

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ningbo Linhua Plastic Co., Ltd.,
Petitioner

v.

Converter Manufacturing, LLC,
Patent Owner

U.S. Patent No. 10,562,222

Filing Date: Feb. 28, 2017

Issue Date: Feb. 18, 2020

Title: Formed Thermoplastic Article Having Smooth Edges

Inter Partes Review No.: IPR2024-01435

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 10,562,222
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. §§ 42.1-100, ET SEQ.**

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LIST OF PETITIONER’S EXHIBITS

No.	Description
1001	U.S. Patent No. 10,562,222
1002	Prosecution History of U.S. Patent No. 10,562,222 (the “Prosecution History”)
1003	Declaration of Glenn May
1004	International Publication No. WO 96/011769 to Portelli et al. (“Portelli”)
1005	U.S. Patent No. 4,228,121 to Meadors (“Meadors”)
1006	Excerpts from JAMES L. THRONE, TECHNOLOGY OF THERMOFORMING (1996) (“Throne”)
1007	First Amended Complaint, <i>Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.</i> , Case No. 5:20-cv-01054 (C.D. Cal.) (Dkt. 35) (the “First Amended Complaint”)
1008	Motion, <i>Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.</i> , Case No. 5:20-cv-01054 (C.D. Cal.) (Dkt. 51) (the “Stay Motion”)
1009	Order, <i>Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.</i> , Case No. 5:20-cv-01054 (C.D. Cal.) (Dkt. 75) (the “Order Granting Stay”)
1010	Proposed Schedule, <i>Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.</i> , Case No. 5:20-cv-01054 (C.D. Cal.) (Dkt. 56-1) (the “Proposed Schedule”)
1011	Curriculum Vitae (CV) of Glenn May

I. INTRODUCTION

Pursuant to 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et seq.*, Ningbo Linhua Plastic Co., Ltd., (“Nimngbo” or “Petitioner”) respectfully requests that the Board initiate *inter partes* review (“IPR”) of claims 1-21 (the “Challenged Claims”) of U.S. Patent No. 10,562,222 (EX1001, the “’222 patent”), which is assigned to Converter Manufacturing, LLC (“Patent Owner”). As explained herein, a reasonable likelihood exists that Petitioner will prevail with respect to the Challenged Claims.

II. STATEMENT OF PRECISE RELIEF REQUESTED

A. Prior Art

The ’222 patent issued from U.S. Patent App. No. 15/445,220, which was filed on Feb. 28, 2017. The earliest possible priority date for the ’222 patent is Aug. 31, 2015, which is the filing date of U.S. Provisional App. No. 62/212,367. Solely for purposes of evaluating prior art in this proceeding, this Petition will treat Aug. 31, 2015, as the earliest effective filing date of the ’222 patent and may refer to the same as “the priority date” or “the time of the alleged invention” without conceding the propriety of the priority claim.

Prior art reference Meadors was not cited during prosecution of the ’222 patent. Although Portelli was cited in an IDS by the applicant during prosecution, Portelli was not substantively discussed or relied on by the Examiner.

The following references are pertinent to the grounds of unpatentability:

- International Publication No. WO 96/011769 to Portelli et al.

(EX1004, “Portelli”) was published on Jan. 18, 1996. Because Portelli was published before the priority date of the ’222 patent, it qualifies as prior art at least under 35 U.S.C. § 102(a)(1).

- U.S. Patent No. 4,228,121 to Meadors (EX1005, “Meadors”) was issued on Oct. 14, 1980. Because Meadors was issued before the priority date of the ’222 patent, it qualifies as prior art at least under 35 U.S.C. § 102(a)(1).

B. Grounds for Challenge

This Petition, supported by Glenn May’s declaration (EX1003), requests cancellation of the Challenged Claims on the following grounds:

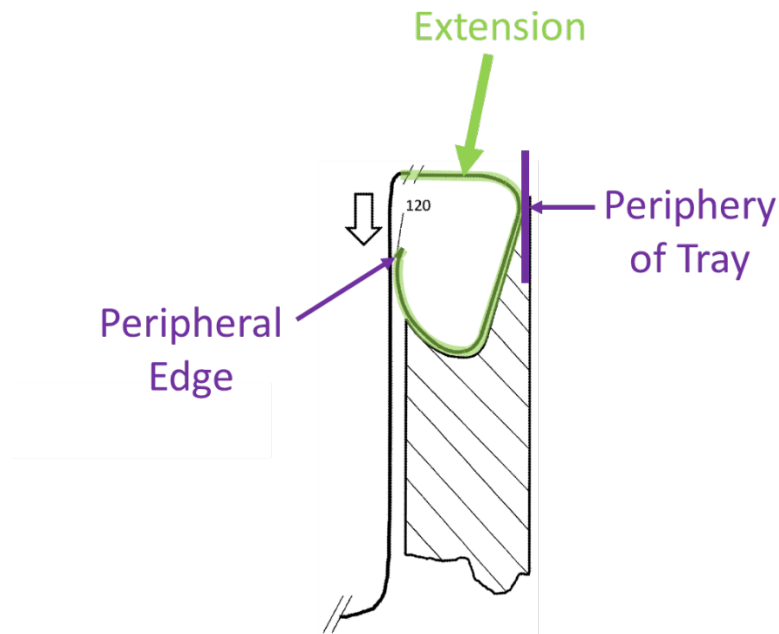
Ground	Claims	Basis
Ground 1	1-21	35 U.S.C. § 103: These claims are obvious over Portelli in view of the general knowledge of a POSITA.
Ground 2	1-6, 11-18, 20-21	35 U.S.C. § 103: These claims are obvious over Meadors in view of the general knowledge of a POSITA.

III. OVERVIEW OF THE ’222 PATENT AND RELATED TECHNOLOGY

The ’222 patent, entitled “Formed Thermoplastic Article Having Smooth Edges,” relates to food-packaging articles formed from thermoformable plastic. EX1003, ¶32.

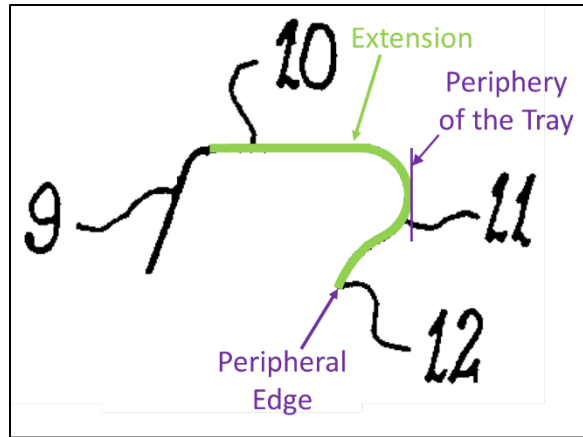
Food-packaging described in the '222 patent may be wrapped in a thin, plastic flexible film or “overwrap.” EX1001, 1:28-47, 1:61 to 3:29, 32:6-63.

Because overwrapped articles may have sharp edges that can tear the overwrap, the '222 patent discloses a method of rolling the outside flange or extension of the article away from the periphery so that the sharp, peripheral edge is turned in and does not contact the overwrap film:

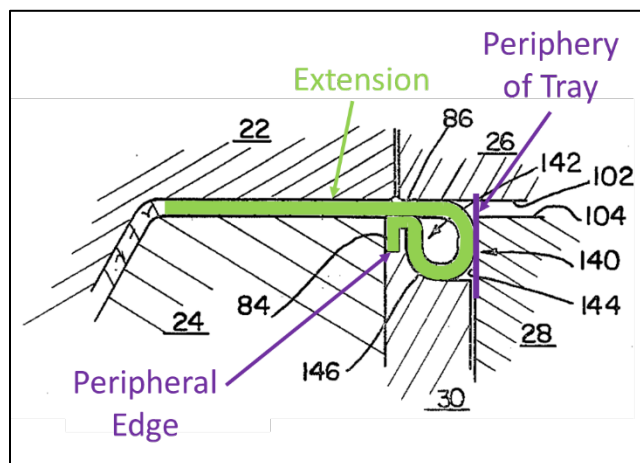


Ex. 1001, Fig. 8K (annotations added); EX1003, ¶¶33-34.

The above method was well known in the art before the priority date:



Portelli, Fig. 13.



Meadors, Fig. 8. EX1003, ¶35.

Textbooks such as that by James. L. Throne, titled “Technology of Thermoforming,” teaches about rolled flanges around the perimeter of articles formed from thermoplastic, and methods and apparatuses for producing them. EX1006 (“Throne”); EX1003, ¶¶36-37.

A. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSITA”) as of Aug. 31, 2015 (earliest purported priority date) would have been a typical technician or engineer

in the field of forming shaped thermoplastic articles would be well versed with the concepts of the claims of the ‘222 Patent. Some of those technicians and engineers would have four-year degrees, but many of them would rely primarily on the practical experience that they acquired on the job. Therefore, a POSITA would be a person with either (a) a Bachelor of Science degree in packaging science, mechanical engineering, material science, or chemistry and two years of experience designing and manufacturing thermoplastic items; or (b) three years of experience designing, using, or manufacturing thermoformed and or injection molded plastic items and tooling. EX1003, ¶38.

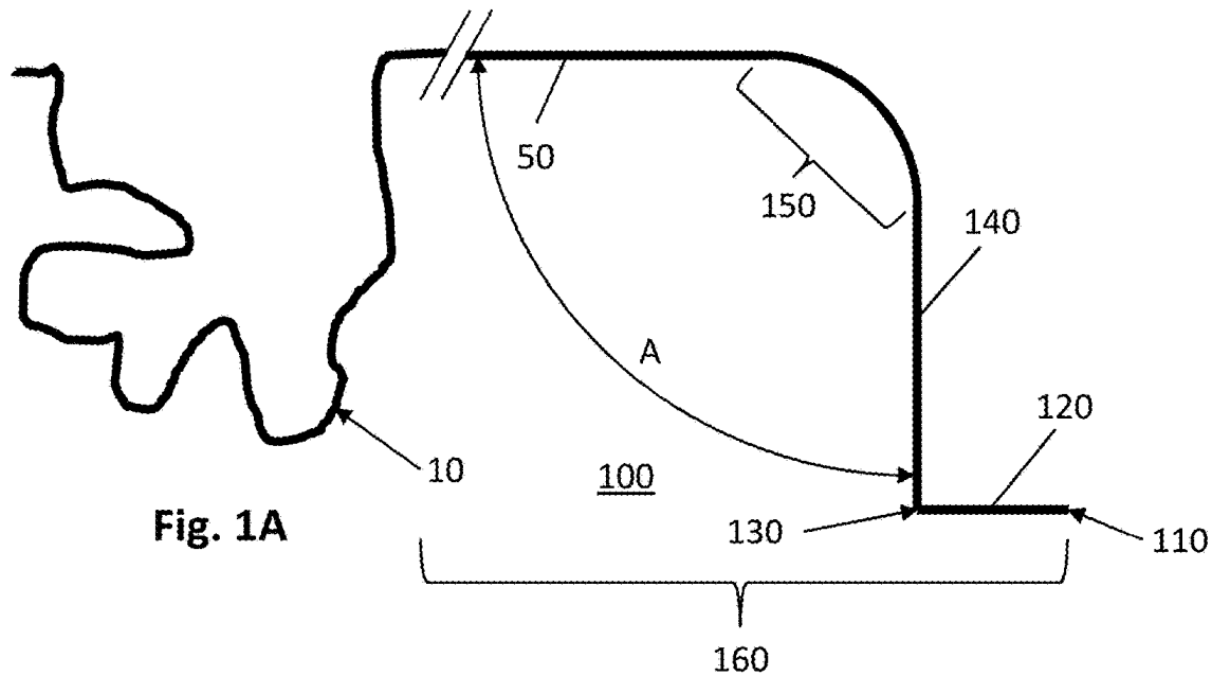
B. Claim Construction Under 37 C.F.R. § 42.104(b)(3)

The Challenged Claims are interpreted using the same claim construction standard used to construe claims in a civil action in federal district court, namely the *Phillips* standard. 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).

For purposes of this proceeding only, Petitioner contends that no formal claim constructions are necessary because the challenged claims are invalid under their plain and ordinary meanings, and “claim terms need only be construed ‘to the extent necessary to resolve the controversy.’” *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011).

The scope of the plain and ordinary meanings of certain claim terms must at least encompass the disclosure and accompanying illustrations in the '222 patent.

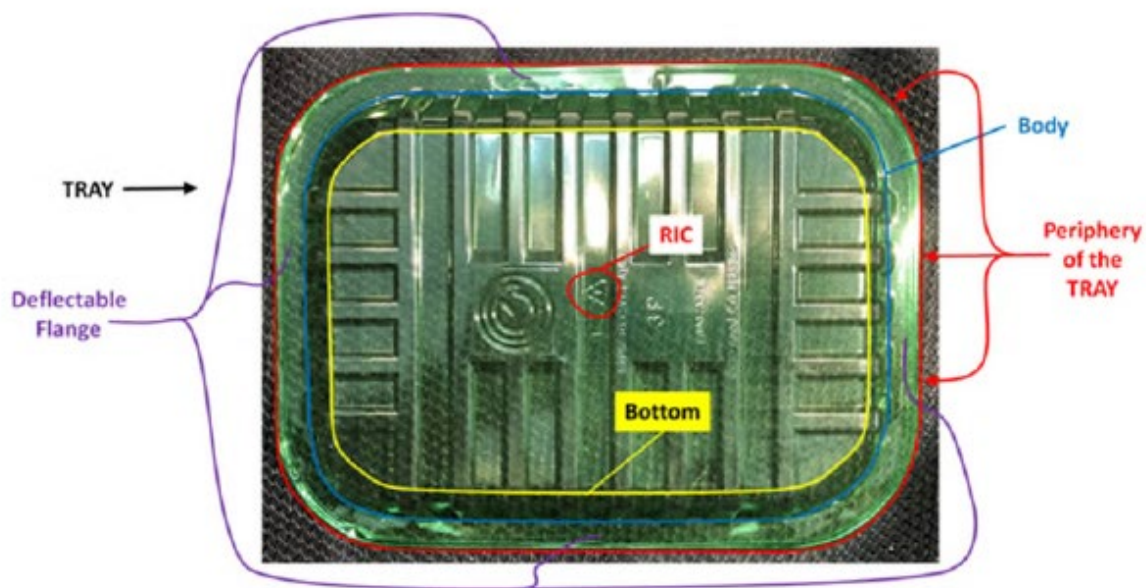
For example:

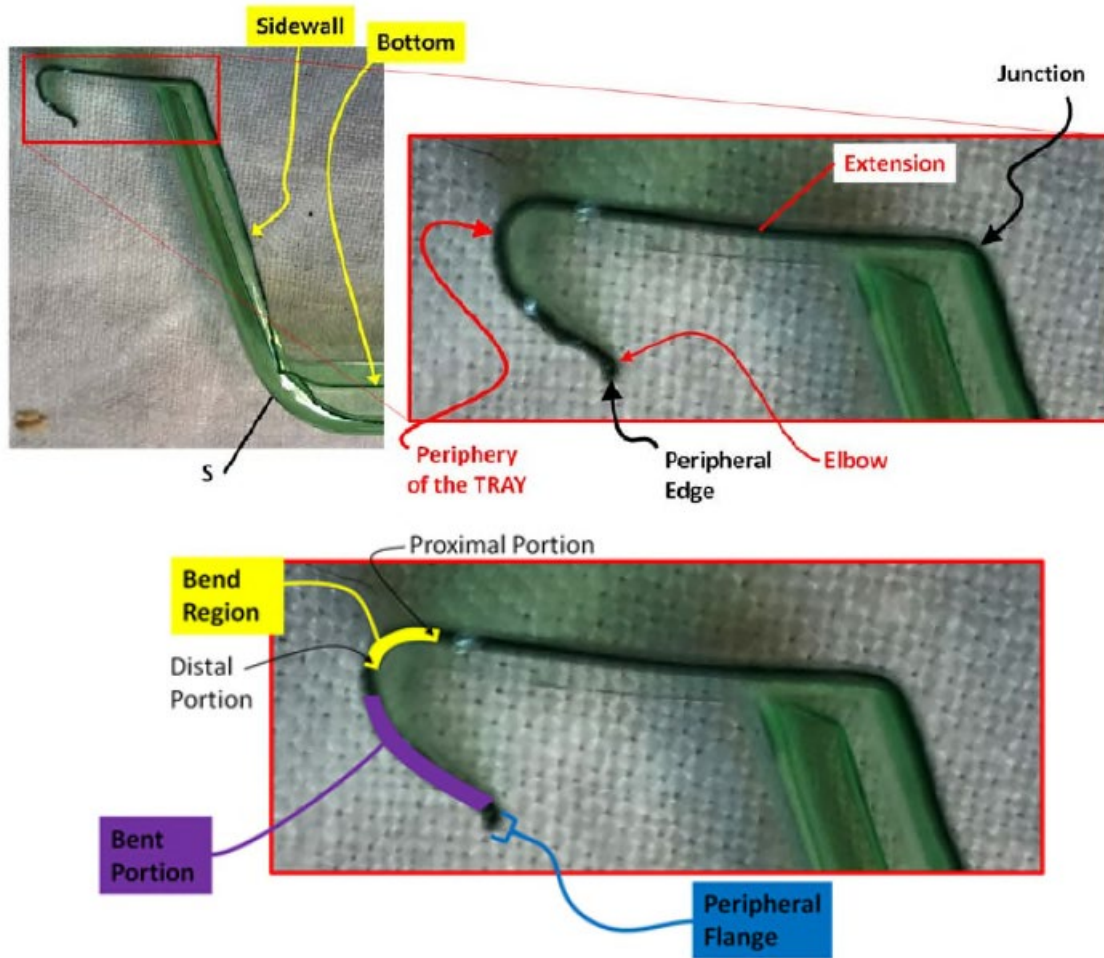


EX1001, Fig. 1A. As described in the specification, “FIG. 1A illustrates a sectional view of a **thermoplastic article 100** having a **deflectable flange 160** formed at an edge thereof. The **deflectable flange 160** in this embodiment includes an **extension 50**, a **bend region 150**, a **spacer 140**, and a **peripheral flange 120**. The **extension 50** connects the shaped **body 10** of the **article 100** to the **bend region 150** of the **deflectable flange 160**. A **spacer 140** can be (and preferably is) interposed between the **bend region 150** and the **peripheral flange 120**. The **peripheral flange 120** is connected to the **spacer 140** by way of an **elbow 130**, which is shown as a right-angle bend in this embodiment. The **bend region 150**

connects the **extension 50** and the **spacer 140** at an approximately right angle (the angle designated A). The **peripheral flange 120** terminates at the **peripheral edge 110** of the thermoplastic material (represented by a thick solid line in this figure) of which the **article 100** is formed.” EX1001, 6:13-28 (key claim terms highlighted).

Furthermore, Patent Owner applied the terms “periphery,” “deflectable flange,” “extension,” “bend region,” “peripheral flange,” “peripheral edge,” “extension,” “bent portion,” “elbow,” and other features to Petitioner’s product in the First Amended Complaint against Petitioner:





EX1007, pp. 7-8; 18; EX1003, ¶¶53-57.

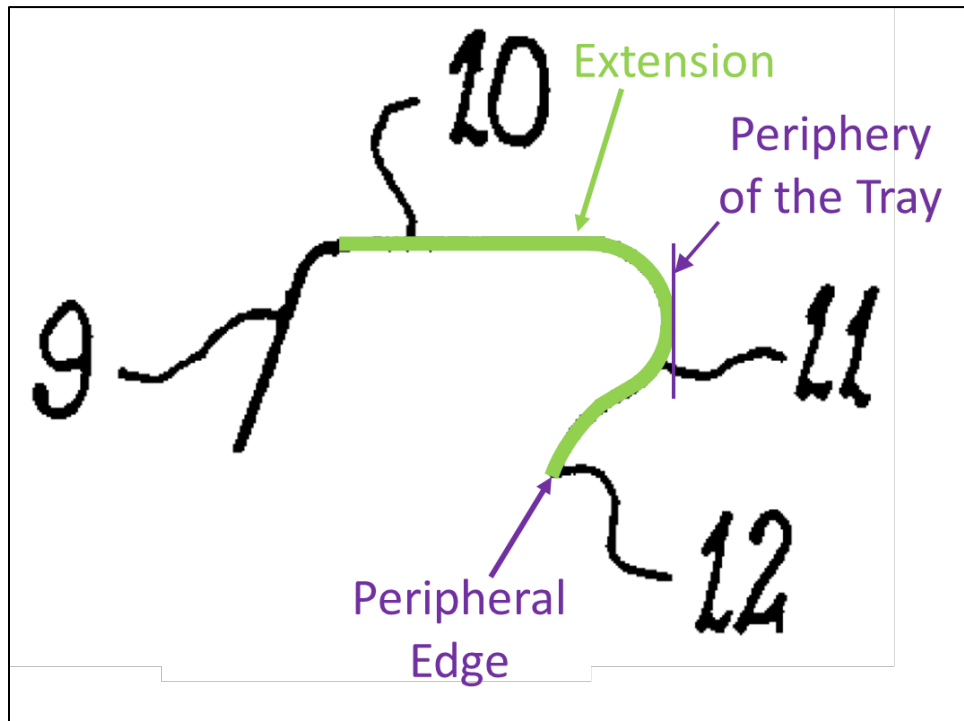
C. The Challenged Claims of the '222 Patent

For ease of reference, the Challenged Claims are reproduced in Appendix A with numbered claim limitations corresponding to the numbering used throughout this Petition.

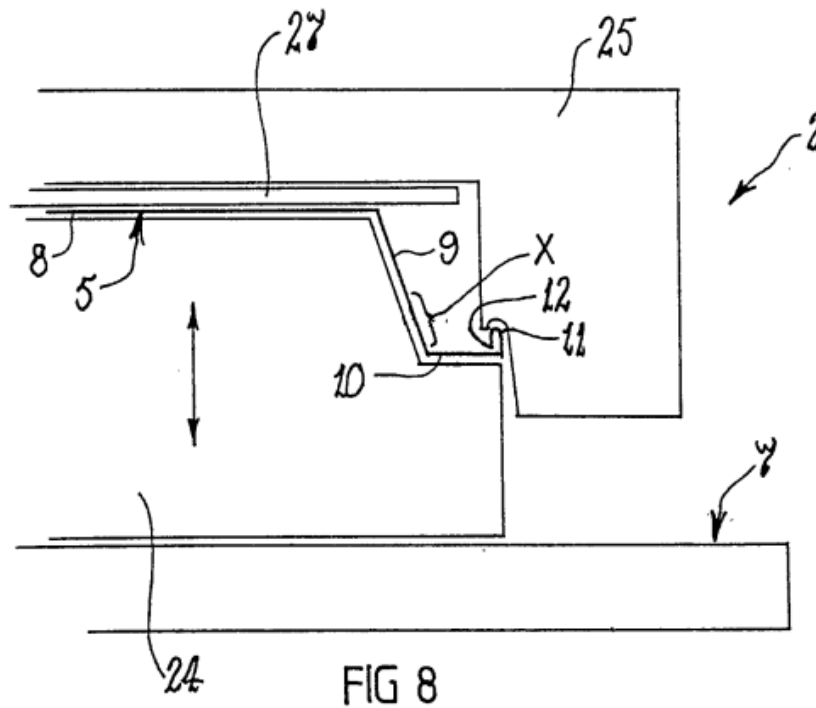
IV. GROUND 1: CLAIMS 1-21 ARE OBVIOUS OVER PORTELLI IN VIEW OF THE GENERAL KNOWLEDGE OF A POSITA

A. Portelli

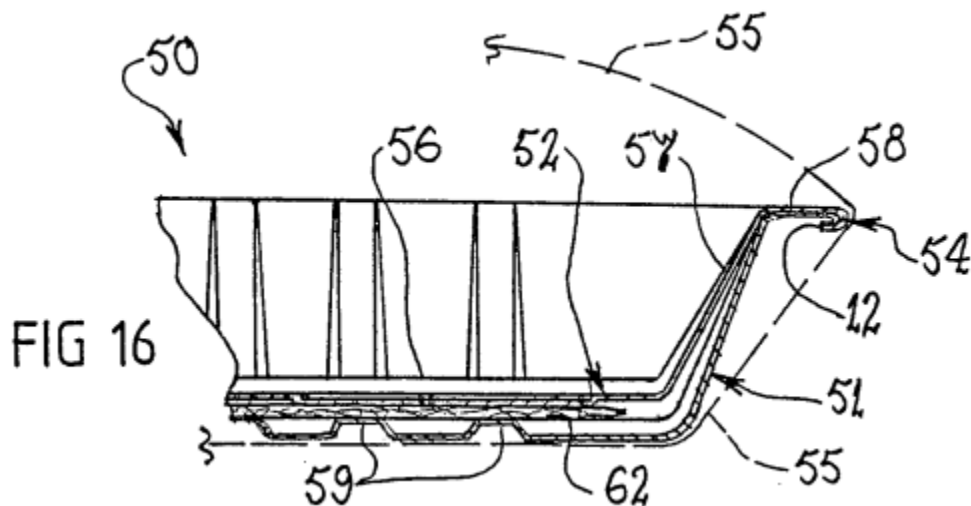
Portelli teaches a method of producing thermoplastic articles that can be overwrapped in plastic film with reduced tendency of the film to tear. EX1004, Abstract; 1:2-11; 2:16-18. Portelli teaches a method and apparatus which yield an article where the peripheral edge is purposely bent or rolled to result in the peripheral edge of the article having a smooth periphery:



Id., Fig. 13.



