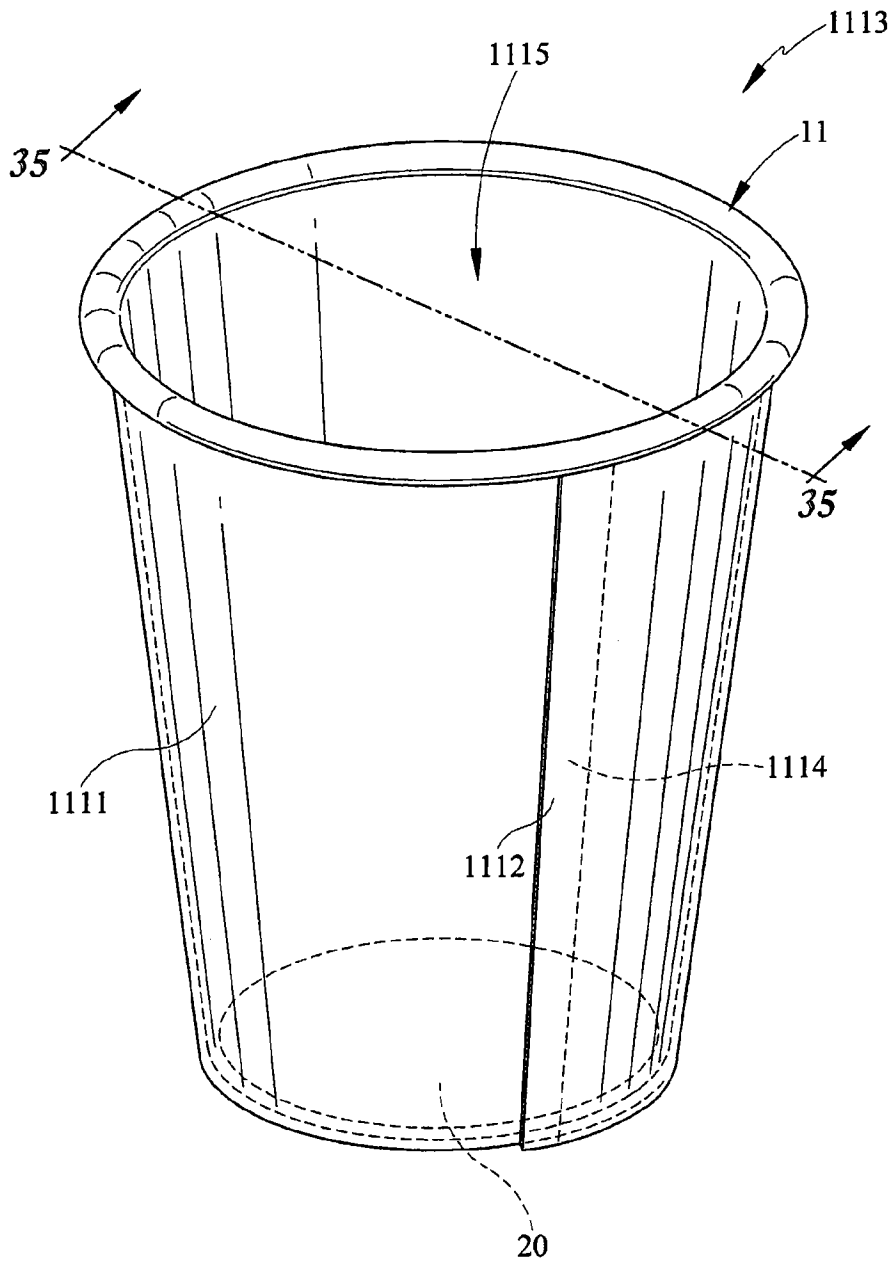


FIG. 34

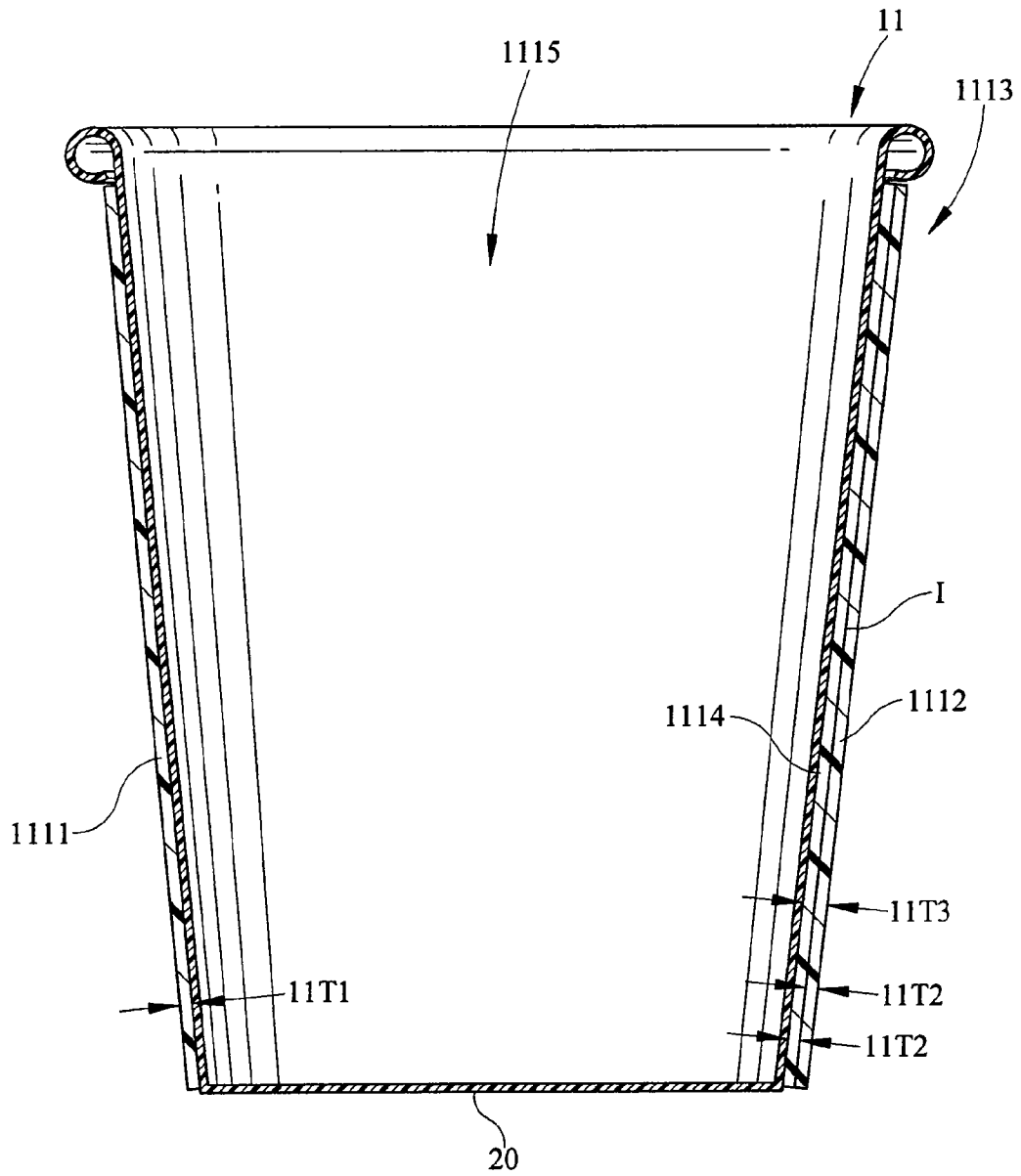


FIG. 35