Id., Fig. 8 (showing tooling configuration used in process to roll thermoplastic article's edge).



Id., Fig. 16 (showing rolled edge displaced from periphery such that it will not contact film overwrap). EX1003, ¶¶47-50.

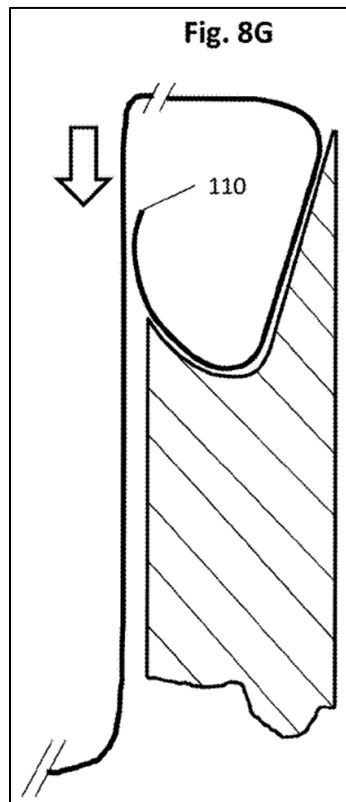
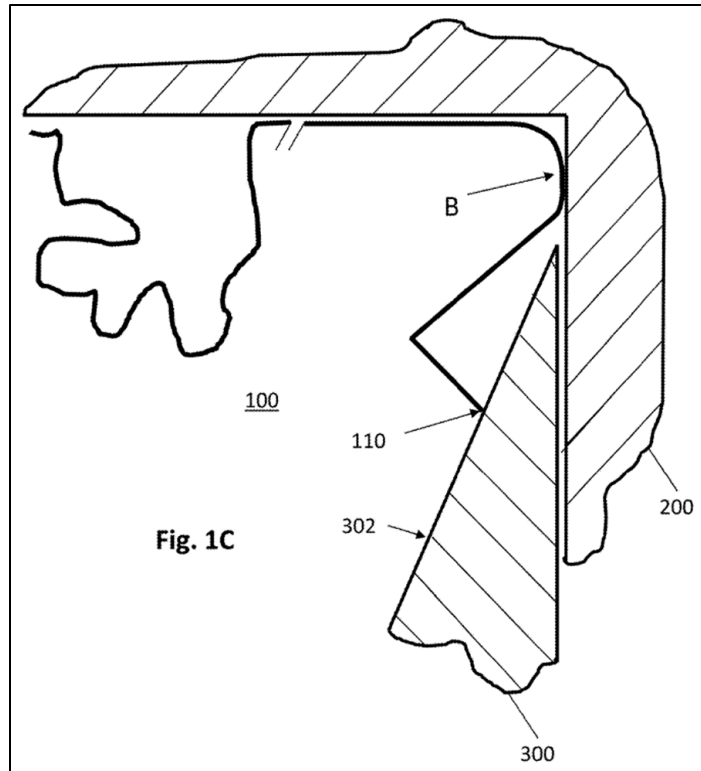
B. Analysis

1. Claim 1

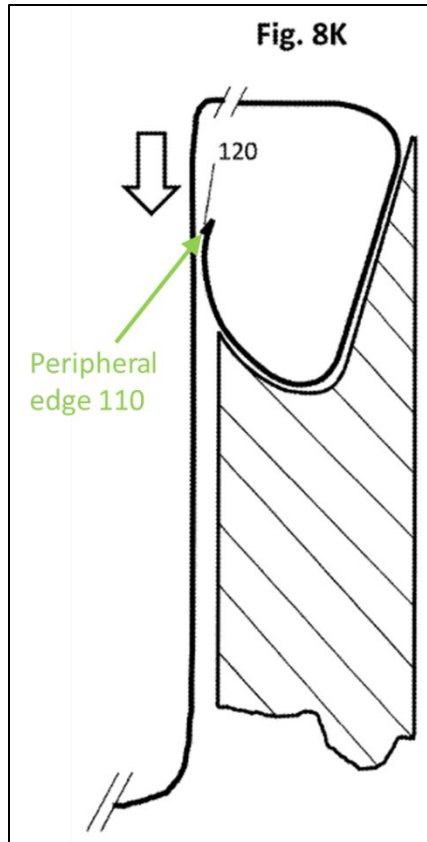
a. 1[Pre]:

To the extent limiting, Portelli describes a method of producing a plastic tray (5) having a peripheral edge region (11) terminating in a terminal edge (12) which is deformed inwardly out of a wrap path around the tray (5). Portelli, Abstract. A POSITA would understand that Portelli refers to a method of producing a smooth periphery on a shaped article, i.e. a package in the form of a tray, made from thermoformable materials. *Id.*, 1:1-5 (“This invention explicitly relates to **trays for packaging** which are **wrapped in plastic film** or plastic wrap, **method of producing such trays, and apparatus for producing such trays.**”). EX1003, ¶58.

Portelli discloses a container formed from a thermoformable sheet having a “sharp terminal edge 12.” Portelli, 9:17-18. This is synonymous with the ‘222 patent’s “peripheral edge” – the terminal edge of the plastic sheet from which the tray is formed. The peripheral edge in the ’222 patent is illustrated in Figs. 1C and 8G, element 110, and is also illustrated in Fig. 8K (annotated below by May):

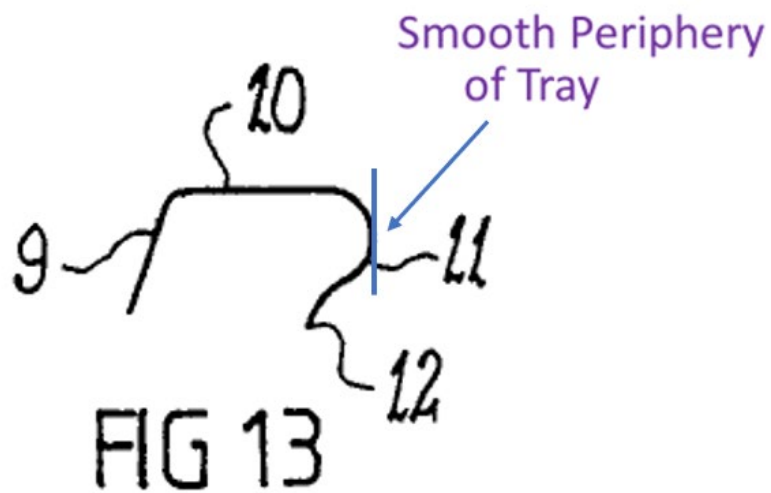


EX1001, Figs. 1C, 8G (showing peripheral edge 110).



EX1001, Fig. 8K (annotated). EX1003, ¶59.

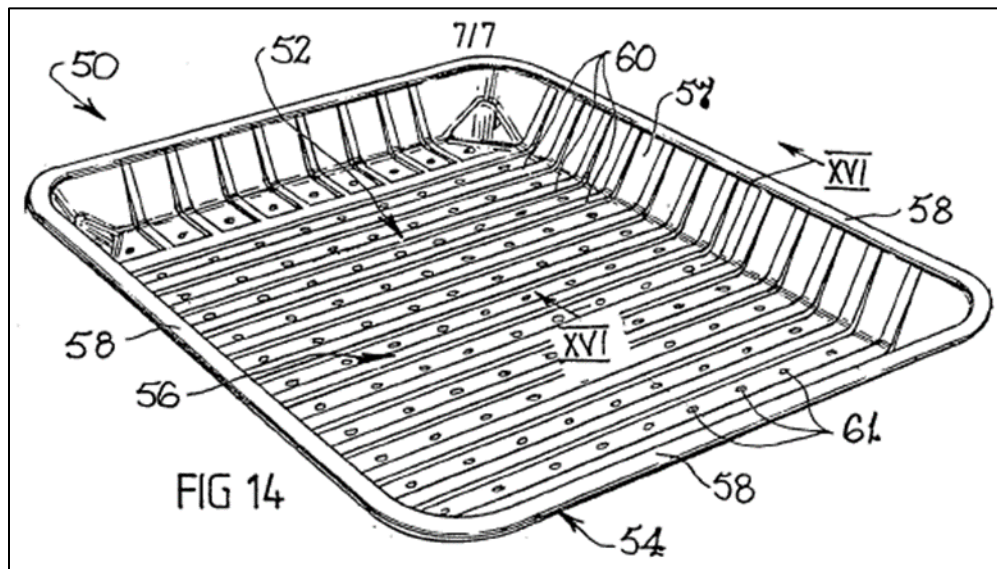
Portelli discloses trays with a smooth periphery:



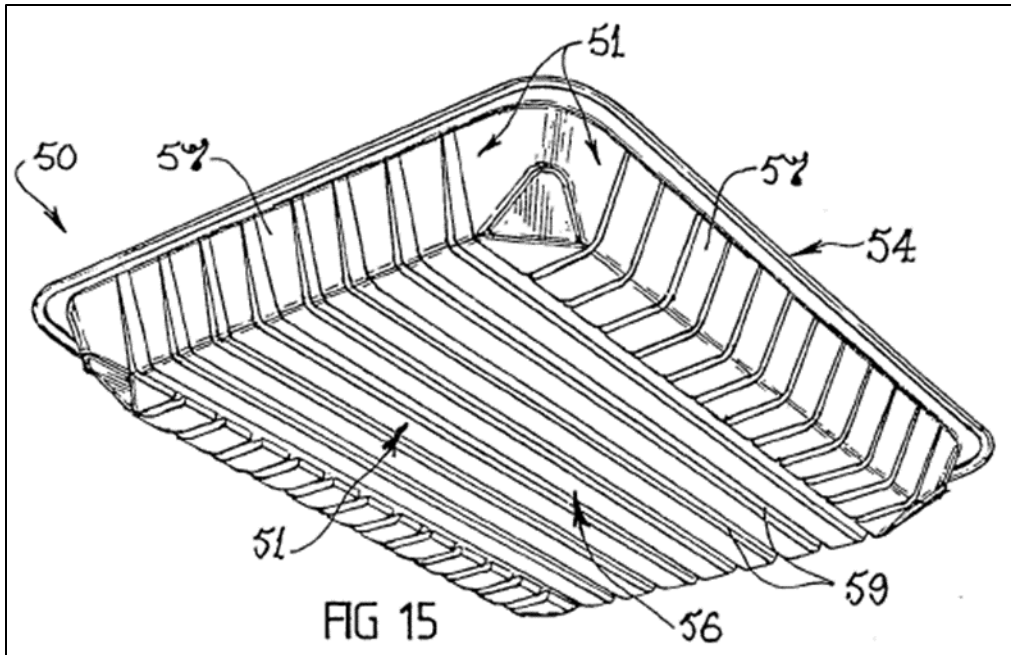
Portelli, Fig. 13. EX1003, ¶¶60-61.

b. 1[A]:

Portelli discloses a “base member 51” and a “cover member 52,” which are “thermoformed from plastic” and include a tray with a deflectable flange (initially sharp terminal edge) surrounding the article:

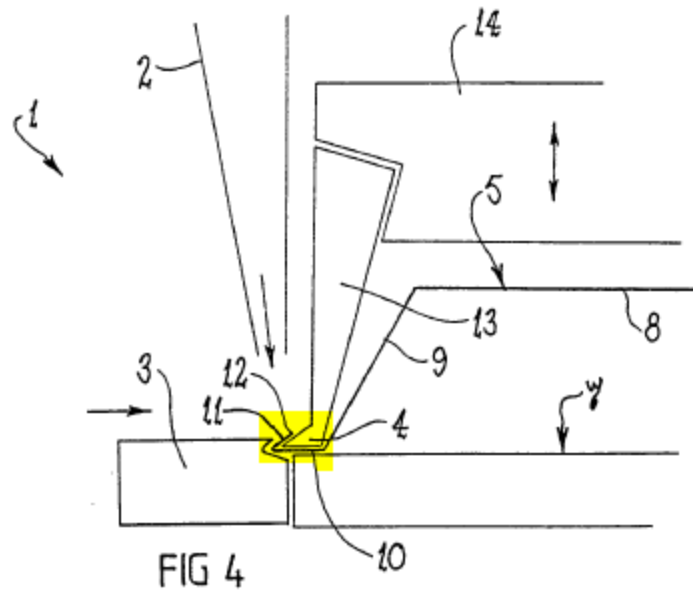
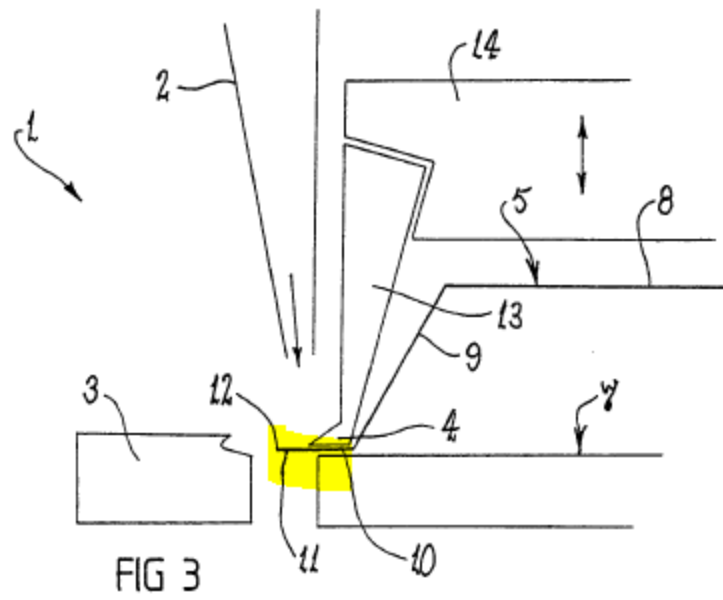


Portelli, Fig. 14.



Portelli, Fig. 15; *id.*, 15:12-16; Fig. 11 (item 5). EX1003, ¶¶62-63.

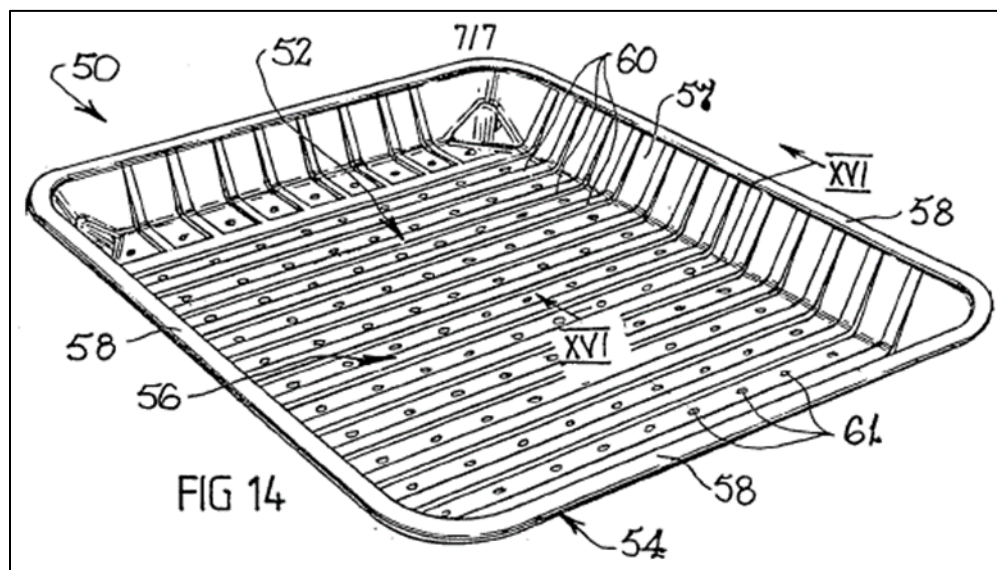
Portelli's container is formed by heating and deforming the peripheral edge region 11 of "a ***thermoformed plastic tray 5***, typically having a ***sharp terminal edge 12***". Portelli, 9:17-24. Portelli discloses "heating the peripheral edge region of the tray such that said ***peripheral edge region becomes malleable.***" Portelli, 2:22-30. Portelli also shows the flange of the thermoplastic shape being deflected in Figs. 3 and 4, where the sharp terminal edge 12 in Fig 3 is deflected and displaced in Fig 4:



Portelli, Figs 3-4 (sharp terminal edge 12 being deflected); *see also id.*, Figs. 1-2, 5-8). EX1003, ¶64.

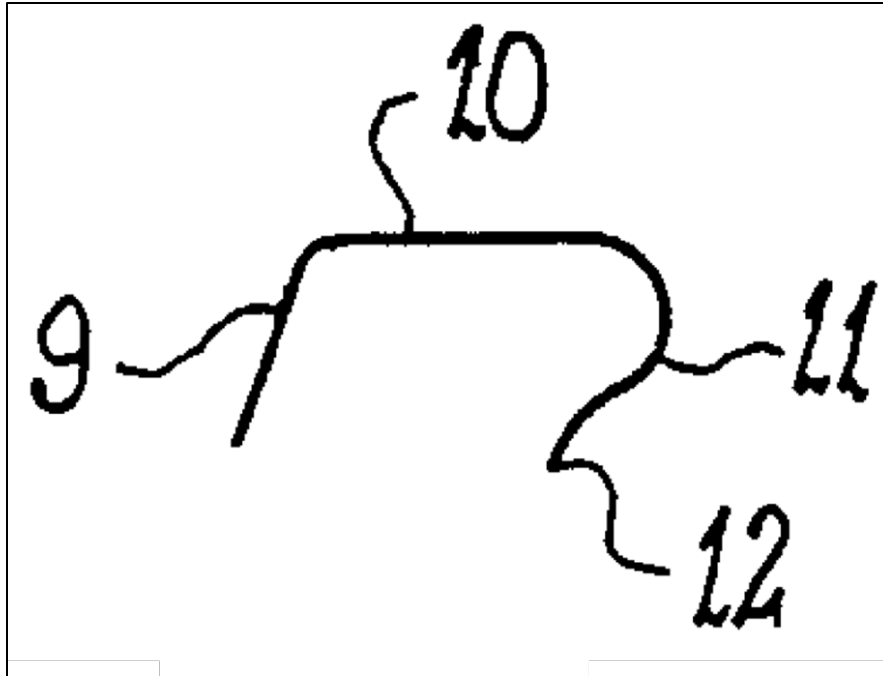
The thermoformable article in Portelli is repeatedly described as a tray, which may be a “rectangular tray.” Portelli, 1:1-5 (“[T]his invention relates to trays for packaging”); 1:7-8; 5:25 (“plastic tray”); 10:17-18 (“rectangular tray 5”). EX1003, ¶65.

Portelli’s tray includes a “circumferential peripheral rim 58 [which] projects outwardly away from the upper end of the side wall 57,” i.e. a “deflectable flange at a peripheral portion of the body”:



Portelli, Fig. 14; 15:28-30. EX1003, ¶66.

The “deflectable flange” is item 10 in Figure 13:

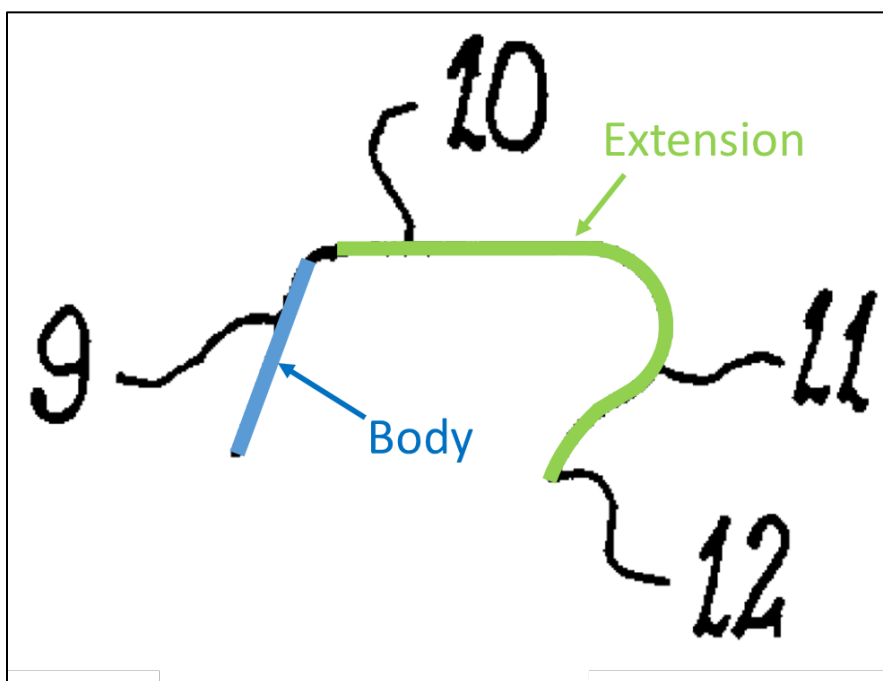


Portelli, Fig. 13. EX1003, ¶67.

Regarding “thermoplastic,” Portelli discloses “in this specification, the term ‘plastic’ shall be construed to include *any group of materials, synthetic or natural, which may be shaped when soft and then hardened, including resins...*”). Portelli, 1:12-16, 9:17-24, 14:10-14, 15:12-14, 16:15-17, Figs. 14, 15. Portelli describes “One particularly suitable plastic from which the trays can be made softens at between 100 degrees C and 150 degrees C and becomes molten near 200 degrees C. Obviously however other plastics can also be used in carrying out this invention and such other *plastics may soften and become molten at temperatures* different to those specified above.” Portelli, 15:4-8. EX1003, ¶68.

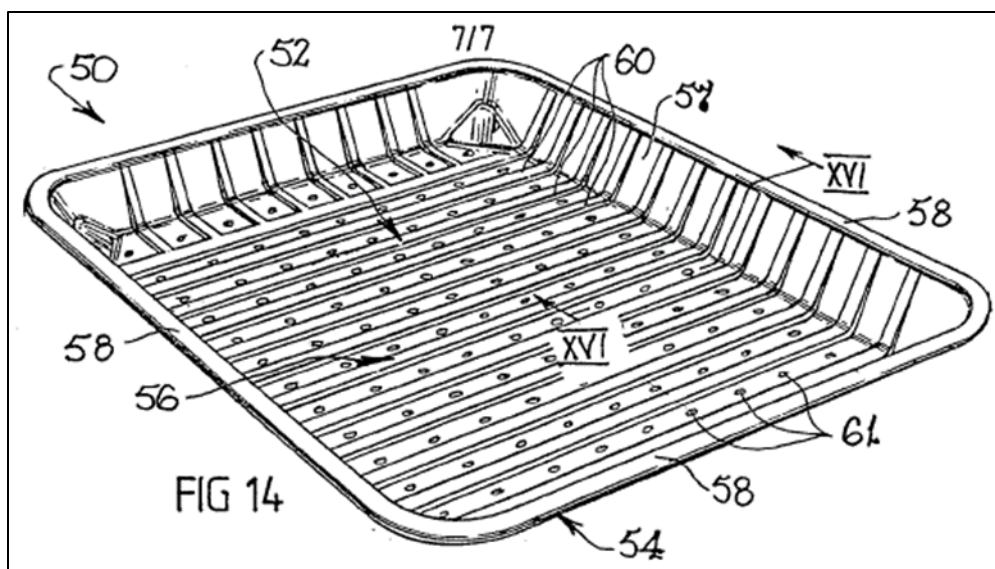
c. 1[B]:

Portelli discloses a rim 10 that is connected to “a peripheral edge region 11 and a terminal edge 12.” Portelli, 14:11-13. The combination of the rim 10, peripheral edge region 11, and terminal edge 12 (same as ‘222 patent’s “peripheral edge”) form an extension:



Portelli, Fig. 13 (annotations added) (showing Portelli’s extension connecting to the article’s body). EX1003, ¶69.

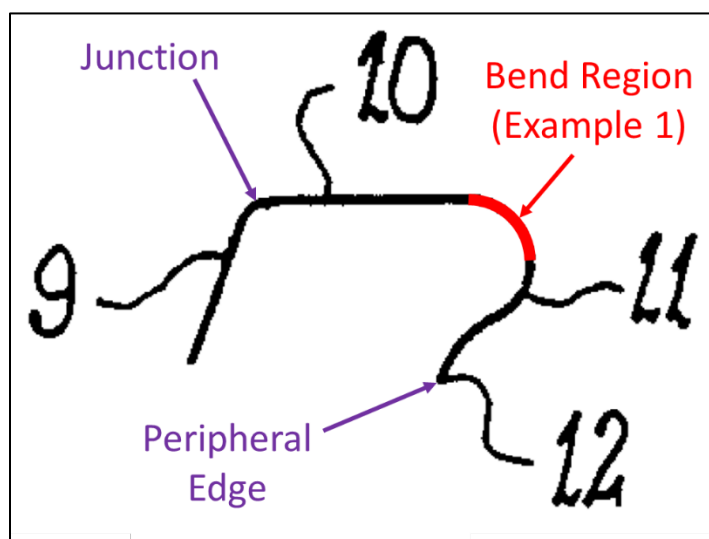
The extension (the combination of features 10, 11, and 12) extends peripherally or outward, away from the sidewall 9/57 and the base 8/56, which together comprise the tray’s body. Portelli’s Fig. 14 shows a “circumferential peripheral rim 58 [which] projects outwardly away from the upper end of the side wall 57”:



Portelli, Fig. 14; 15:28-30. EX1003, ¶70.

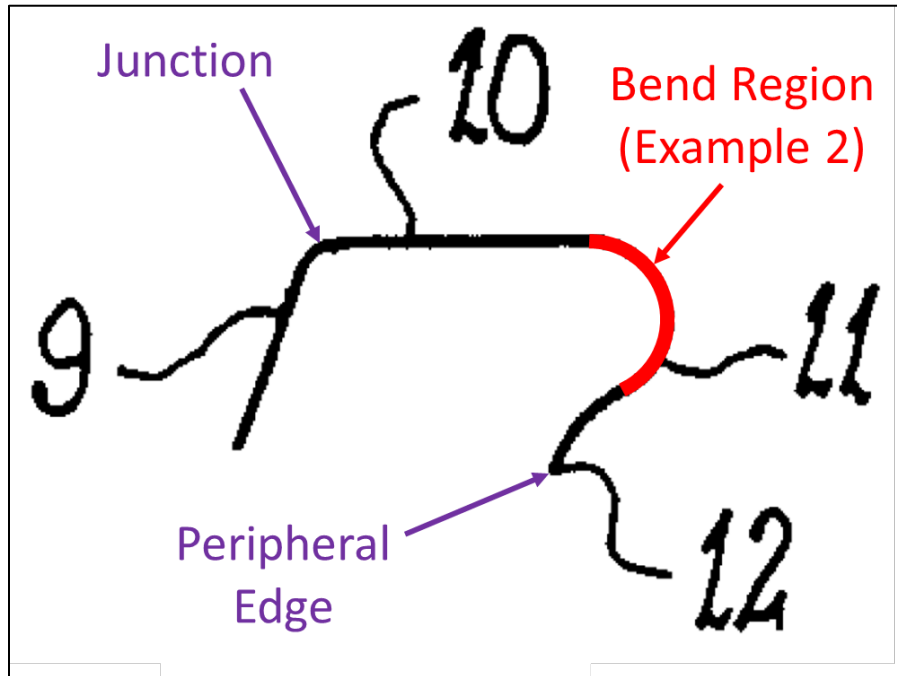
d. 1[C]:

Portelli's "bend region" with a smooth contour can be the upper portion of the curve at the right side of Fig. 13:



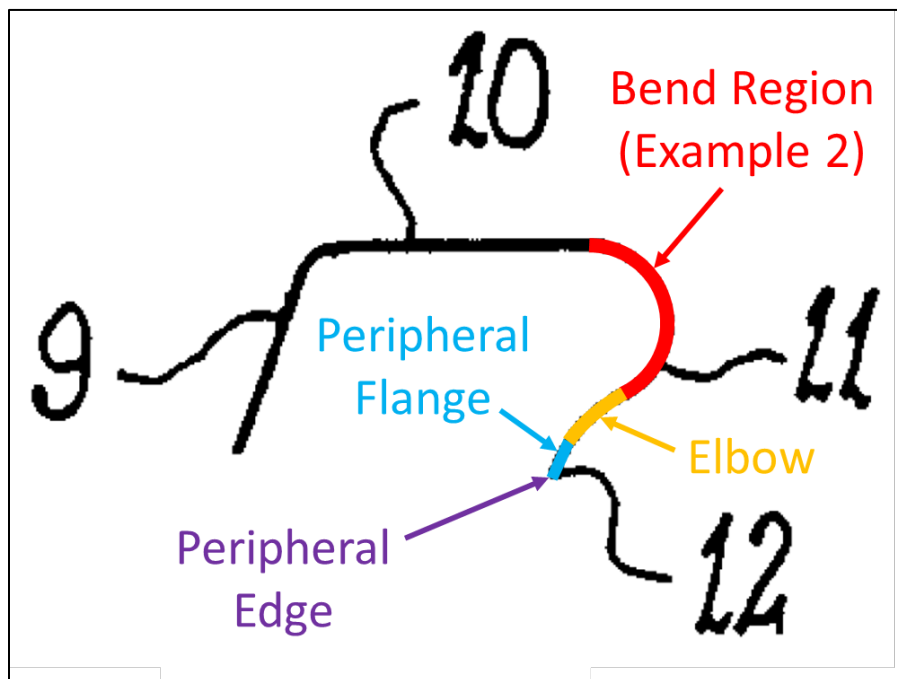
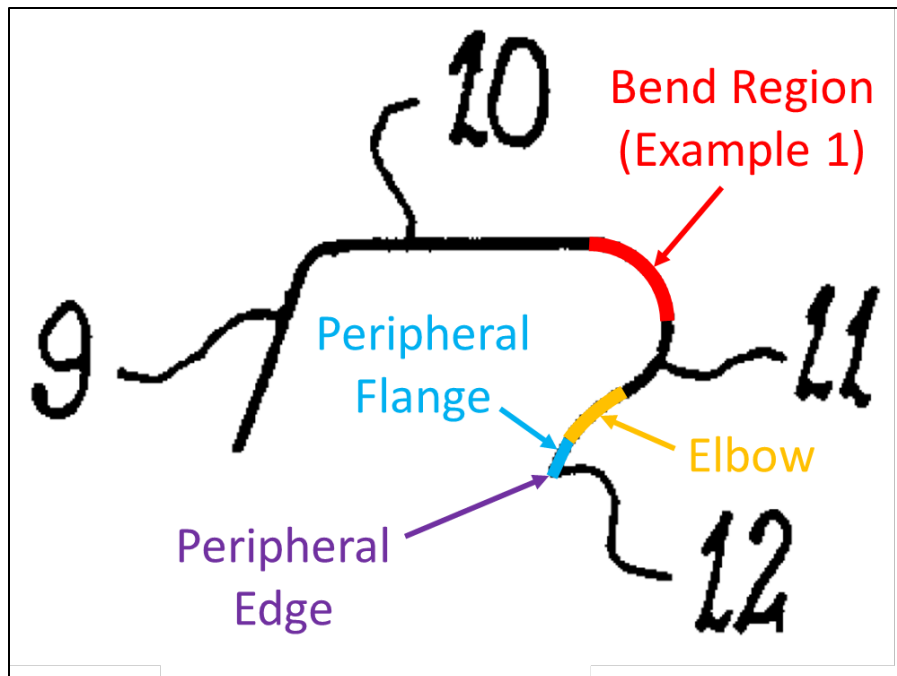
Portelli, Fig. 13. EX1003, ¶72.

The “bend region” can also be a combination of the upper and lower portions of the curve:



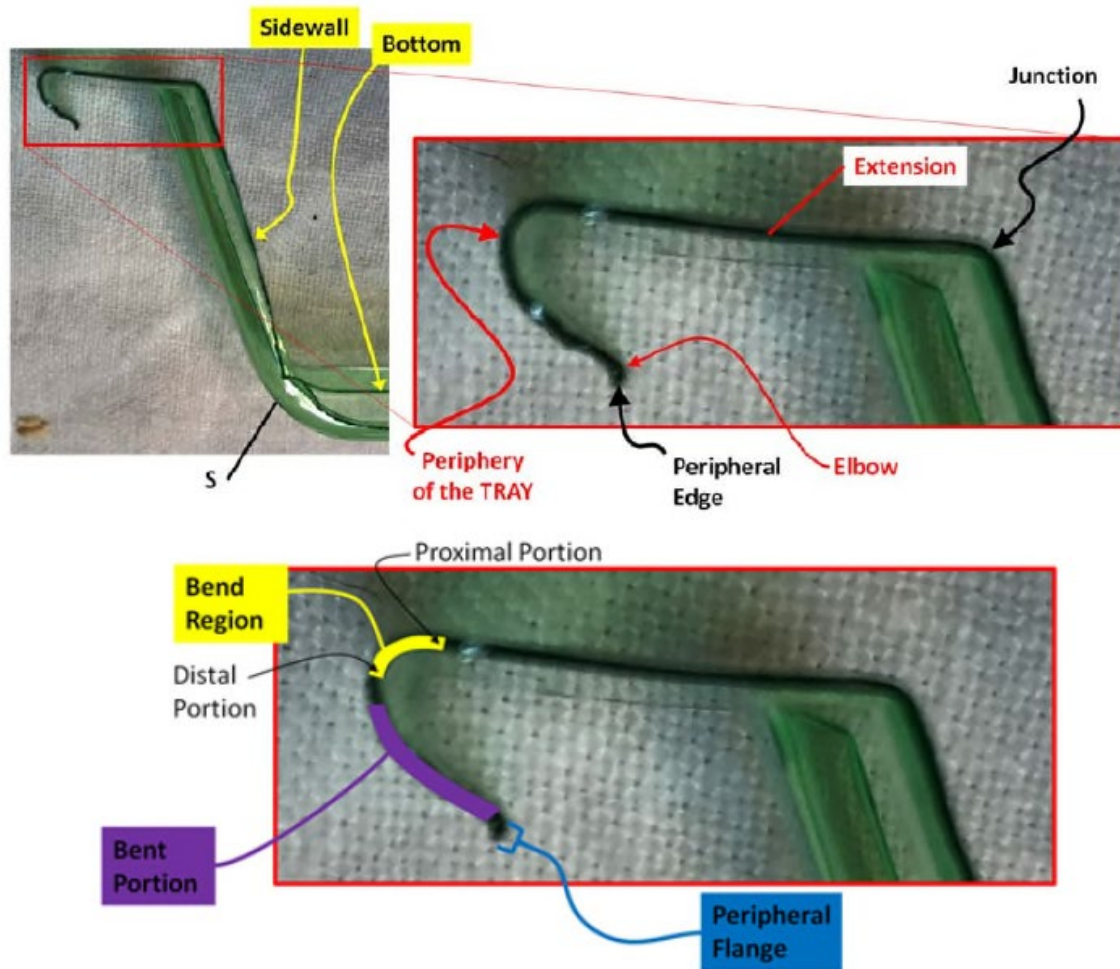
Portelli, Fig. 13. EX1003, ¶¶73-74.

Portelli’s tray teaches an elbow connecting the bend region to the peripheral flange. It shows the elbow as the section below the bend region, and curved in the opposite direction:



Portelli, Fig. 13. EX1003, ¶75.

The First Amended Complaint refers to a downward curvature in Petitioner's product, which is materially identical to Portelli's "bend region" and "elbow":



EX1007, p.8. EX1003, ¶76.

The '222 patent describes a **spacer** as item 140:

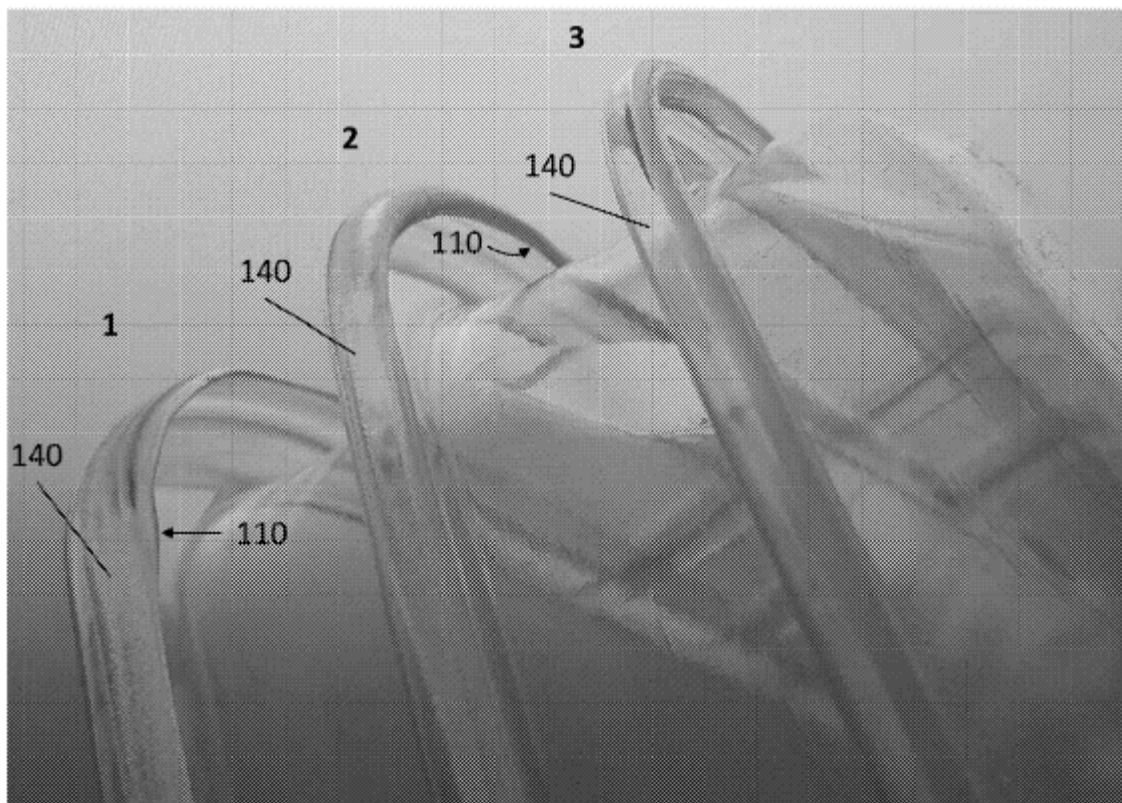


Fig. 6E

Ex. 1001, Fig. 6E (showing spacer 140).

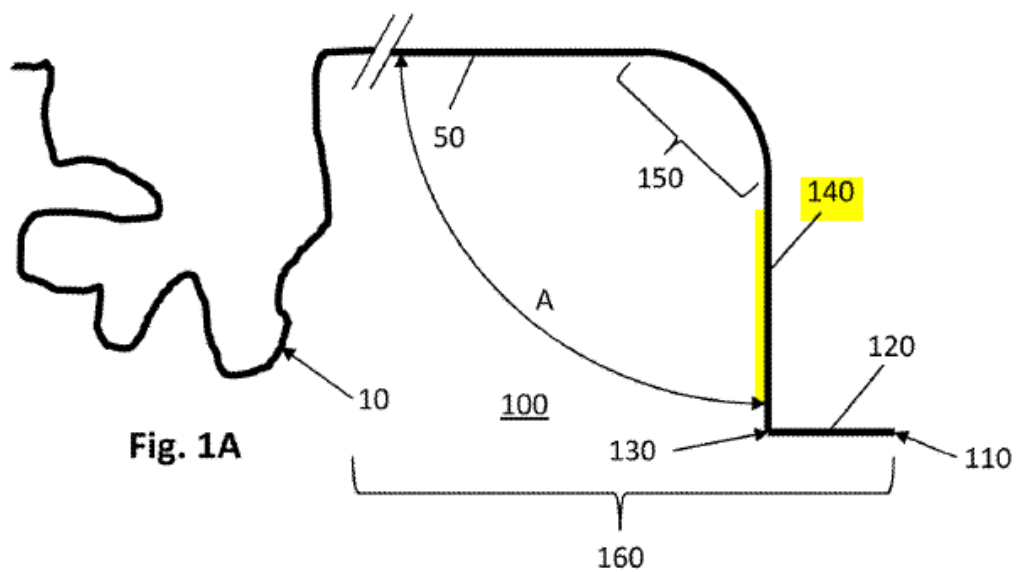
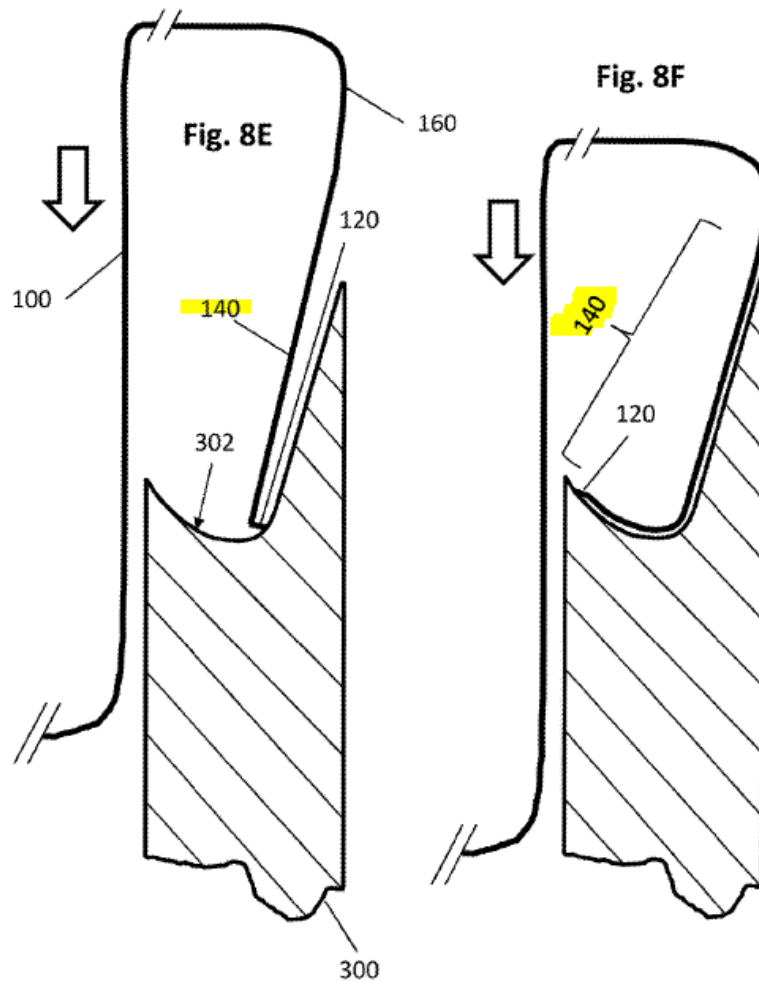


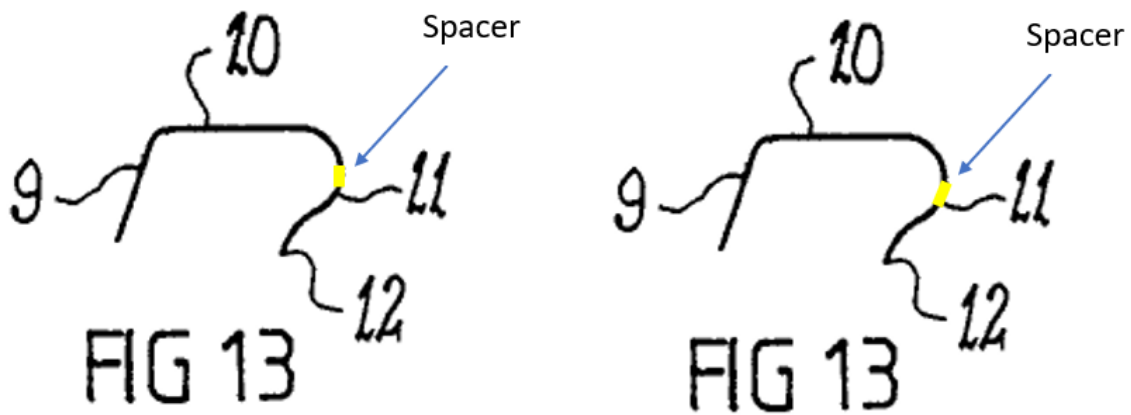
Fig. 1A

Ex. 1001 Fig. 1A (spacer 140 highlighted).



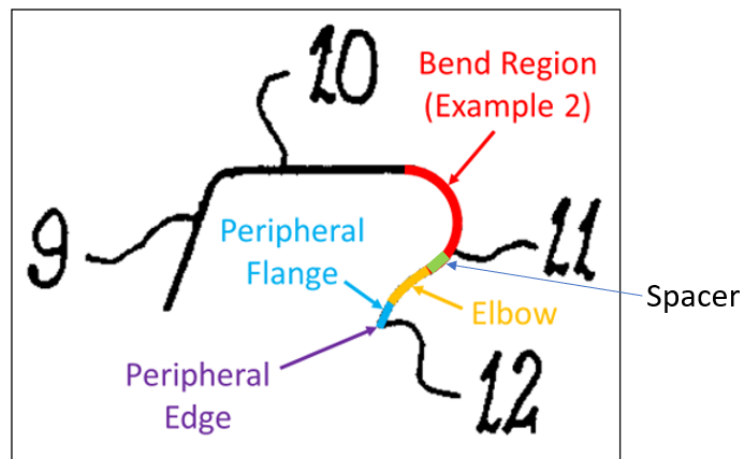
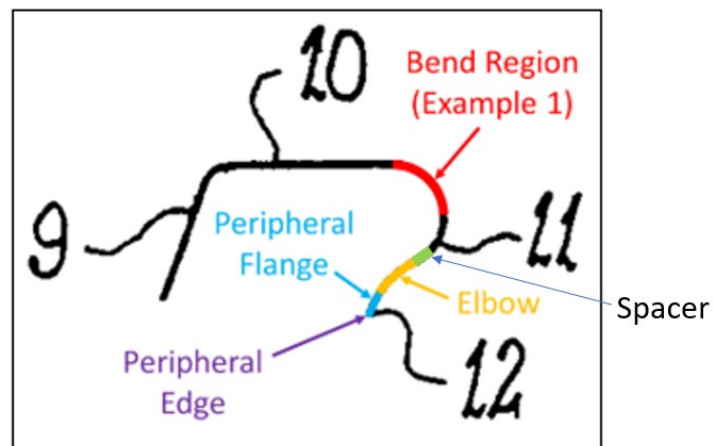
Ex. 1001, Figs. 8E-8F (spacer 140 highlighted). EX1003, ¶79.

Portelli teaches a *spacer* connected with a peripheral flange which bears a peripheral edge of the thermoplastic:



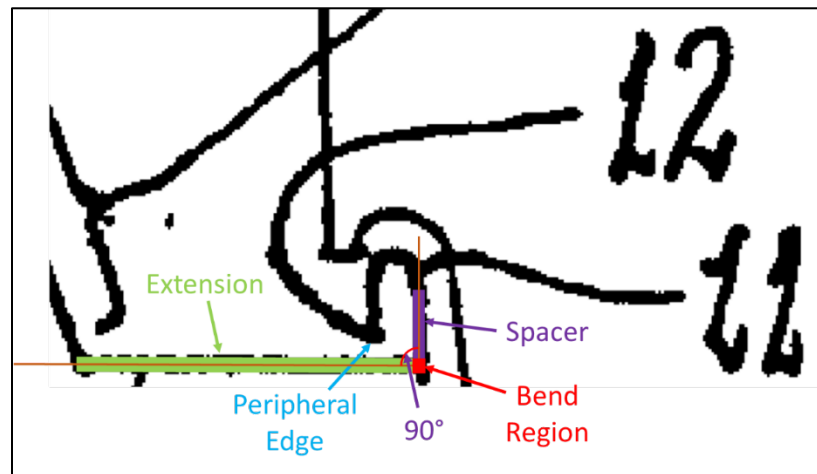
Portelli, Fig. 13 (annotated). EX1003, ¶80.

Another example of Portelli's Fig. 13 spacer:



Portelli, Fig. 13 (excerpted and annotated). EX1003, ¶81.

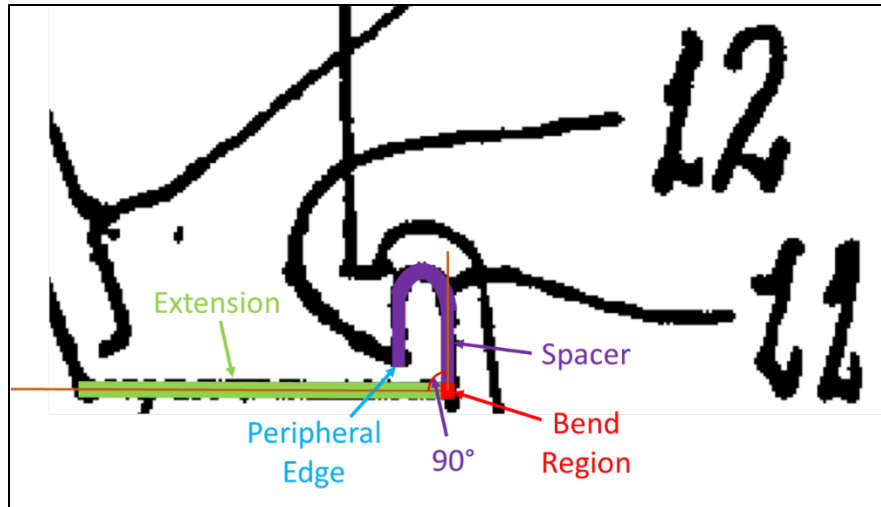
Figure 8 of Portelli shows a bend region having a smooth contour and interconnecting the extension **at an approximately right angle** with a spacer. The vertical segment in Fig. 8 comprises a spacer, and Portelli's Fig. 8 bend region interconnects the extension and spacer at 90 degrees, as shown below:



Portelli, Fig. 8 (annotated). EX1003, ¶82.

The spacer can also include the vertical segment in the middle of the excerpt of Fig. 8 plus the remainder of the curve up to and including the peripheral edge.

The bend region interconnects the extension and spacer at 90 degrees:

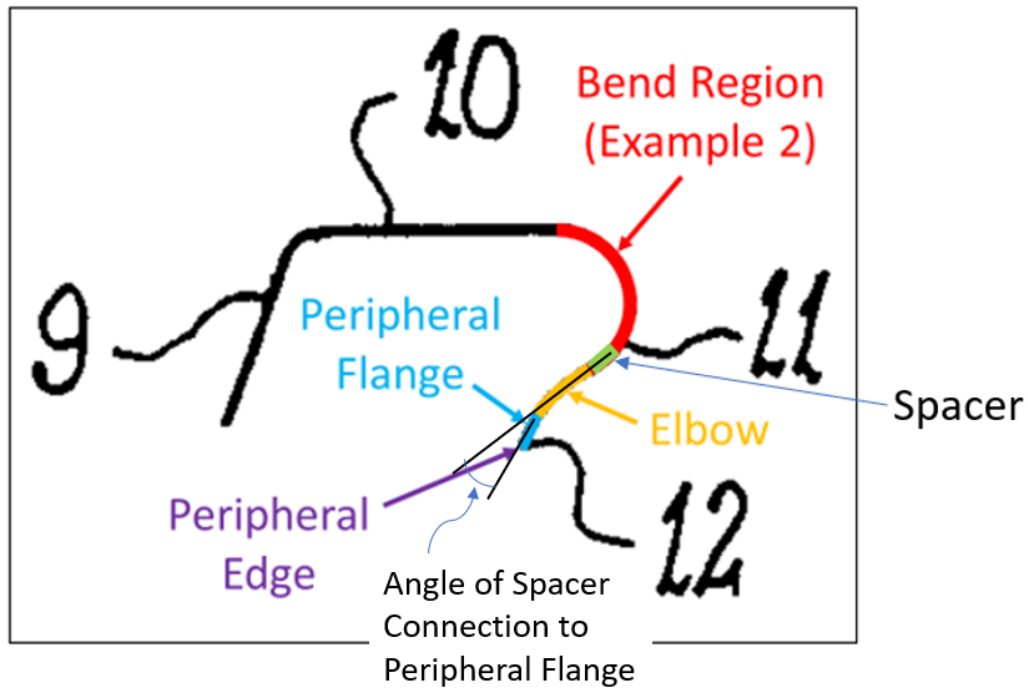


Portelli, Fig. 8 (annotated). EX1003, ¶84.

Thus, the combination of Portelli's Figs. 8 and 13 teach a bend region having a smooth contour and interconnecting the extension, at an approximately (or exactly at a) right angle, with a spacer. The extensions illustrated in Portelli Figures 8 and 13 are interchangeable and can be combined. This is because both drawings are referenced by Portelli in disclosing the prior art of rolled flanges with displaced peripheral flanges resulting in smooth tray peripheries. *See* Portelli, 14:10-28. EX1003, ¶¶85-86.

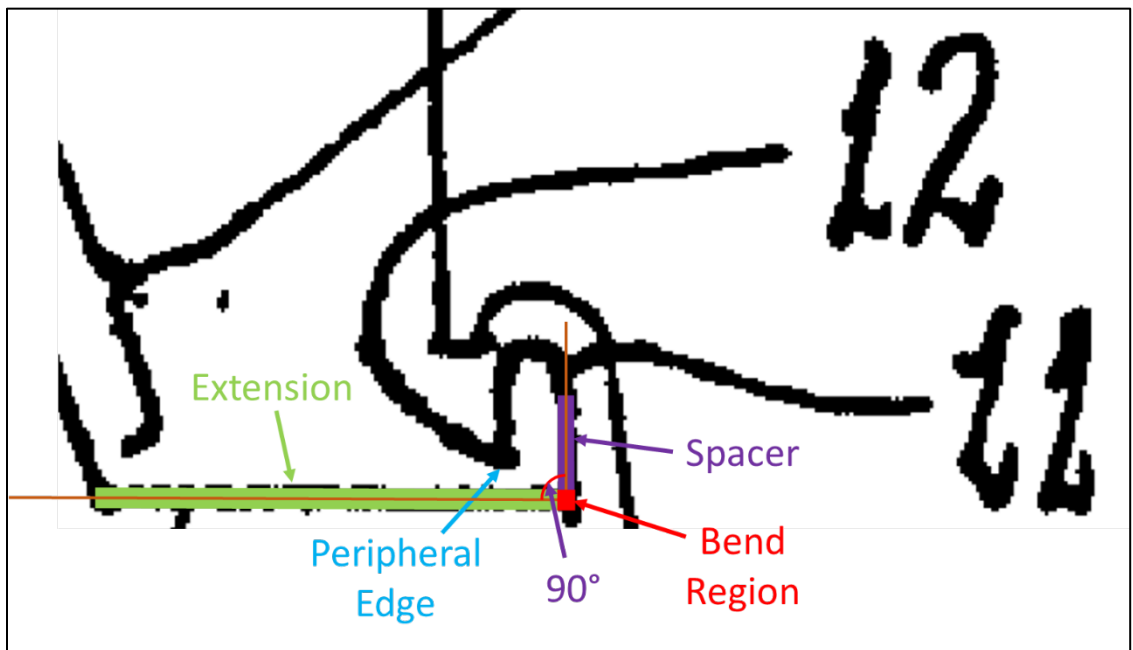
e. 1[D]:

Given the curvature of the elbow taught by Portelli, the **spacer and peripheral flange are connected at an angle other than 180 degrees**. The angle of connection shown in Portelli Figure 13 is far less than 180 degrees, measuring only approximately 30 degrees:



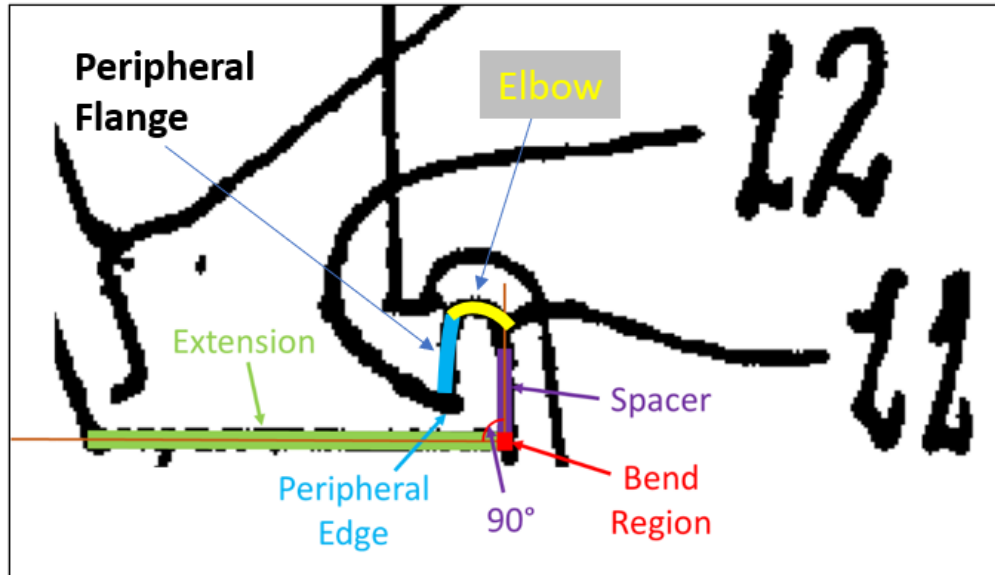
Portelli, Fig. 13 (annotated). EX1003, ¶92.

The vertical segment in the middle of Fig. 8 below also comprises a spacer:



Portelli, Fig. 8 (annotated). EX1003, ¶93.

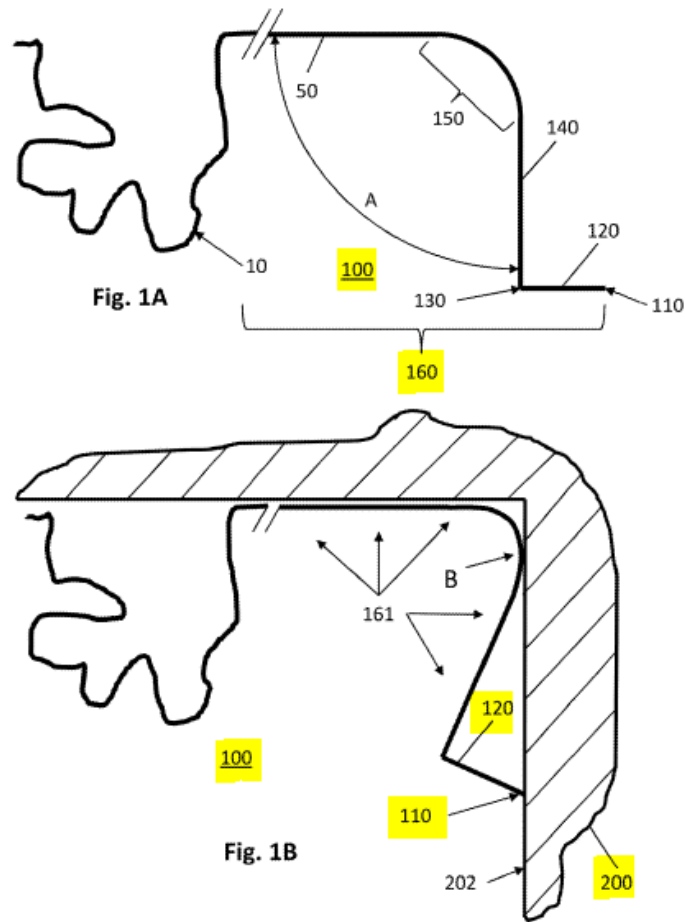
Portelli 's Fig. 8 also discloses an elbow and peripheral flange, with the elbow connecting the peripheral flange to the spacer at an angle other than 180 degrees:



Portelli, Fig. 8 (annotated). EX1003, ¶97.

f. 1[E]:

The '222 Patent Figure 1A shows a shaped thermoplastic article 100 with deflectable flange 160. In Fig. 1B, article 100 is inserted within an “upper body” (cavity), where “impingement of the peripheral edge 110 of the peripheral flange 120 ... causes the deflectable flange 160 to deflect.” EX1001, 6:13-36.



Ex. 1001. Figs. 1A, 1B. EX1003, ¶99.

Figure 1C “illustrates the outcome of inserting ram 300 into the interior of the upper body 200 behind the thermoplastic article 100” ... where it “causes even greater defection of the deflectable flange 160 and yielding a rounded periphery to article 100 at the point(s) B at which bending is induced within the bend region 150.”

EX1001, 6:37-48.

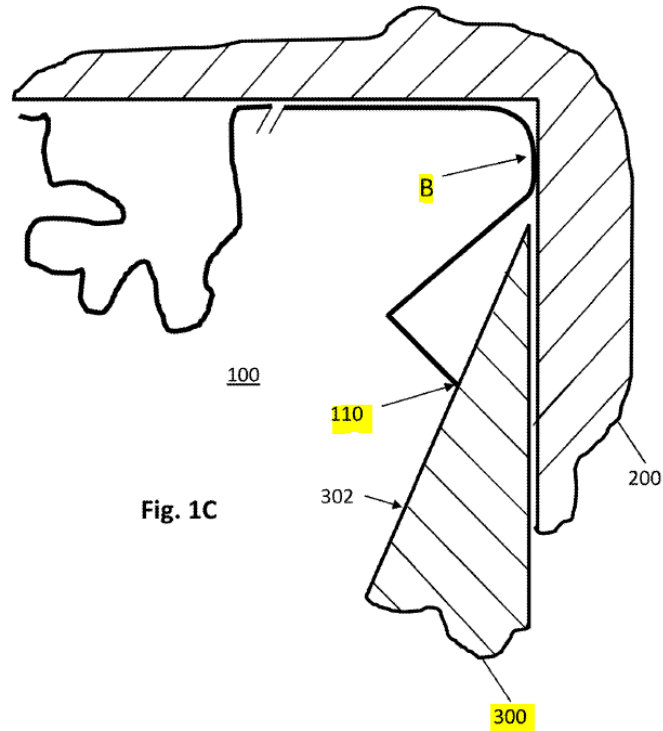
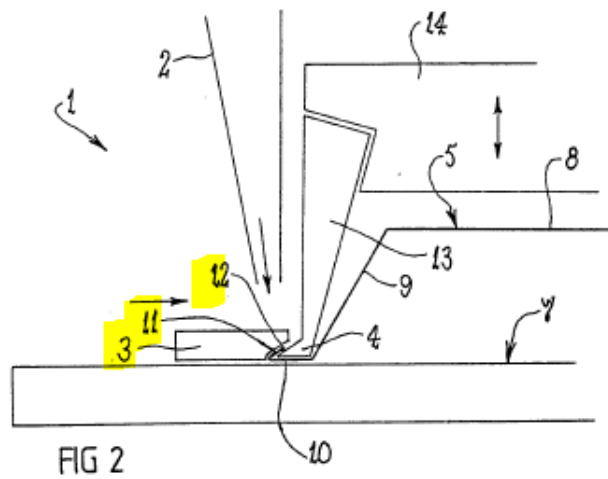
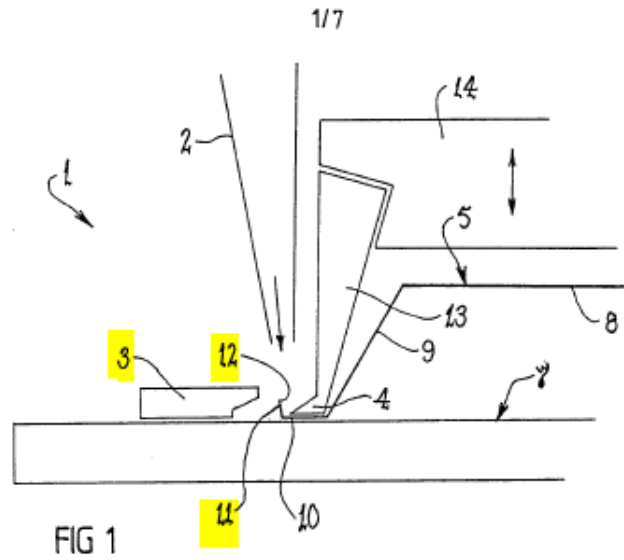


Fig. 1C

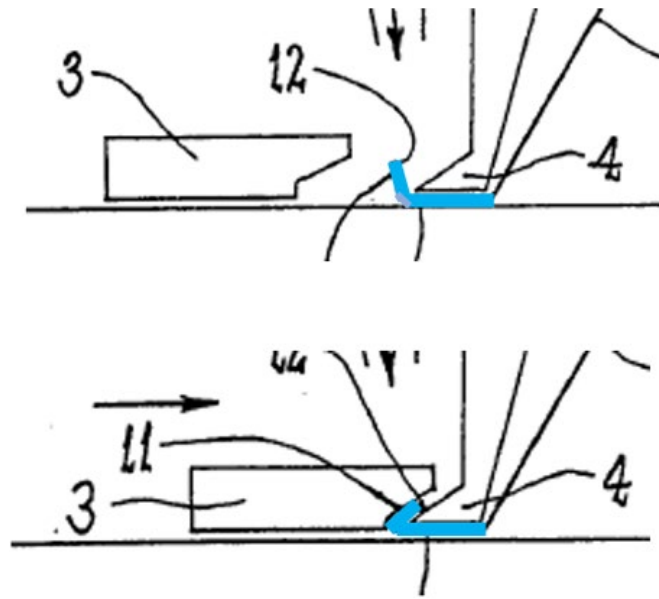
Ex. 1001 Fig. 1C. EX1003, ¶100.

Portelli shows *impinging a ram (3) against the peripheral flange (11) to deflect the spacer towards the extension (10), whereby the magnitude of the angle between the spacer and the extension is decreased on account of at least one portion of the deflectable flange becoming bent, relative to its pre-impingement position:*



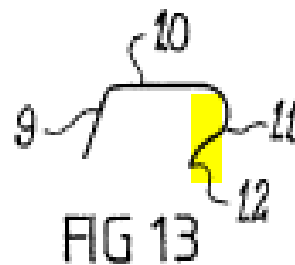
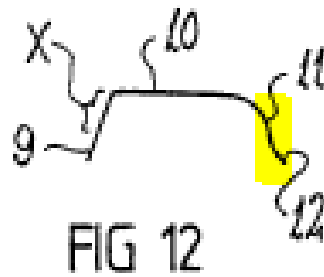
Portelli, Figs. 1 and 2 (annotated); EX1003, ¶101.

Excerpts of Portelli Figures 1-2 show how the impinging of ram (3) against peripheral flange (11) deflects the spacer towards extension (10), bending it and decreasing the angle therebetween:



Portelli, Figs. 1 and 2 (annotated); EX1003, ¶102; *see also* EX1003, ¶¶103-104 (similar impinging shown in Portelli Figs. 3, 4, 7, 8).

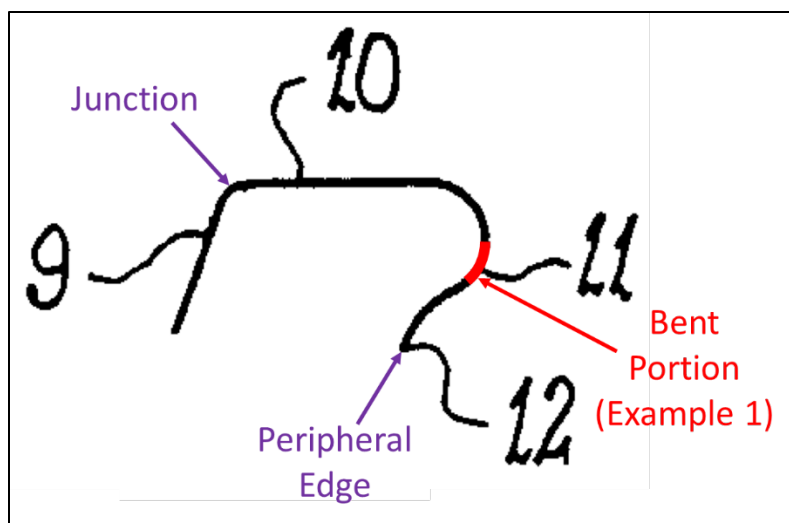
Portelli shows in Figure 12 the “pre-impingement position” of the peripheral flange, and in Figure 13 the effect of impinging a ram against the peripheral flange to deflect the spacer towards the extension. Portelli thereby teaches that the magnitude of the angle between the spacer and the extension is decreased on account of at least one portion of the deflectable flange becoming bent relative to its pre-impingement position:



Portelli, Figs. 12 and 13. EX1003, ¶107

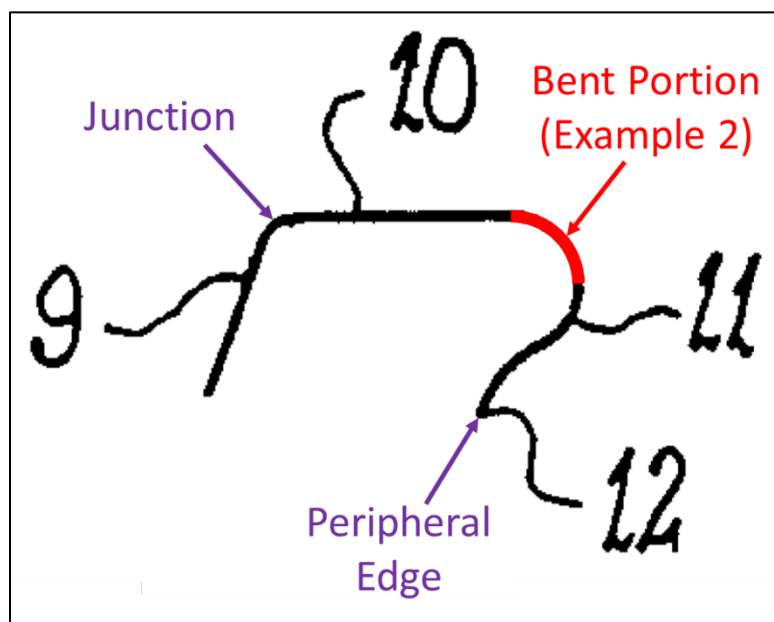
g. 1[F]:

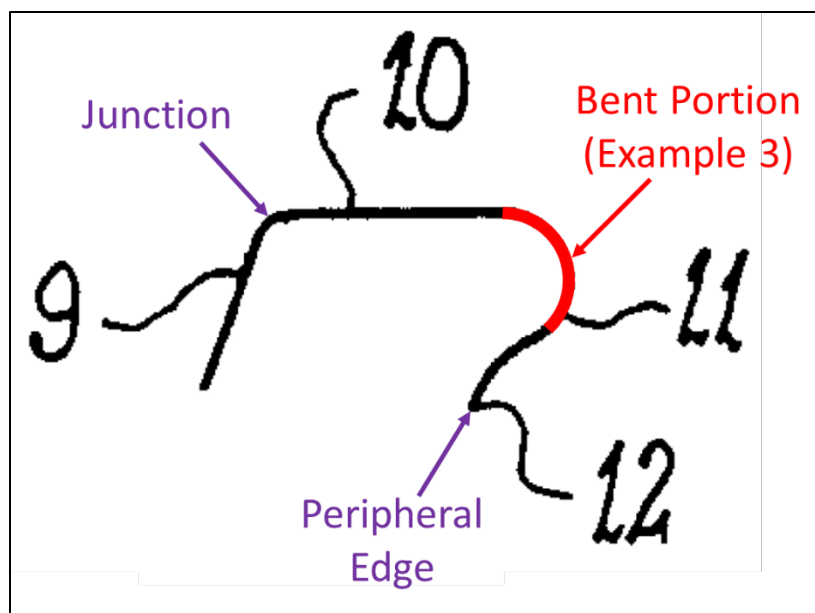
Portelli's Figure 13 discloses a peripheral edge 12 of thermoformable sheet and **bent portion** interposed between the peripheral edge and the junction between the body and the extension. Portelli illustrates the "bent portion" in several ways, including the lower portion of the curve highlighted on the right of Fig. 13 below (Example 1):



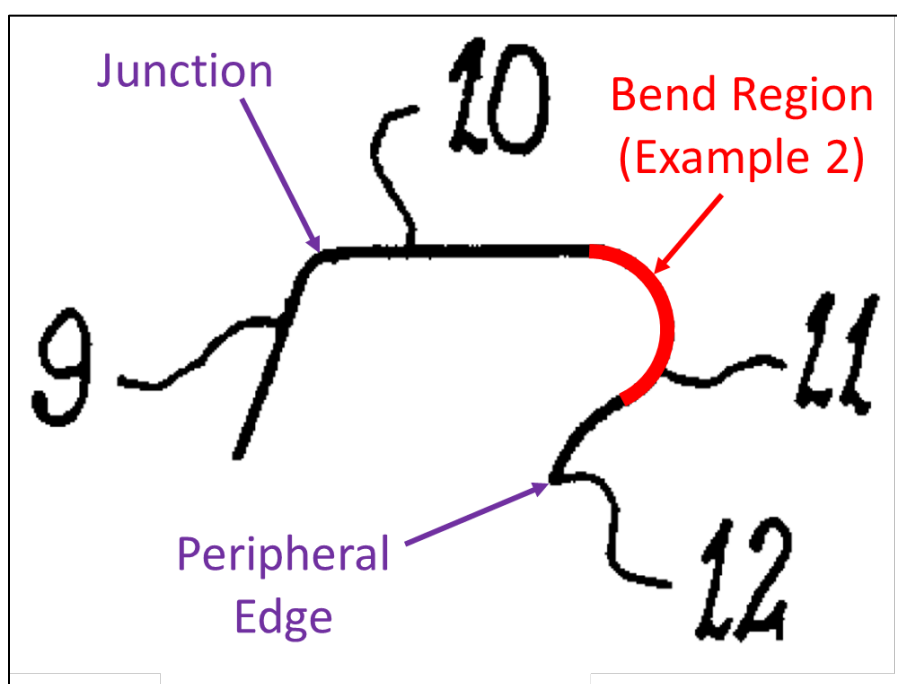
Portelli, Fig. 13 (annotated). EX1003, ¶110.

The “bent portion” is also disclosed in Portelli as the upper portion of the curve highlighted on the right side of Fig. 13 (Example 2), or the combination of the upper and lower portions of that curve (Example 3):





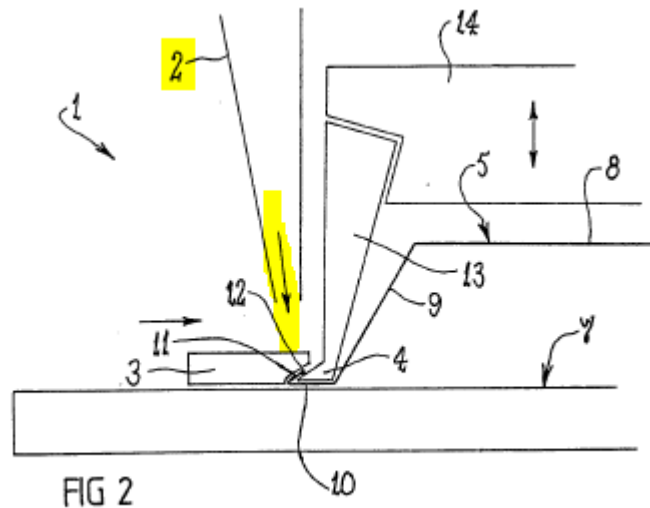
Portelli, Fig. 13 (annotated). EX1003, ¶111. As shown *supra* for claim element 1[C], this “bent portion” may coincide with at least the “bend region”:



Portelli, Fig. 13 (annotated). EX1003, ¶¶73-74.

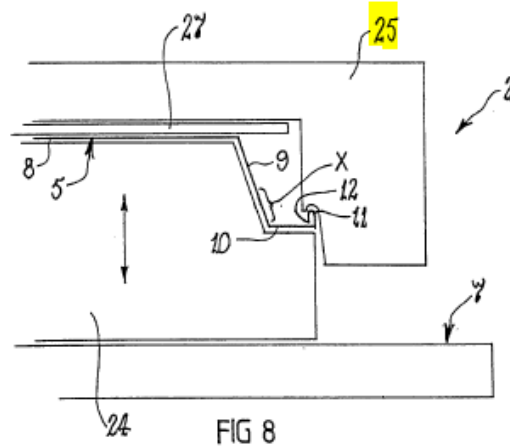
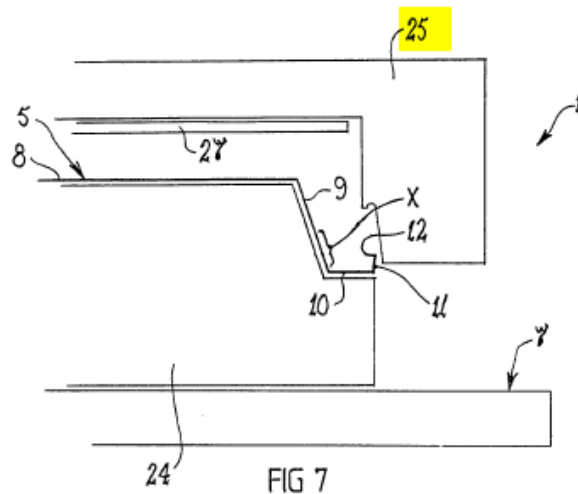
h. 1[G]:

Portelli describes the apparatus in Figure 2 as having a “heating means in the form of a hot air duct 2 through which hot air is blasted.” Portelli, 8:24-29.



Portelli, Fig. 2. EX1003, ¶112.

“[T]he tray 5 is positioned upside down, and **die 25 is configured so as to heat and deform the peripheral edge region 11** of the tray 5 by rolling, when it is brought into contact therewith. The **die 25 may be heated by any suitable heating means**. Such heating means will be well known to persons skilled in the art...” Portelli, 12:24-29.



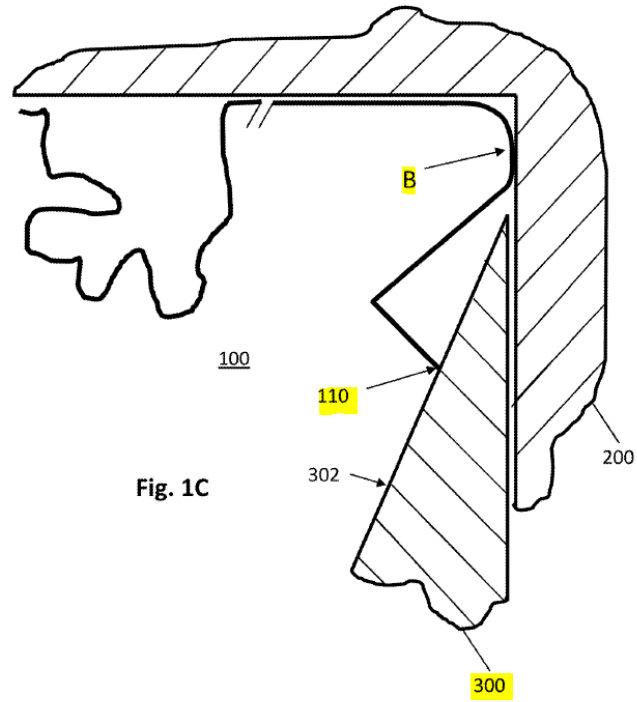
Portelli, Figs. 7-8. EX1003, ¶113.

Portelli explains that “heating means for heating the peripheral edge region of the tray to a temperature at which it is malleable.” Portelli, 6:4-5. Portelli further explains “Preferably the die is configured so as to heat the peripheral edge region of the tray when it initially engages the tray to a temperature at which the edge region is malleable, and thereafter to roll the peripheral edge region of the tray.” Portelli, 6:17-19. EX1003, ¶115.

Portelli further discloses that “One particularly suitable plastic from which the trays can be made softens at between 100 degrees C and 150 degrees C and becomes molten near 200 degrees C. Obviously however other plastics can also be used in carrying out this invention and such other plastics may soften and become molten at temperatures different to those specified above.” Portelli, 5:4-8. A POSITA would understand that Portelli’s references to thermoplastics becoming “malleable” and “softening” and becoming “molten” are synonymous with the claimed “glass transition temperature.” EX1003, ¶116.

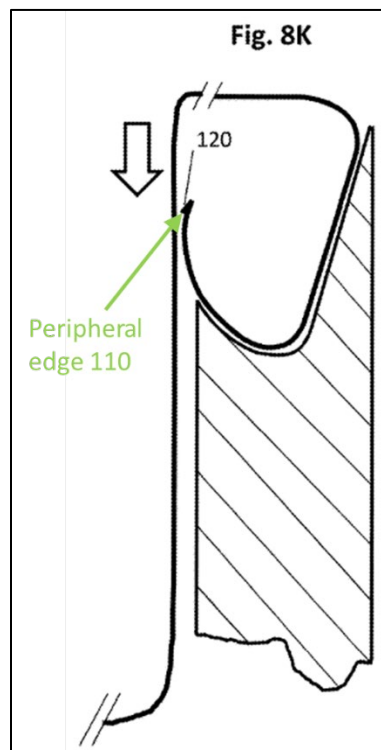
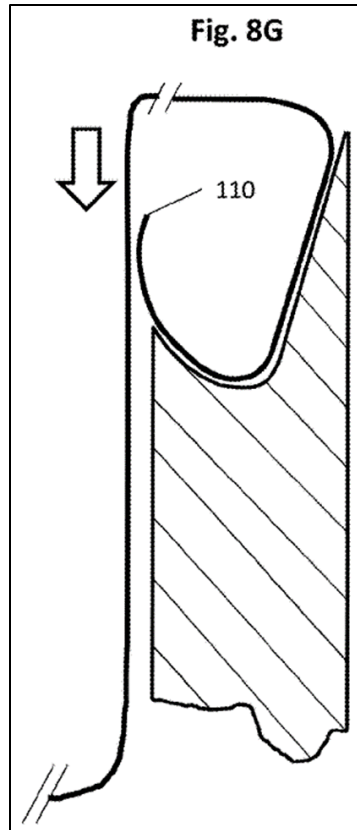
i. 1[H]:

According to the ’222 patent, Fig. 1C “illustrates the outcome of inserting ram 300 into the interior of the upper body 200 behind the thermoplastic article 100”... where it “causes even greater defection of the deflectable flange 160 and yielding a rounded periphery to article 100 at the point(s) B at which bending is induced within the bend region 150.” *Id* 6:37-48. Fig. 1C below shows ram 300 impinging the deflectable flange to deflect the spacer toward the extension:



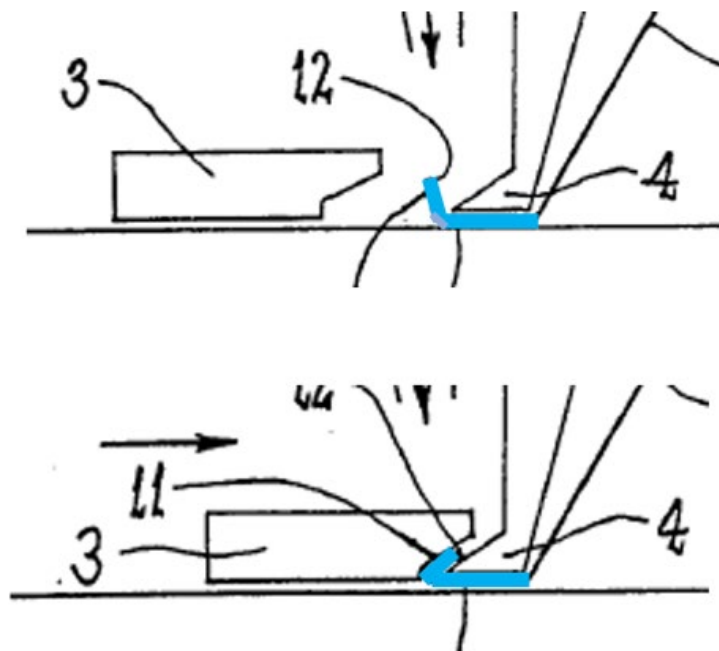
Ex. 1001, Fig. 1C. EX1003, ¶117.

The '222 patent illustrates ram 300 impinging deflectable flange to deflect spacer toward the extension:



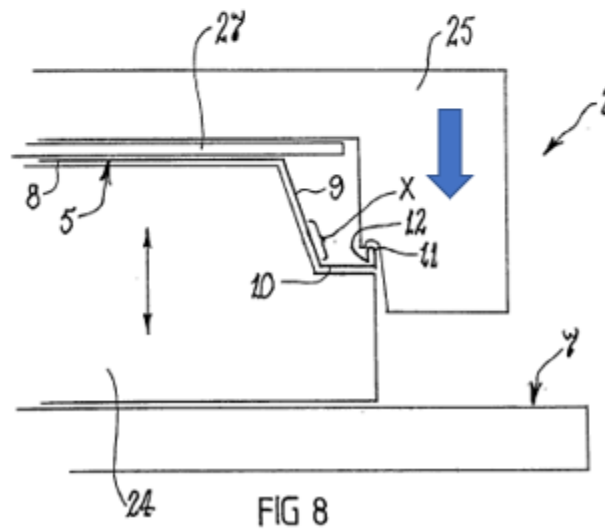
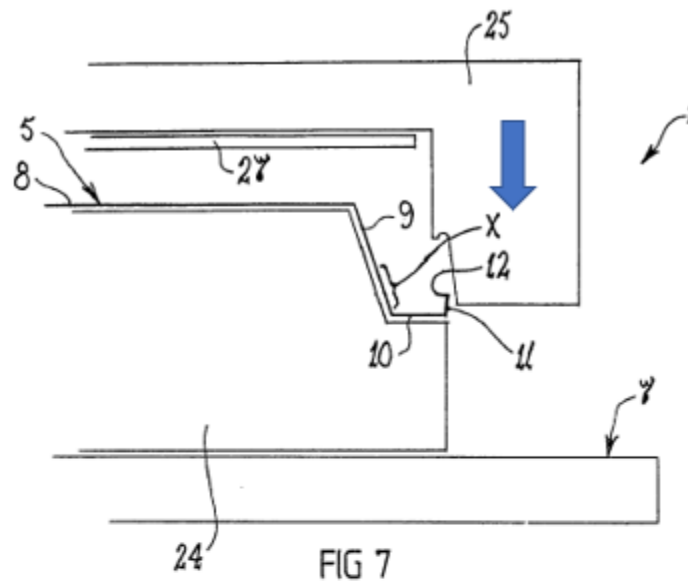
Ex. 1001, Figs 8G, 8K.

Portelli Figs. 1 and 2 show how the impinging of the ram (3) against the peripheral flange (11) deflects the spacer towards the extension (10), bending it and decreasing the angle therebetween:



Portelli, Figs. 1, 2. EX1003, ¶126.

Portelli Figures 7 and 8 show the ram moving towards the peripheral flange in increments with Figure 7's ram still some distance from the peripheral flange, and Figure 8 showing the ram having contacted the peripheral flange and deflected the spacer towards the extension, but still having some distance to travel and re-engage with the article.



Portelli, Figs. 7, 8. EX1003, ¶126.

“Advantageously the temperature gradient across the peripheral edge region is obtained by configuring the die such that it is in heat conductive contact with part of the peripheral edge region of the tray longer than other parts thereof.”

Portelli, 3:27-30. A POSITA would understand this to mean that through either ram configuration or further ram movement, the peripheral flange of the article can be further impinged in order to heat the bent portion to displace the flange and yield a smooth periphery. EX1003, ¶¶129-130.

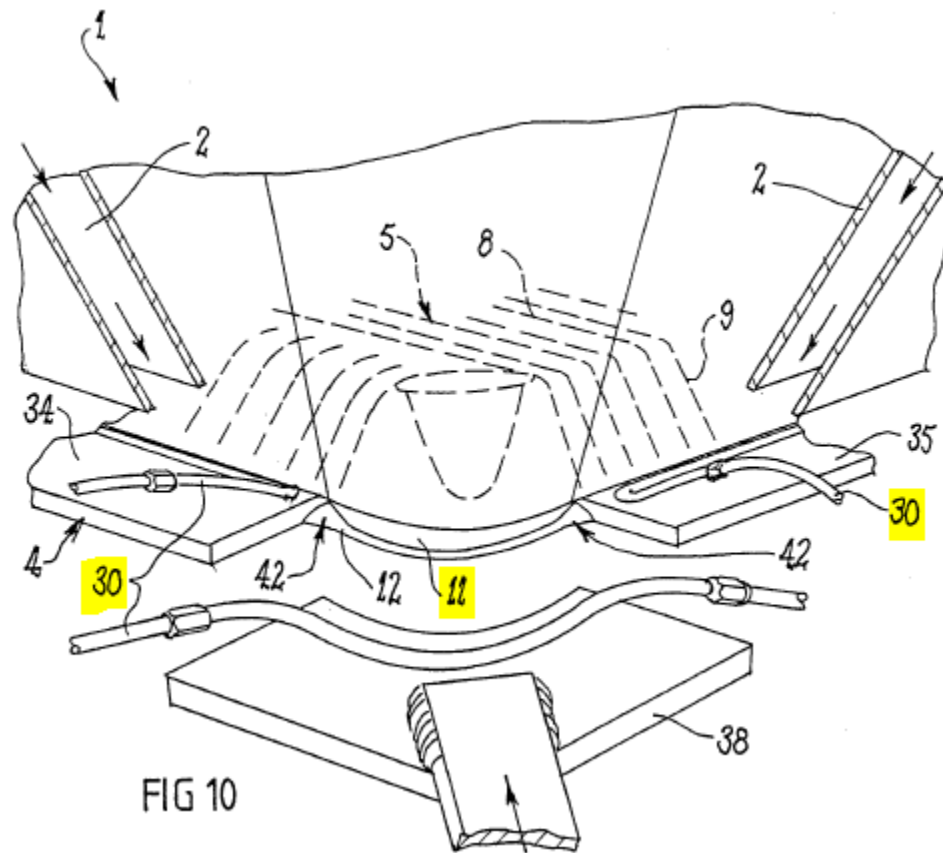
j. 1[i]:

Portelli discloses “The former 3 is then moved outwardly away from the peripheral edge region 11 and the clamping foot 9 is pivoted inwardly and upwardly relative to the clacker box 14 to free it from the deformed peripheral edge region 11.” Portelli, 10:1-3. Similarly, Portelli describes “The straight edge or linear portions 34-37 are then retracted back from the tray edge...” signifying the “discontinuation of (a portion of) the impingement,” and describes the final results as “a neat tray edge corner having a smooth blended form with a rounded profile.” Portelli, 11:8-14. EX1003, ¶¶131-132.

2. Claim 2:

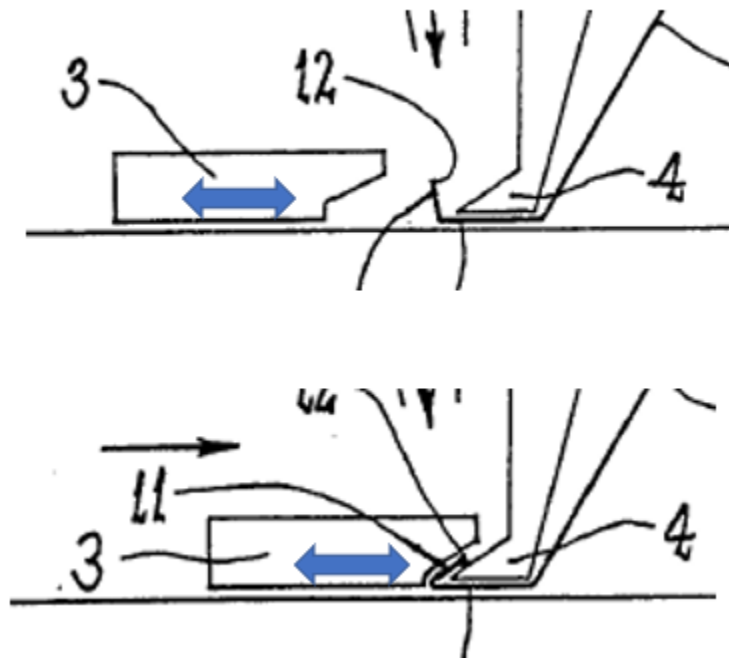
Portelli describes cooling of the article’s bent portion after displacing the sharp peripheral edge: “Typically the method includes cooling the peripheral edge region of the tray such that it sets and hardens with the terminal edge displaced out of the wrap path.” Portelli, 3:6-8. Portelli further describes a method of cooling to include “...actively cooling the peripheral edge region of the tray using cooling water.” Id. 4:10-12. “Advantageously the apparatus of this embodiment also

includes cooling means for actively cooling the peripheral edge region of the tray. Such cooling means typically includes cooling water which is passed over the former.” Id. 7:4-6. *See also id.*, 8:25-26; 9:27-29; 10:6-8. In describing Figs. 9-11, Portelli states, “As discussed above cooling water is used to cool and harden the deformed peripheral edge region 11. The cooling water is circulated through pipes 30 mounted on the former 3 thereby acting to cool the former 3 which in turn cools the region 11.” Id. 10:21-24.



Portelli, Fig. 10. EX1003, ¶133.

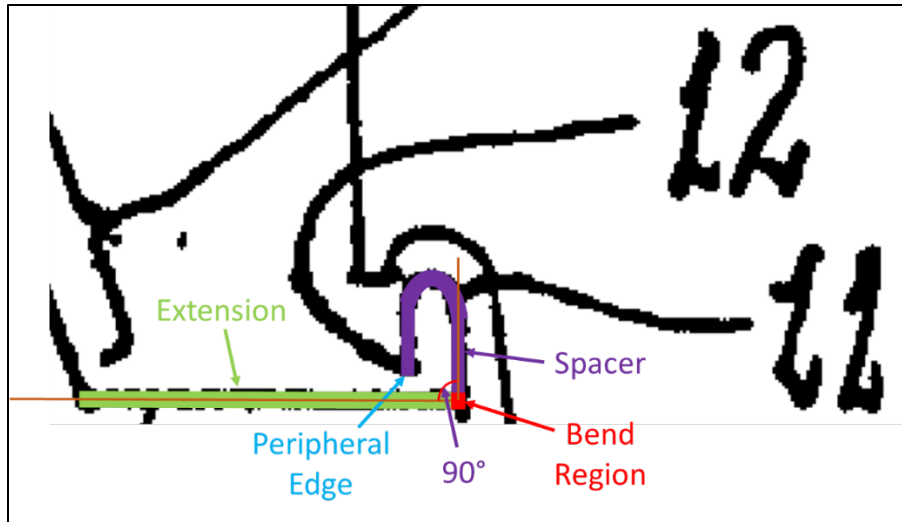
Portelli teaches disengaging the ram from the deflectable flange: “The former 3 is then moved outwardly away from the peripheral edge region 11 and the clamping foot 9 is pivoted inwardly and upwardly ... to free it from the deformed peripheral edge region 11.” *Id.* 10:1-5. Portelli’s Figs. 1 and 2 depict the slidable ram (3) which can move to engage and disengage the deflectable flange (11):



Portelli, Figs. 1, 2; *see also id.*, Figs. 7, 8. EX1003, ¶¶134-135.

3. Claim 3:

Portelli discloses a bend region which interconnects the spacer with the extension at an angle of 90 degrees, which is “not less than 75 degrees, but less than 105 degrees”:



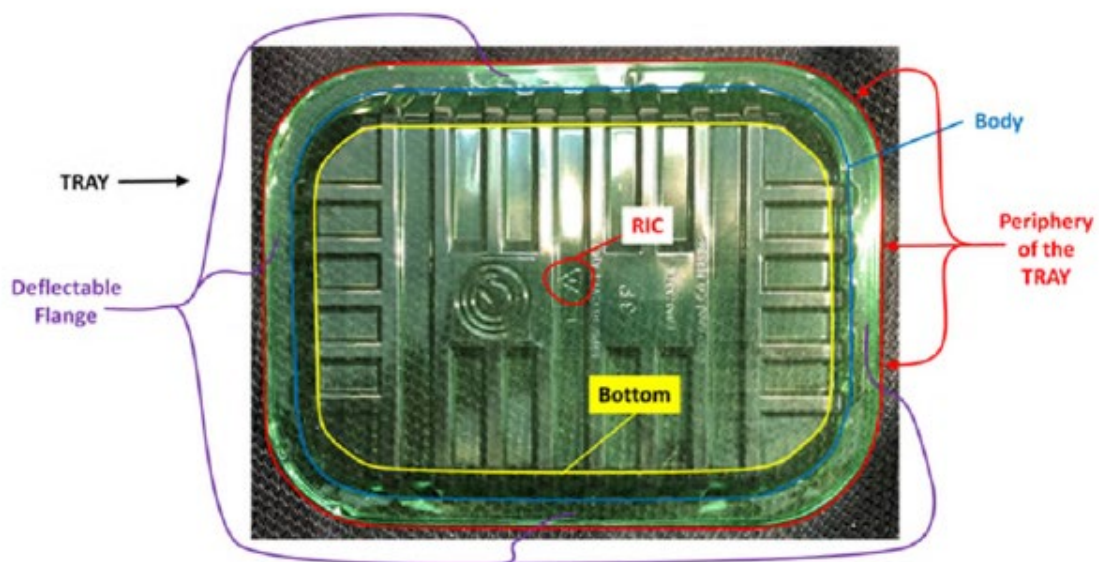
Portelli, Fig. 8. EX1003, ¶138.

4. Claim 4:

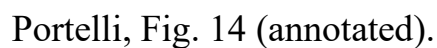
See arguments *supra* for claim 3. EX1003, ¶¶139-140.

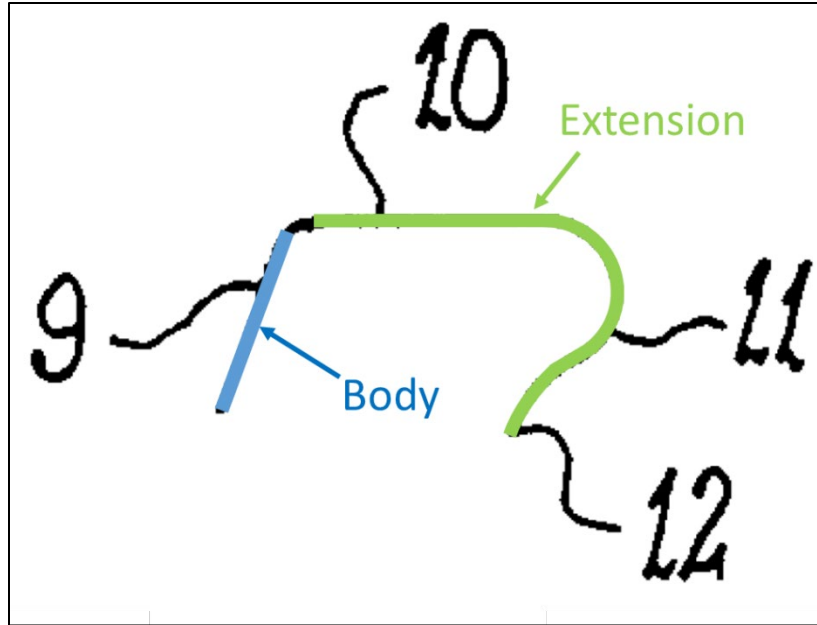
5. Claim 5:

Patent Owner in their First Amended Complaint refer to an article with a body and deflectable flange:



Portelli discloses a tray with a “circumferential peripheral rim 58 [which] projects outwardly away from the upper end of the side wall 57,” i.e. a “deflectable flange about its entire periphery.” Portelli, 15:27-30. The combination of the rim 10/58, peripheral edge region 11, and terminal edge 12 (same as ’222 patent’s “peripheral edge”) form an extension, which is equivalent to the claimed deflectable flange:



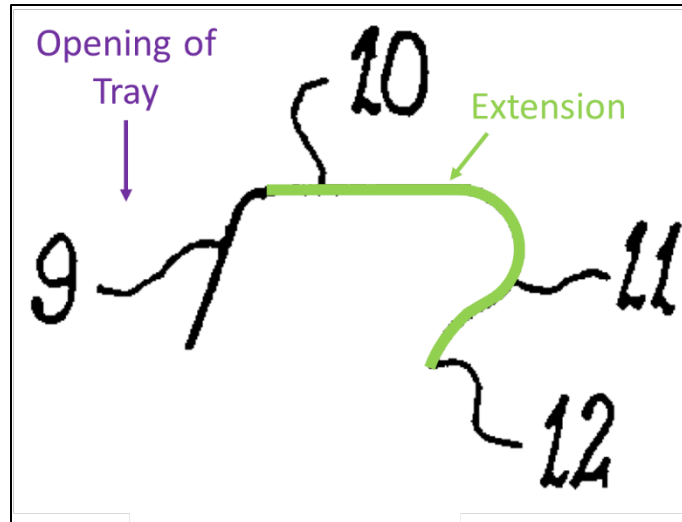


Portelli, Fig. 13 (annotated, showing extension, i.e. deflectable flange connecting to the article's body). EX1003, ¶¶144-145.

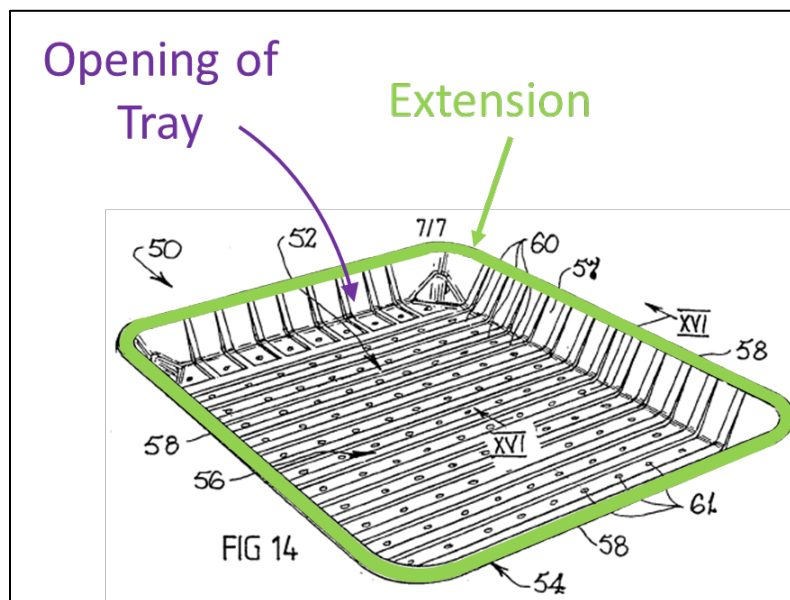
6. Claim 6:

See arguments supra for claim 5.

Portelli's Fig. 13 extension includes "rim 10" (item 58 in Fig. 14), peripheral edge region 11, and peripheral edge 12, *id.* 14:11-13, and with the opening being the area to the left of sidewall 9 as shown below in Fig. 13. Portelli Fig. 14 shows peripheral rim 58 and thereby tray extension, encircling the tray opening:



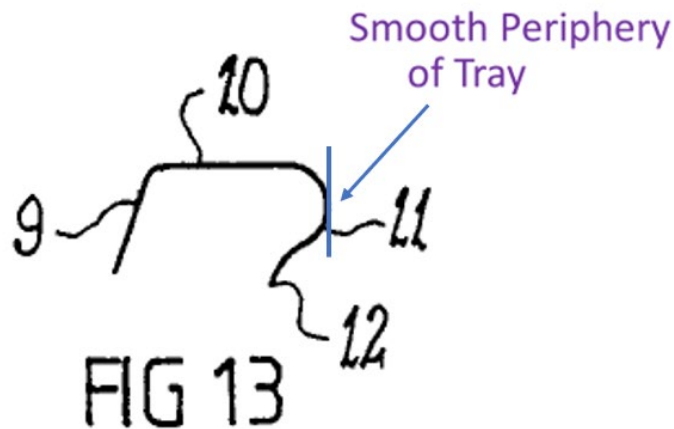
Portelli, Fig. 13.



Portelli, Fig. 14. EX1003, ¶¶147-149.

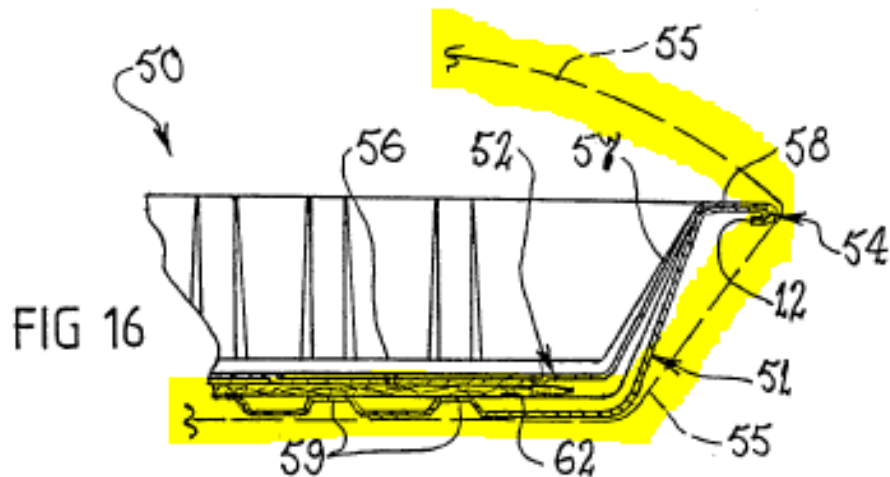
7. Claim 7:

Portelli discloses a smooth periphery at the outermost perimeter of the tray. This smooth periphery is shown in Portelli Fig. 13, marked at the far right of the “peripheral edge region 11”:



Portelli, Fig. 13. EX1003, ¶¶150-151.

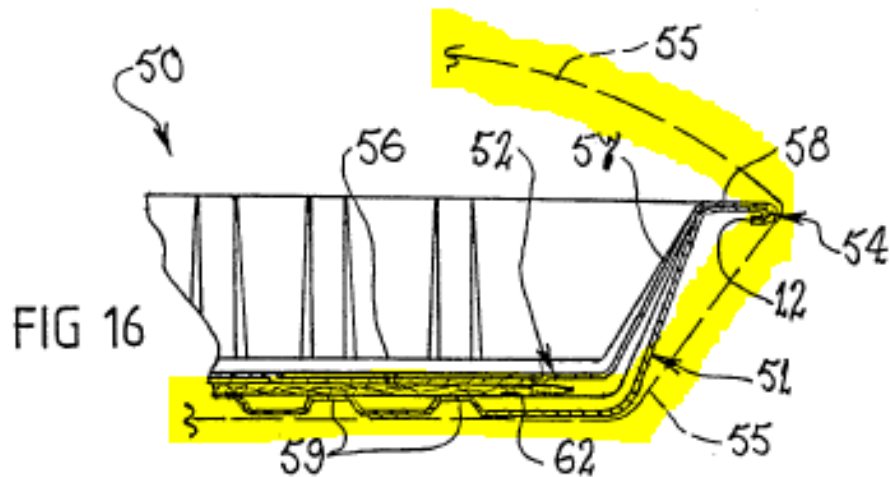
Portelli teaches sealing the tray's compartment using a film that contacts the smooth periphery of the body about the entire periphery of the opening: "this invention relates to *trays for packaging which are wrapped in plastic film or plastic wrap*, methods of producing such trays, and apparatus for producing such trays." Id. 1:2-5. Portelli's Fig. 16 shows the "terminal edges 12 ... are folded downwardly inwardly well out of the wrap path and the tray 50 presents a less aggressive edge 54 to the wrap path 55 [highlighted below] ... providing a tray with a peripheral edge 54 which does not damage plastic wrap." Id. 15:20-26.



Portelli, Fig. 16 (showing sealing compartment using film that contacts the smooth periphery of the body). EX1003, ¶¶152-153.

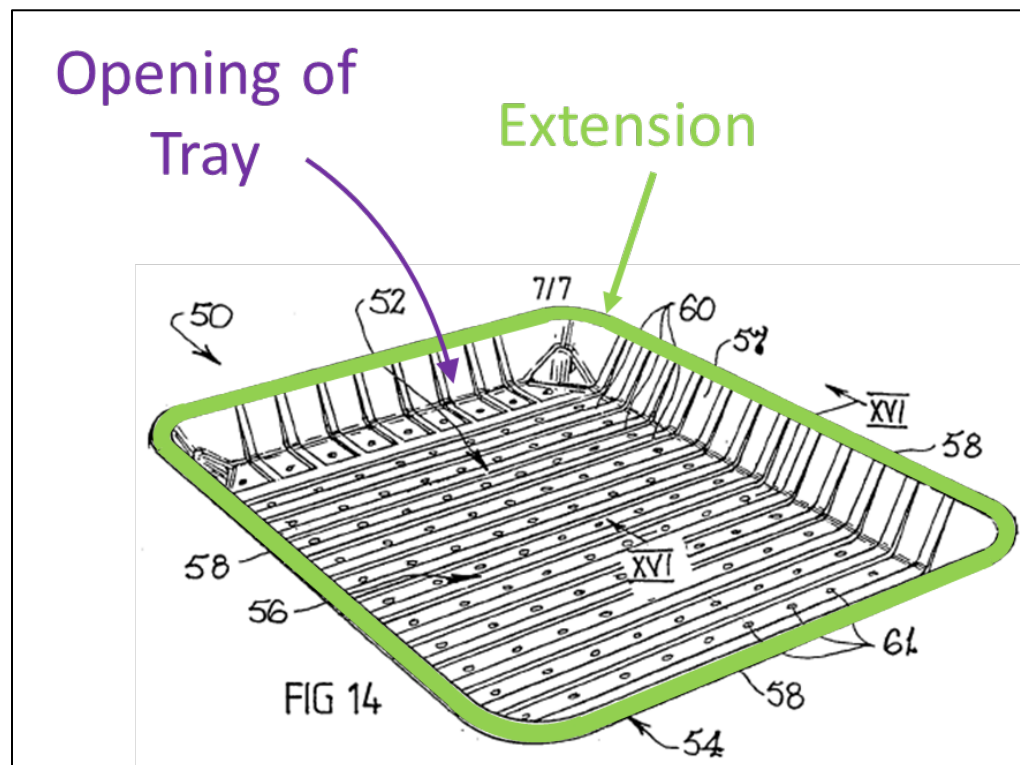
8. Claim 8:

See arguments *supra* for claim 7.



Portelli, Fig. 16 (showing sealing compartment using over wrap film that seals to itself to envelop the body per wrap path 55); *Id.*, 1:2-5; 15:20-26. EX1003, ¶¶154-156.

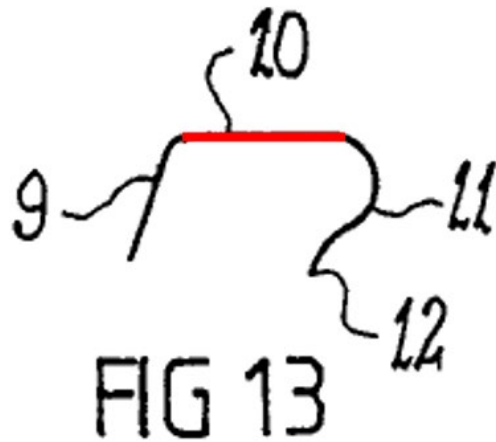
The extension, i.e. deflectable flange encircles the entire periphery of Portelli's thermoplastic article. A POSITA would readily understand that common over-wrapping applications such as shrink wrapping or flow wrapping (i.e. horizontal form-fill-seal, or HFFS) necessarily requires the film to seal to itself and envelop the body.



Portelli, Fig. 14 (annotated to show body and periphery about which an over wrap film would seal to itself). EX1003, ¶157.

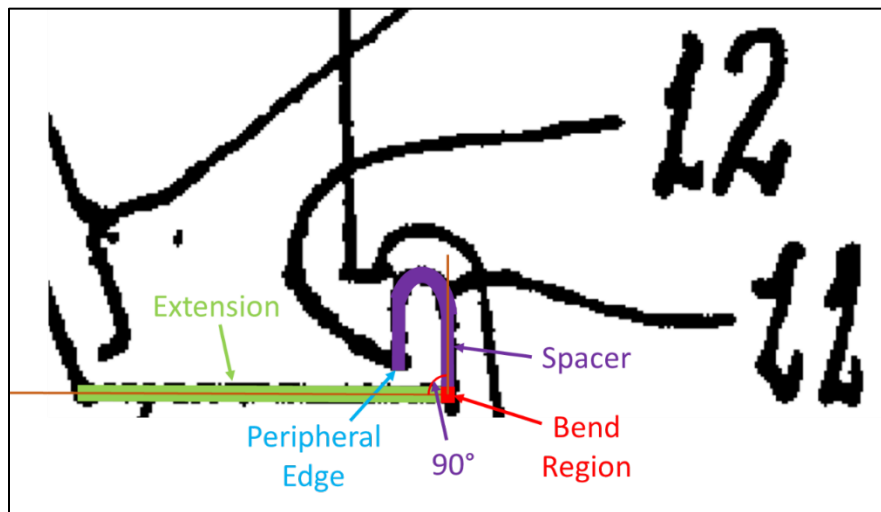
9. Claim 9:

Portelli Figure 13 shows an extension with a flat, horizontal portion (annotated red), which Portelli identifies as “rim” 10:



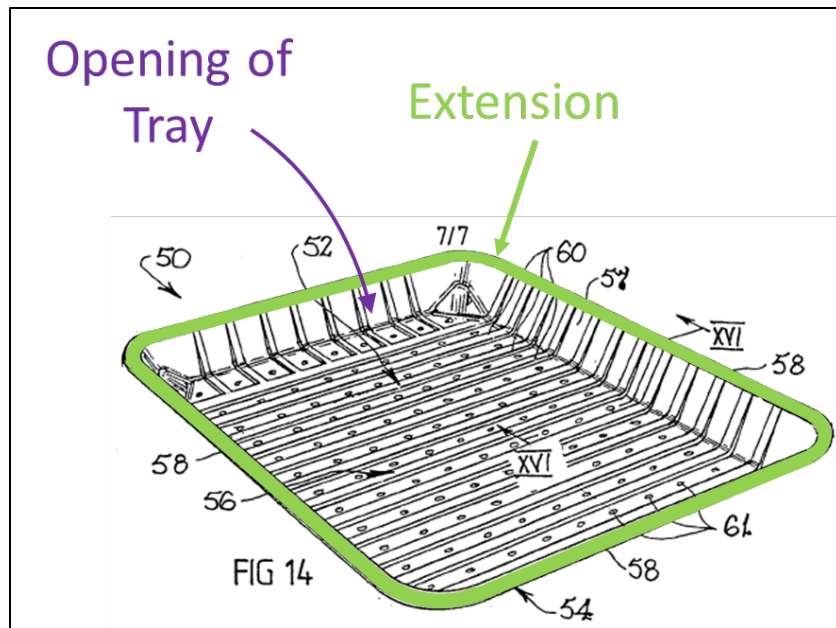
Portelli, Fig. 13 (rim 10 highlighted). EX1003, ¶¶158-159.

Portelli Figure 8 shows a flat, horizontal extension portion, annotated in green:



Portelli, Fig. 8. EX1003, ¶160.

The extension encircles the entire periphery of Portelli's thermoplastic article.

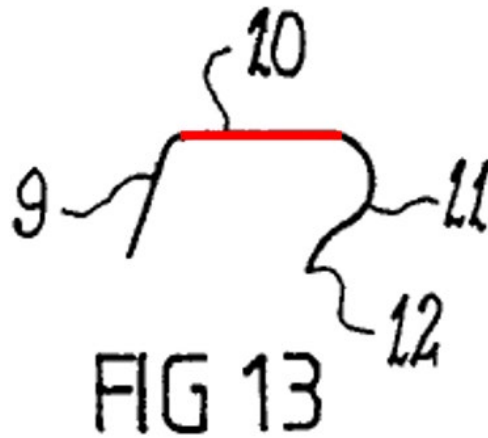


Portelli, Fig. 14. EX1003, ¶161.

A POSITA would have understood that common techniques for “applying a film across the opening of the compartment and sealing the film about the periphery” would include the common practice of heat sealing. A POSITA would further understand that Portelli’s tray includes the necessary flat, horizontal extension around the tray’s entire periphery, and would be motivated to use such a tray and features in this manner, given the commonality and ubiquitous nature of such sealing techniques. EX1003, ¶162.

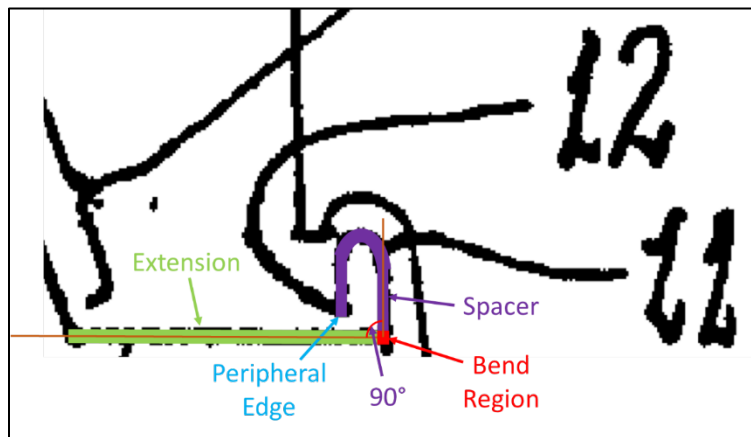
10. Claim 10:

This claim refers to tray sealing technique commonly known in the art as “VSP,” or vacuum sealed packaging. Portelli Figure 13 shows an extension which includes a flat, horizontal portion (annotated in red), also identified as “rim” 10:



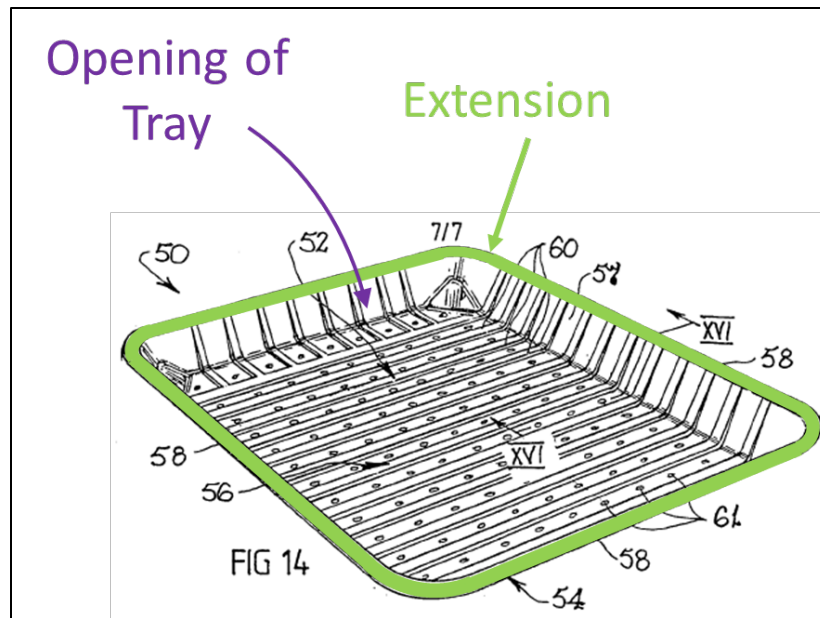
Portelli, Fig. 13 (showing flat, horizontal sealing portion of extension). EX1003, ¶¶163-164.

Portelli Figure 8 shows a flat, horizontal extension portion:



Portelli, Fig. 8 (showing flat, horizontal sealing portion of extension in green). EX1003, ¶165.

The extension encircles the entire periphery of Portelli's thermoplastic article.

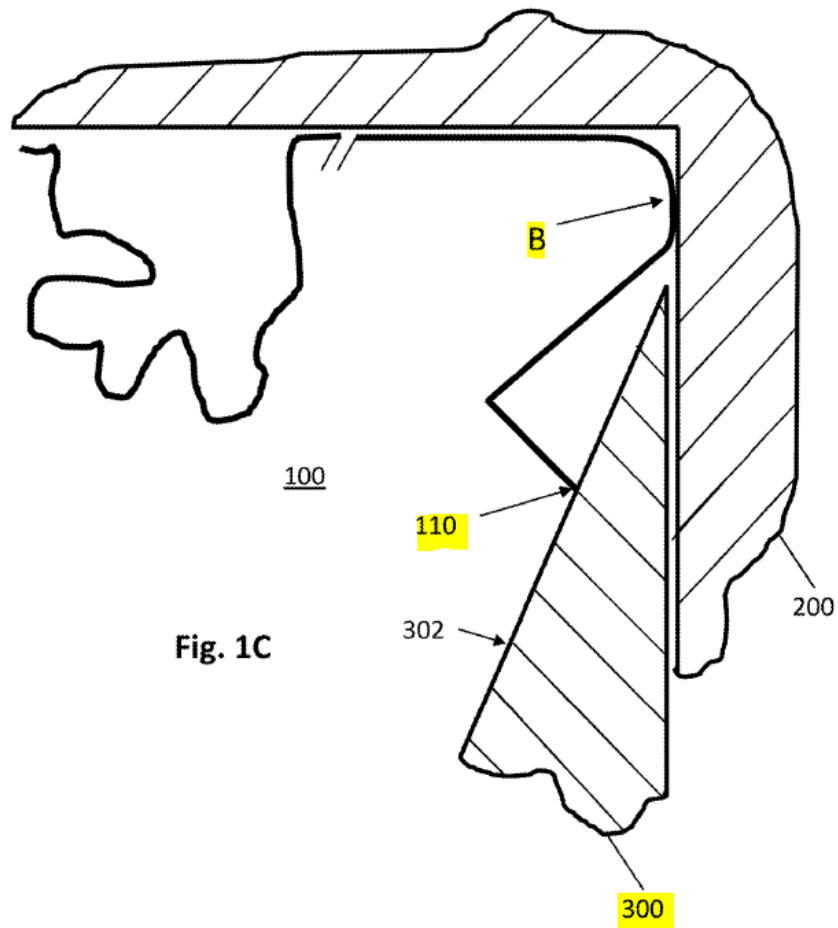


Portelli, Fig. 14 (showing body and periphery about which a VSP film would be sealed). EX1003, ¶166.

A POSITA would have understood that Portelli's tray includes the necessary flat, horizontal extension around the tray's entire periphery, and would be motivated to use such a tray and features for film which is thermoformable and is disposed in a softened state around the smooth periphery of the body and cooled below its softening temperature such that the film must be stretched outwardly about the smooth periphery of the body in order to displace the film from the opening. EX1003, ¶167.

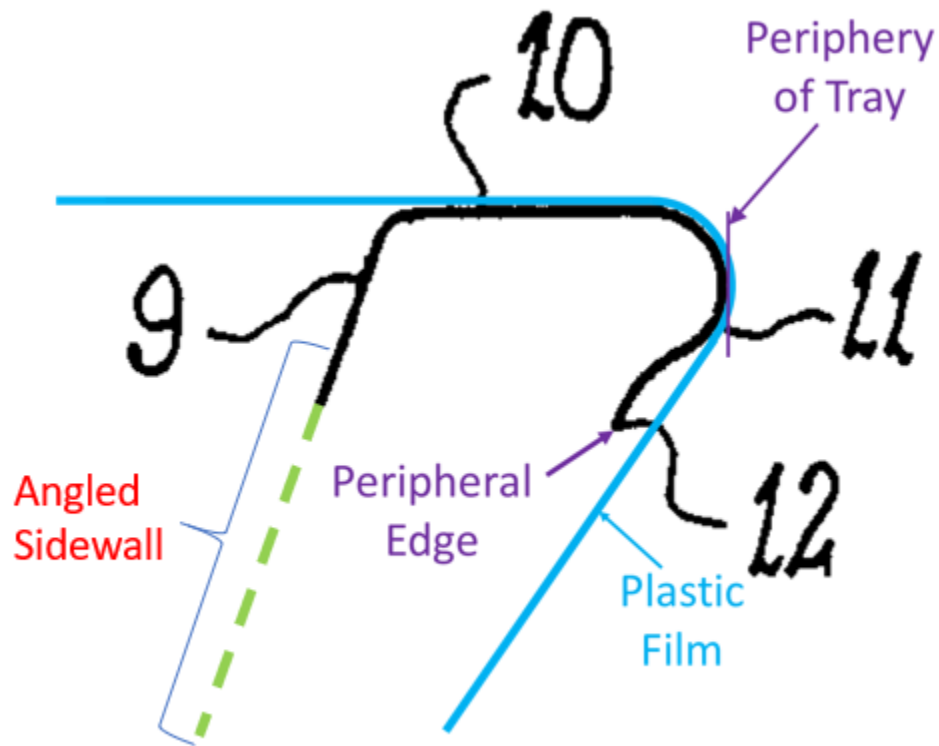
11. Claim 11:

Figure 1C in the '222 patent illustrates ram 300 and peripheral edge of article 110:



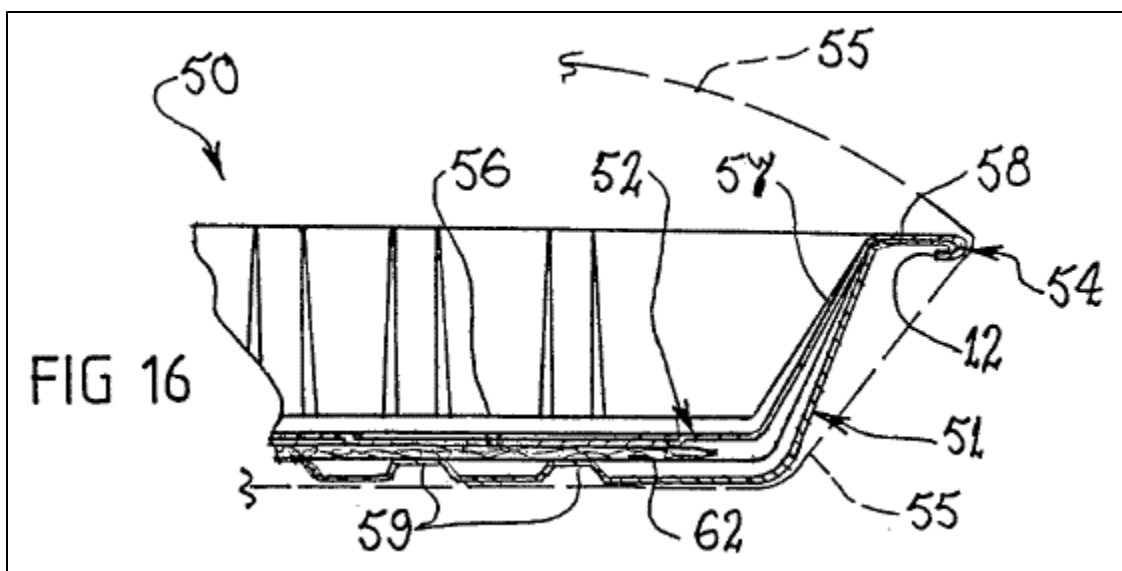
Ex. 1001 Fig. 1C (“B” points to induced bending).

Portelli Fig. 13 shows peripheral edge 12 will not contact, cut or damage the plastic overwrap film, since peripheral edge is displaced sufficiently away from the “wrap path”:



Portelli, Fig. 13 (annotations, including green dotted line depicting tray sidewall, plastic film denoted in blue). EX1003, ¶¶170-171.

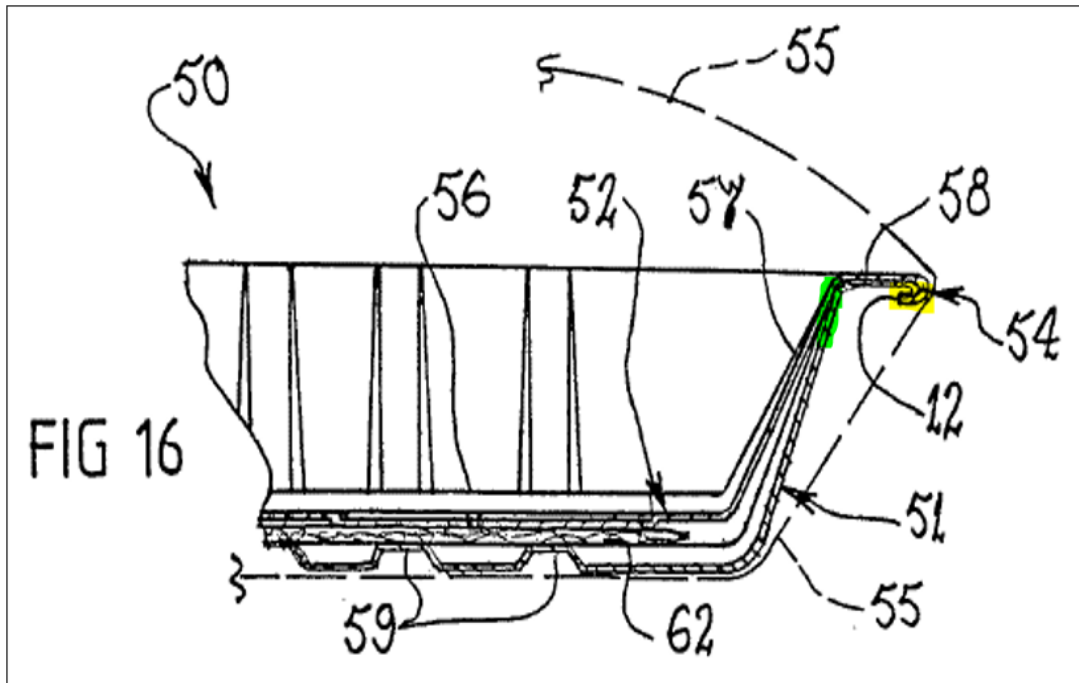
Figure 16 of Portelli shows the peripheral edge 12 displaced inward, away from film 55 so that film 55 does not contact the peripheral edge 12:



Portelli, Fig. 16. EX1003, ¶172.

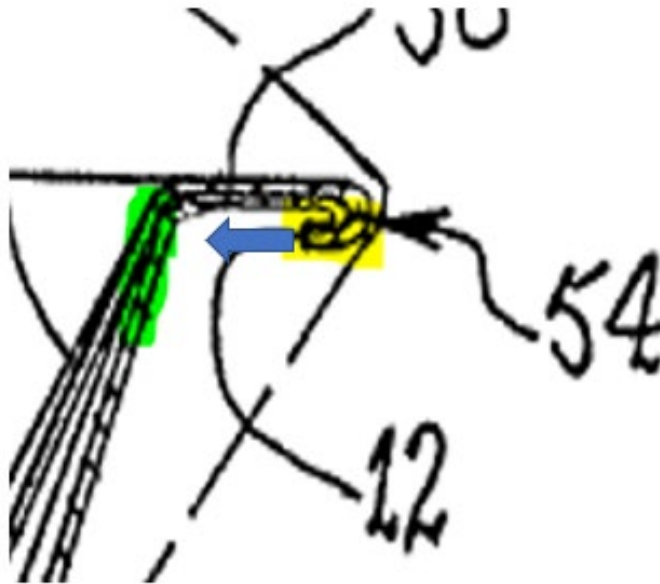
12. Claim 12:

Figure 16 of Portelli, which shows the peripheral edge 12 (yellow), after formation and cooling of the bent portion, displaced inward and *points at the tray's body* (green):



Portelli, Fig. 16. EX1003, ¶¶174-175.

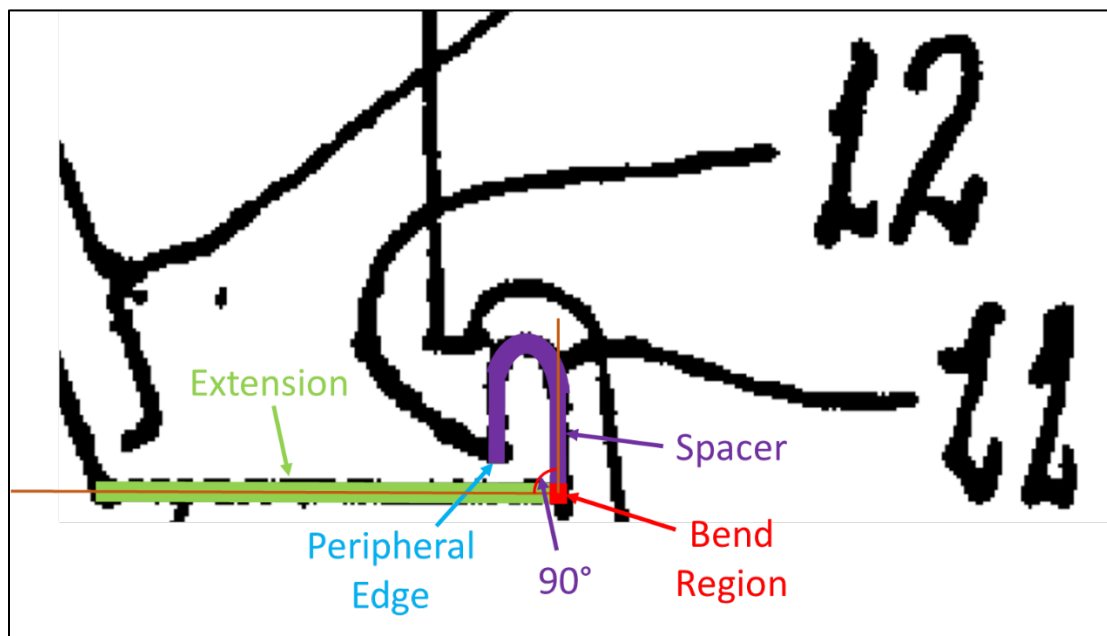
Figure 16 shows peripheral edge 12 (yellow), after formation and cooling of the bent portion, displaced inward and *pointing (blue arrow) at the tray's body (green)*:



Portelli, Fig. 16. EX1003, ¶¶176-177.

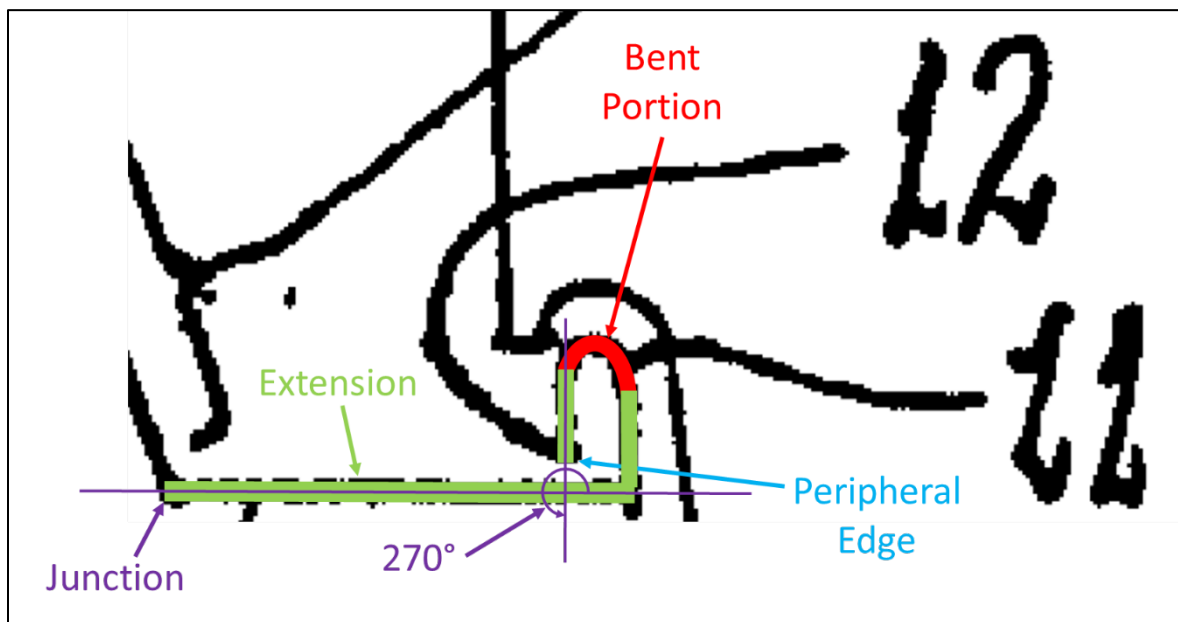
13. Claim 13:

As previously shown, Portelli's Fig. 8 discloses a bend region which interconnects the spacer with the extension at an angle of 90 degrees:



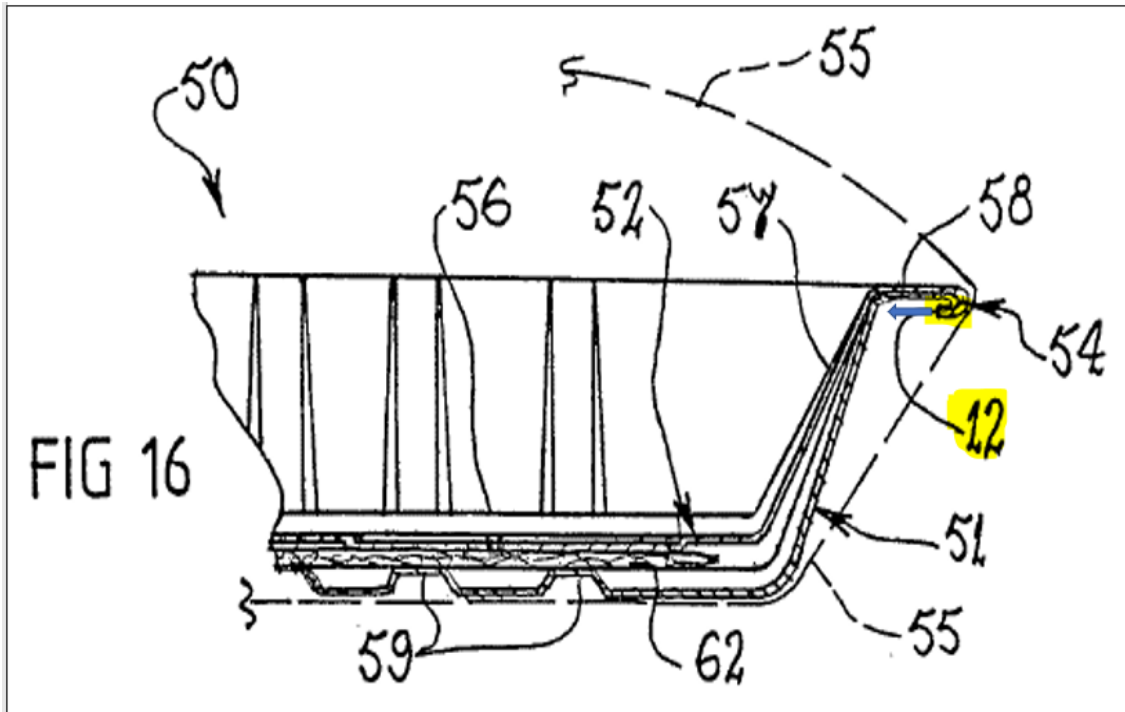
Portelli, Fig. 8 (annotated). EX1003, ¶¶178-179.

Portelli teaches a tray in which the bent portion is bent so far that the peripheral edge nearly touches the horizontal part of the extension. May measured the angle between those two lines by scanning Portelli Fig. 8 digitized file into QCAD 2D CAD version 3.26.1 software. Using the software's angle measurement tool, May determined the angle to be 270 degrees, which is not less than 180 degrees:



Portelli, Fig. 8 (annotated). EX1003, ¶180.

Portelli Fig. 16 shows the peripheral edge 12 (annotated yellow), after formation and cooling of the bent portion, displaced inward and in fact *offset from the plane of extension 180 degrees*, i.e. not less than 180 degrees (or displaced in the opposite direction, indicated by blue arrow):



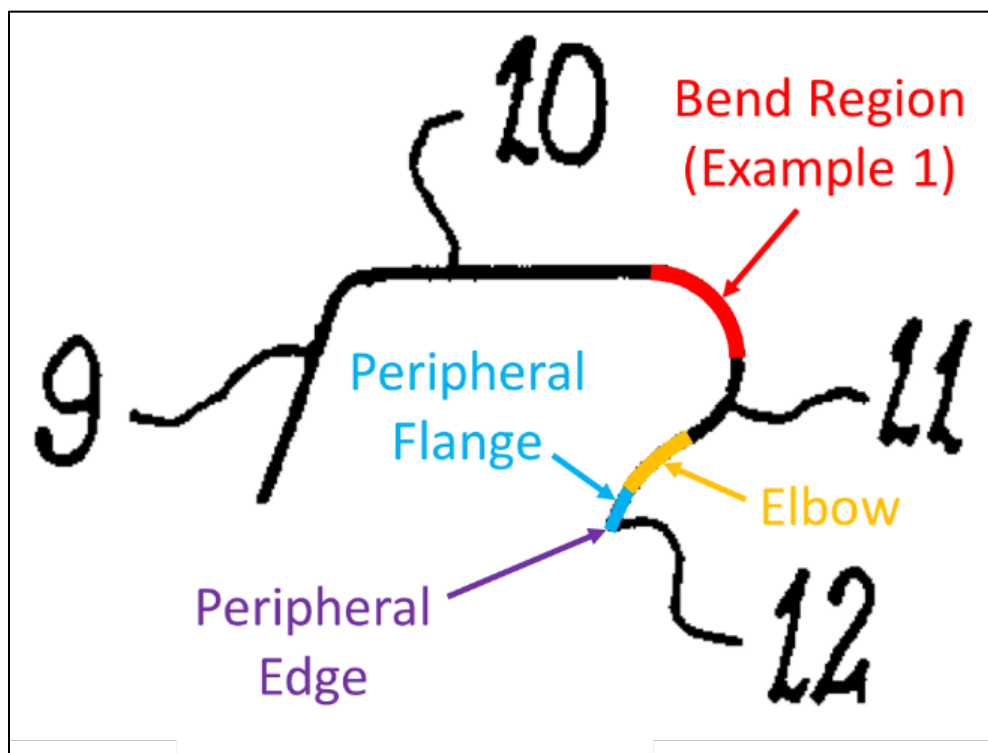
Portelli, Fig. 16 (showing peripheral edge 12 *offset from the plane of extension 180 degrees*). EX1003, ¶183.



Portelli, Fig. 16 (excerpt highlighting peripheral edge 12 *offset from the plane of extension 180 degrees*). EX1003, ¶184.

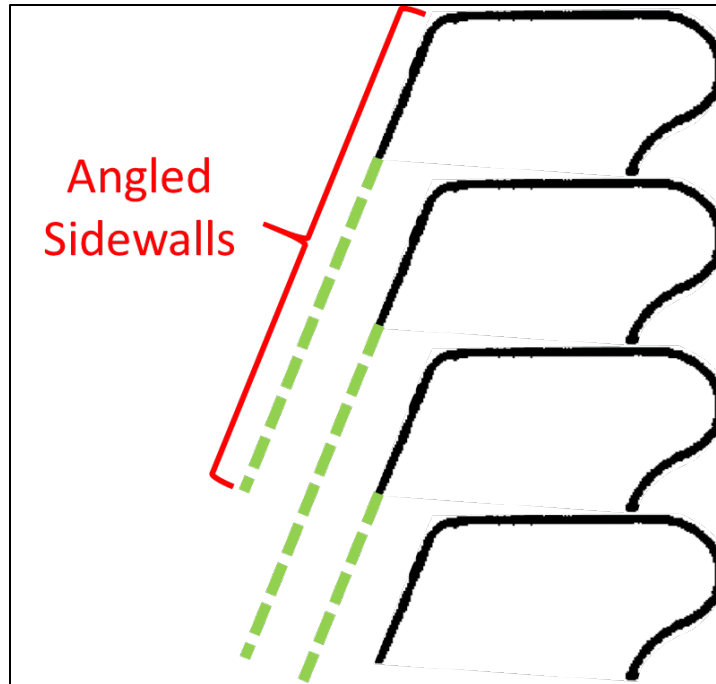
14. Claim 14:

Portelli's Fig. 13 shows differing heights and geometries for the deflectable flange, i.e. a bend region, an elbow, and a peripheral flange:



Portelli, Fig. 13. EX1003, ¶187.

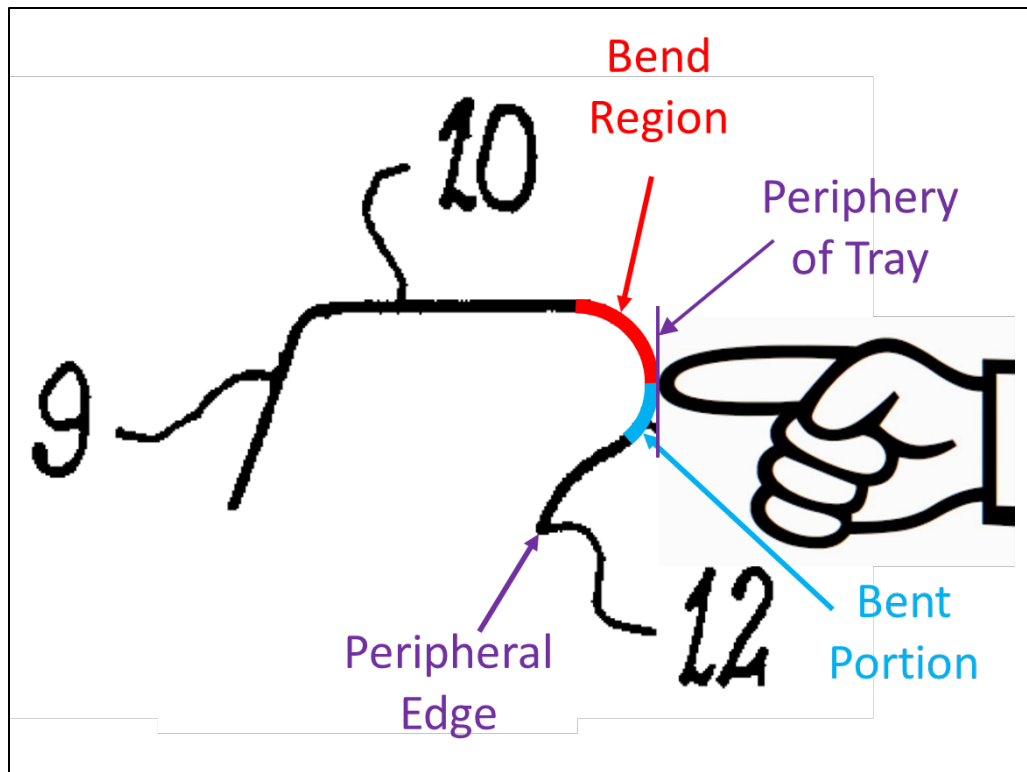
Portelli's tray is configured such that a plurality of trays can be stacked in a nested conformation due to angles of sidewall 9. This can be shown by duplicating and visually stacking in a nested conformation copies of the shape illustrated in Fig. 13, including sidewall 9 and extension, whereby peripheral edge of an upper article rests on the extension's upper surface from a lower adjacent article, i.e. creating a "stacking extension":



Potelli, Fig. 13 (duplicate shapes and annotations added). EX1003, ¶188.

15. Claim 15:

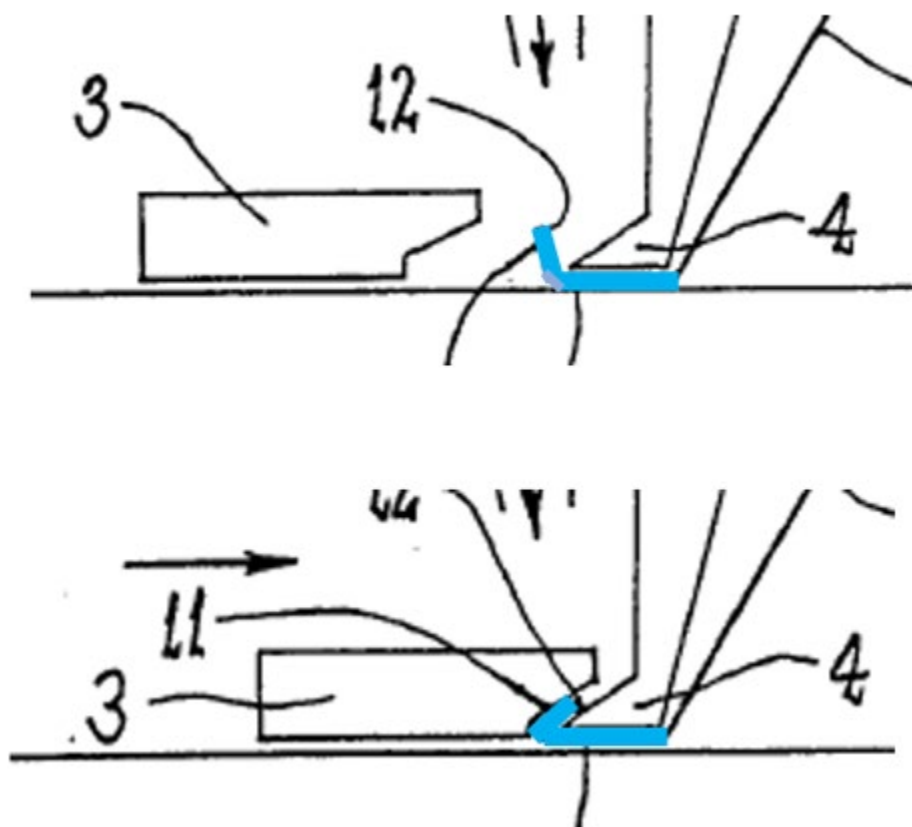
Due to the ram being impinged against the deflectable flange sufficiently, the peripheral edge cannot be perceived by a person running a finger along the periphery of the shaped article after cooling the bent portion:



Portelli, Fig. 13. EX1003, ¶¶189-190. *Id.* Abstract (The “*terminal edge (12) ... is deformed inwardly out of a wrap path around the tray (5).*”), 1:2-4 (“[T]his invention relates to trays for packaging which are wrapped in plastic film or plastic wrap,”), 3:1-3 (“bringing an appropriately configured deforming means into engagement with said peripheral edge region of the tray to *displace the terminal edge out of the wrap path*”). EX1003, ¶191.

16. Claim 16:

Portelli Figs. 1 and 2 show how the ram (3) is urged against peripheral flange (11) by applying force to at least the extension in the direction of the ram:



Portelli, Figs. 1-2. EX1003, ¶¶192-193.

Portelli describes Figs. 3 and 4, “The only difference between these two embodiments lies in the configuration and action of the former 3. As it is brought into engagement with the peripheral edge region 11 of the tray 5, *which in this embodiment is horizontally extending*, the edge region 11 is curled or rolled upwardly and around so as to form the curved or rounded edge for the tray.” Id. 12:1-8.. “The former 3 is a solid block slidable along the support surface 7 towards and away from the anvil 4... The anvil 4 is formed by clamping foot 13 pivotally mounted on a clacker box 14. This pivotal mounting enables the anvil to be removed

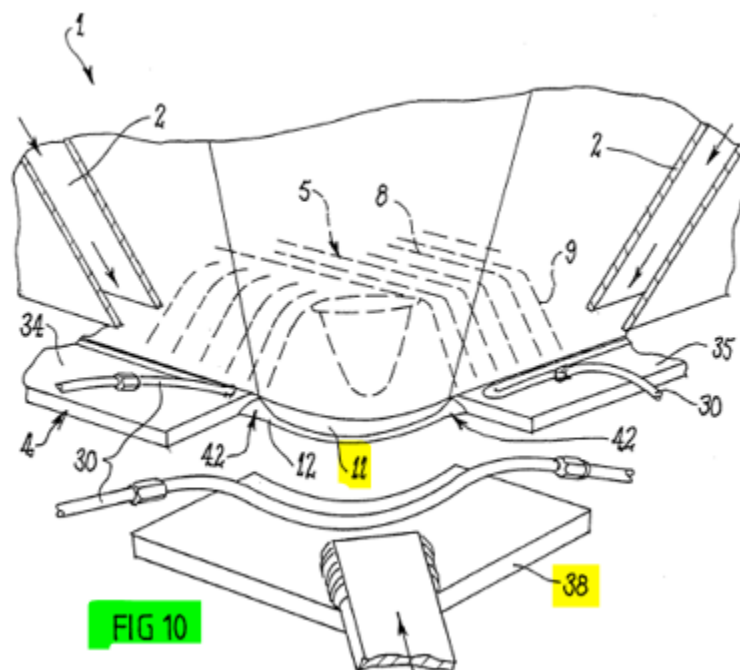
from underneath the peripheral edge region 11 when the peripheral edge region 11 has been formed... In the fully deformed position the operative surface of the former 3 is adjacent the complementary surface of the anvil 4.” Id. 9:4-26. EX1003, ¶¶194-195.

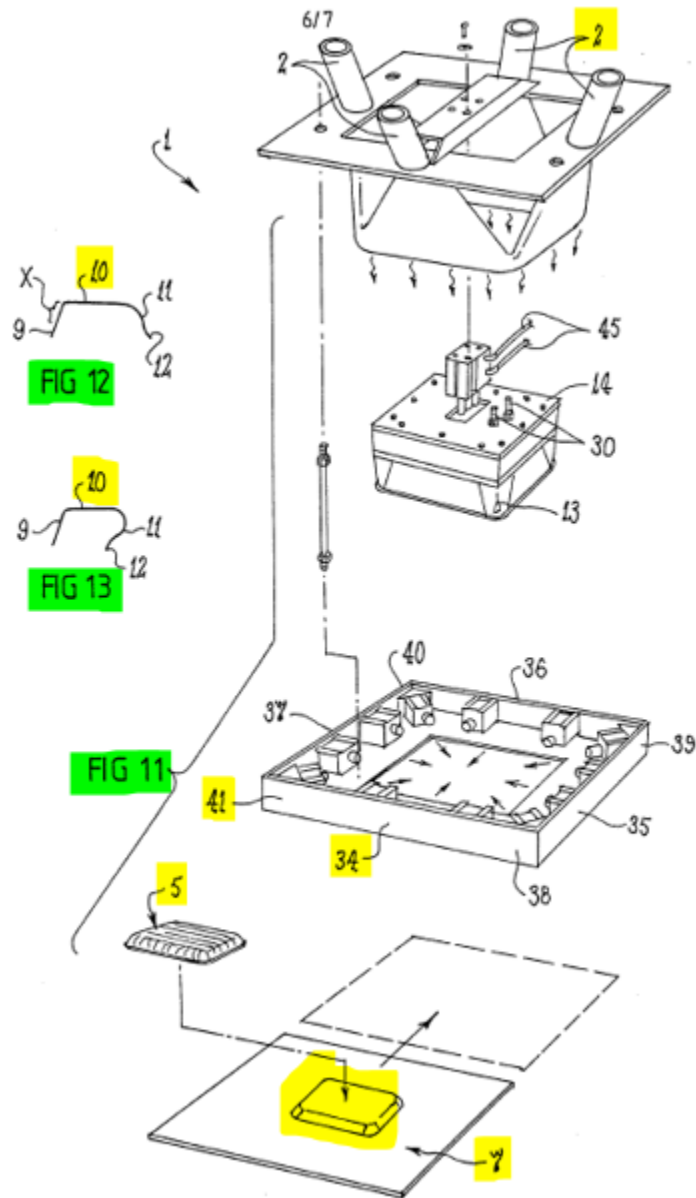
Portelli describes the importance of executing the method of displacing the peripheral edge concurrent with molding the article body to take advantage of the residual heat inherent in the newly-formed thermoplastic article and flange: “Naturally if the deforming or rolling of the edge of the tray is carried out at the site of the thermoforming of the tray, such pre-heating step is generally unnecessary.” Id. 15:1-3. EX1003, ¶196.

A POSITA would understand that in thermoforming Portelli’s article, a mold would be used to form the article, and a common mold type for forming such articles is a “male” mold, which would “substantially fill the opening as it is used to form the concave compartment in the article’s body.” Indeed, the use of a plug in forming thermoplastic articles is common and well understood before the ’222 patent’s priority date. In fact, “plug assist” thermoforming is a common methodology and apparatus. EX1003, ¶197. Using common trimming equipment, such as trim-in-place die cutting tooling, a POSITA would know to apply Portelli’s teachings around a plug (anvil 4) to the article could be formed and trimmed, and the peripheral edge could be displaced while the mold acted as a plug to inhibit displacement of the

deflectable flange. Indeed, a POSITA would not only recognize Portelli's teachings, but would be motivated to implement such an inline configuration given the efficiency it represents compared to a separate offline or second pass operation. EX1003, ¶198.

Portelli describes means for inhibiting inward displacement of the deflectable flange, "*Another particularly desirable feature is the maintaining of the support surface 7* at the ambient temperature or even colder to maintain some rigidity in the rim 10 of the tray 5 when hot air is blown through the duct 2. This is important to get the region 11 to bend at the correct point, that is without bending the rim 10. The contact of the rim 10 is shielded by the clackerbox 14 and clamping foot 13 which is interposed between the hot air blast and the rim 10. It is desirable that some rigidity be maintained in the lateral outer portion of the rim 10 as this is the point around which the peripheral edge region 11 is folded. Further, the rigidity of the rim 10 also acts as a brake to former portions 34-41 defining the end of the stroke thereof." Id. 11:15-26. Note that "support surface 7" which supports the inside of tray 5 is equivalent to '222 patent's "plug that substantially fills the opening is inserted therein prior to urging the ram against the peripheral flange, whereby the plug inhibits inward displacement of the deflectable flange." This feature and others referenced in Portelli's foregoing paragraph are highlighted in yellow below:



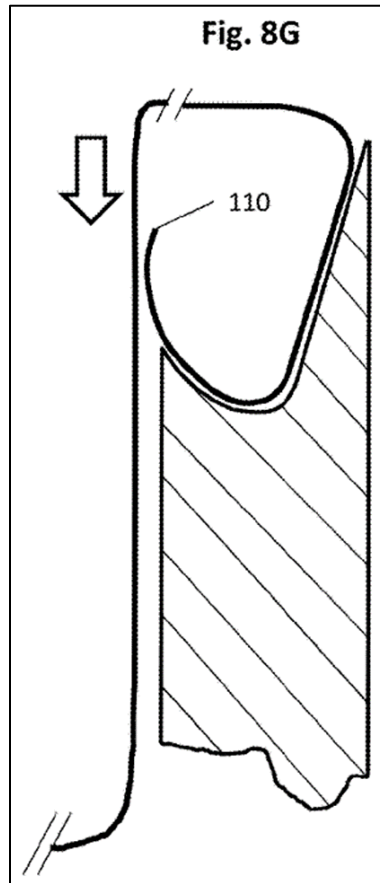


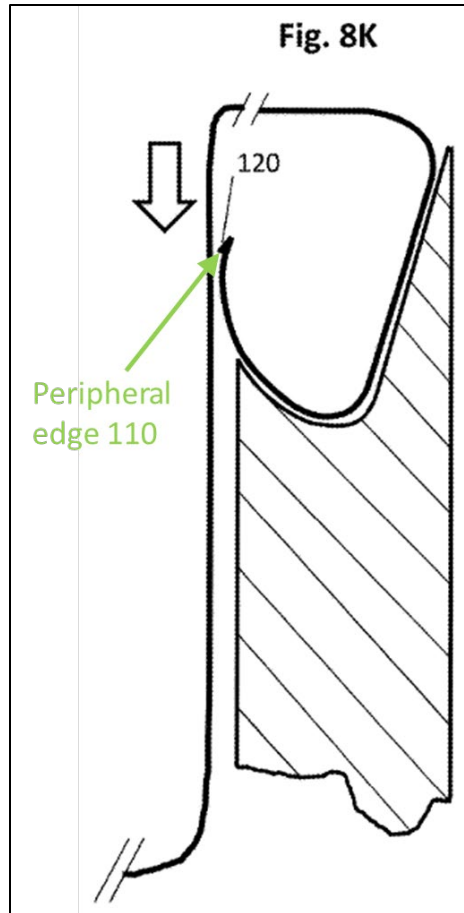
Portelli, Figs. 10-13 (annotated). EX1003, ¶199.

17. Claim 17:

The '222 patent illustrates ram 300 impinging deflectable flange at an upper face of the ram, the upper face having a contour that deflects inwardly toward the

body, whereby greater impingement of the deflectable flange against the upper surface of the ram deflects the peripheral edge increasingly toward the body:





EX1001, Figs 1C, 8G, 8K (annotated). EX1003, ¶¶201-202.

Portelli Fig. 7 discloses a ram 25 with an “upper face having a contour that deflects [peripheral edge 12] inwardly toward the body” of tray 5, as seen below where article 8 and ram 25 are inverted:

Portelli, Fig. 8 (excerpted and annotations added). EX1003, ¶¶204-205.

As shown in Portelli's Fig. 8, the peripheral edge of Fig. 13 could be bent all the way over into a 270-degree angle just as Portelli discloses in Fig. 8. Portelli references "the apparatus of Figs. 7 and 8." *Id.* 14:10-28 and provides a description of processing the tray extensions of the invention using that apparatus. According to May, a POSITA would interpret this to mean that the tray of Figs. 12 and 13 can be introduced and thermoformed by the apparatus of Figs. 7 and 8. Doing so would produce a tray with the extension up to the peripheral edge bent all the way over into a 270-degree angle (which meets claim the "at least about 180 degrees" recited by claim 17), like that shown in Portelli Fig. 8:

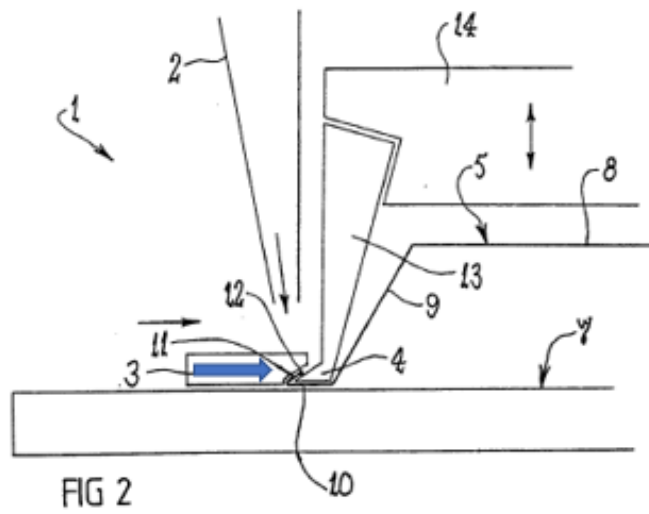
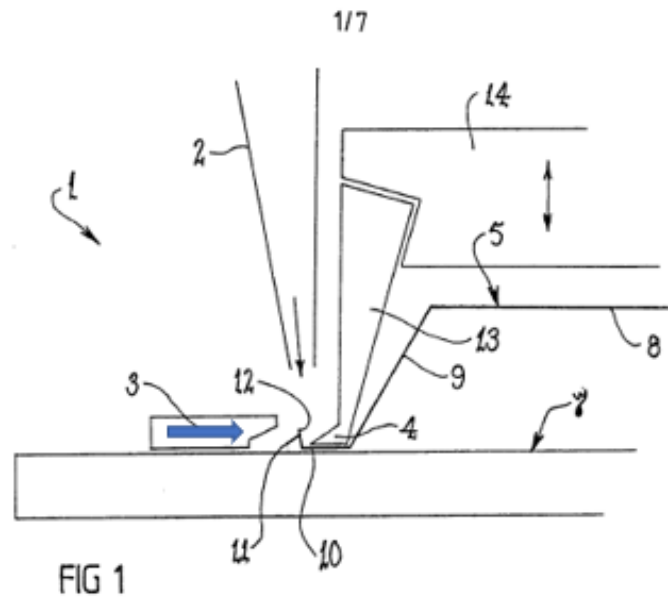


Portelli, Fig. 13 (modified to show peripheral edge 12 bent to 270 degrees with Fig. 8 ram 25 (excerpted and annotated). EX1003, ¶¶206-207.

Portelli discloses the peripheral edge is offset from the plane of the extension by an angle of not less than 180 degrees. *See* arguments *supra* for claim 13. EX1003, ¶¶208-209.

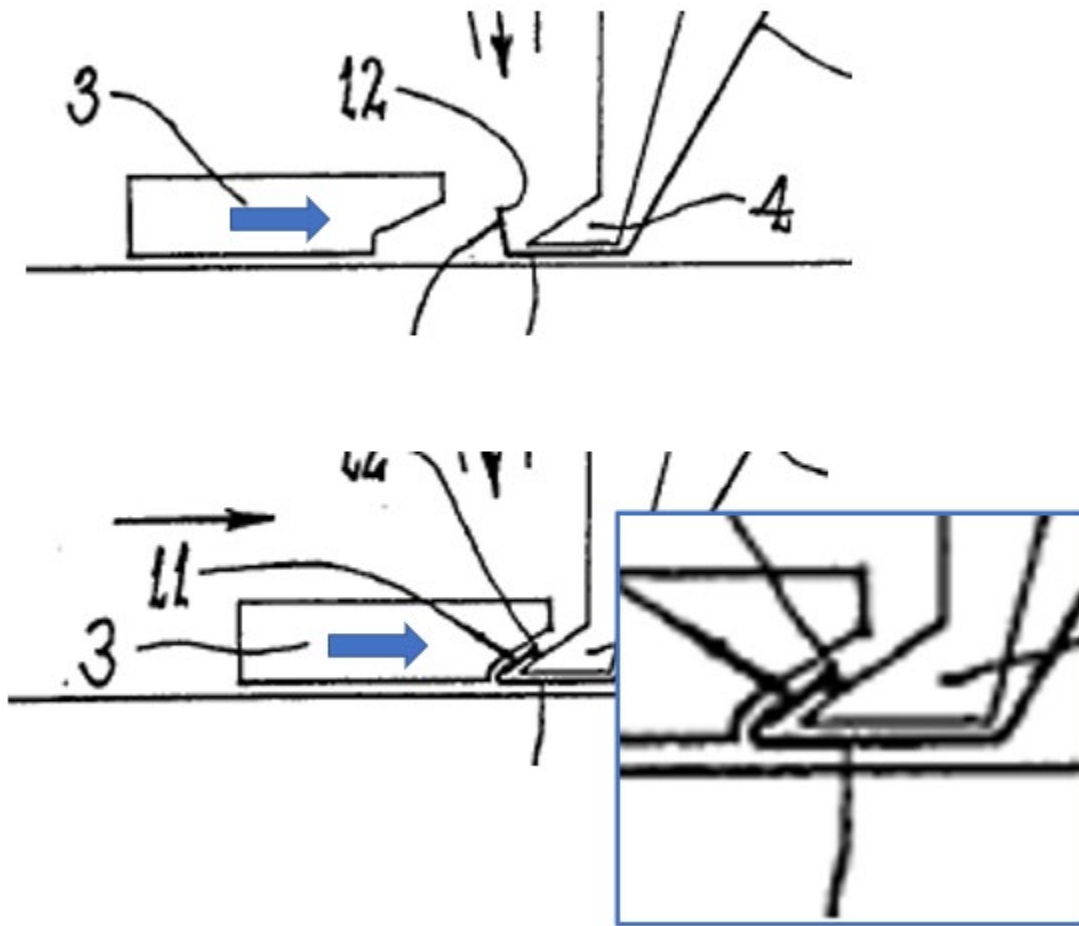
18. Claim 18:

Figures 1 and 2 show the ram moving in proximity to the peripheral flange in increments, with Fig. 1's ram still some distance from the peripheral flange, and Fig. 2 showing the ram having contacted the peripheral flange and deflected the spacer towards the extension, but still having a "discrete, incremental advancement" to travel and sequentially engage the ram with the deflectable flange and its spacer:



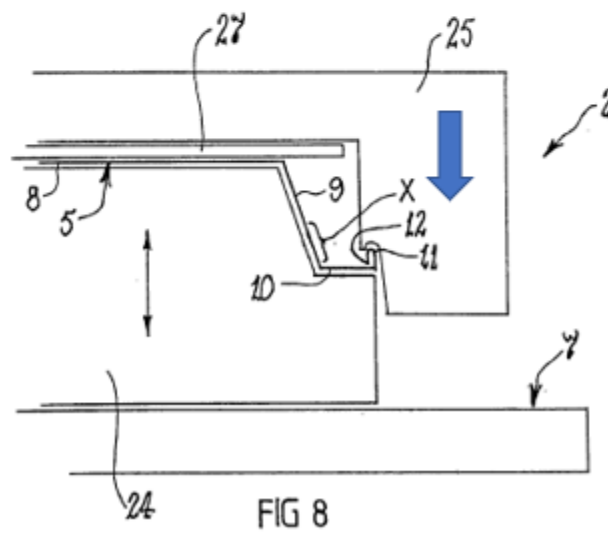
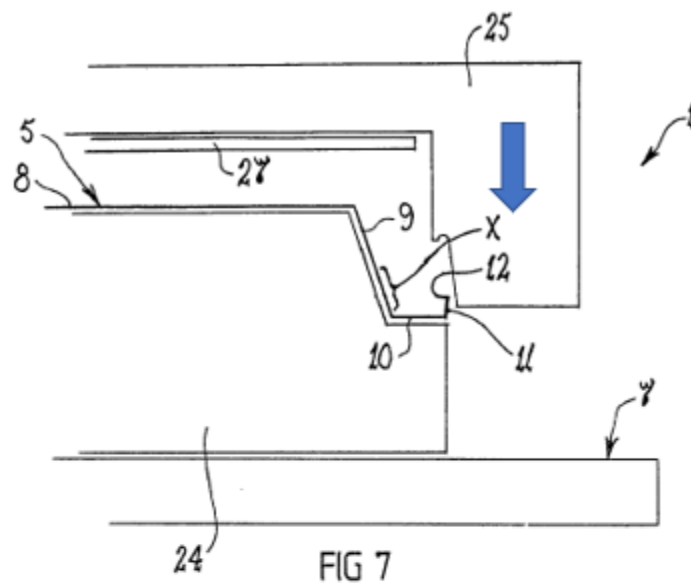
Portelli, Figs. 1-2 (annotated); *see also* Figs. 3-6. EX1003, ¶¶212-213.

Further detail:



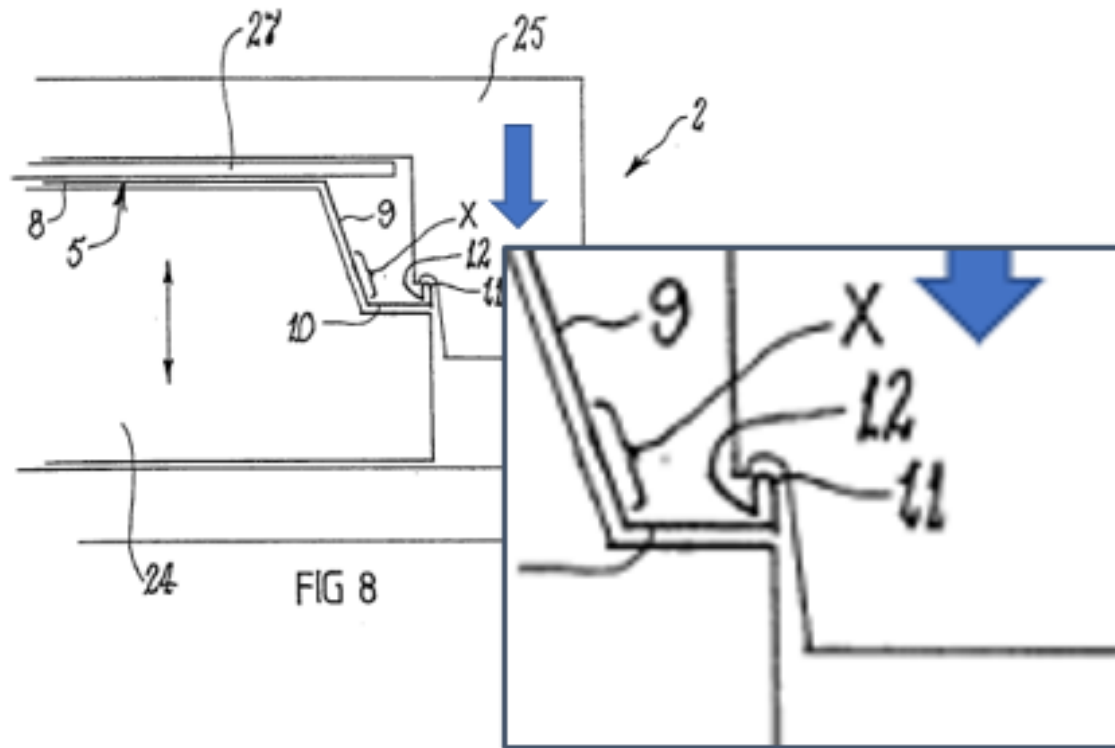
Portelli, Figs. 1-2. EX1003, ¶214.

Portelli similarly demonstrates in Figs. 7 and 8 the ram moving towards the peripheral flange in increments:



Portelli, Figs. 7 and 8 (annotated). EX1003, ¶215.

Further detail:



Portelli, Fig. 8 (excerpted and annotated). EX1003, ¶216.

Portelli provides further disclosures on “further impinging”, stating, “Advantageously the temperature gradient across the peripheral edge region is obtained by configuring the die such that it is in heat conductive contact with part of the peripheral edge region of the tray longer that other parts thereof.” Id. 3:27-30. According to May, a POSITA would understand this to mean that through either ram configuration or further ram movement, the peripheral flange of the article can be further impinged in order to heat the bent portion to displace the flange and yield a smooth periphery. EX1003, ¶217.

Portelli further discloses the use of a plurality of discrete, incremental

advances of the rams in describing Figs. 9-11: “The former 3 which extends circumferentially around the tray edge 12 is divided up into a plurality of portions... The linear portions...overlap the corner radius of the tray 5. Thus there is some overlap of the tray edge region covered by respectively the linear portions... and the corner portions... This overlap is very useful in rounding off the tray edge in the corner region satisfactorily as otherwise it has a tendency to form sharp points. Once the peripheral edge region 11 of the tray 5 has been heated to a malleable state, the linear portions... are actuated by being brought into deforming engagement therewith.... *The straight edge or linear portions... are then retracted back from the tray edge and the corner portions... actuated and brought into engagement therewith. The linear and corner portions cannot be actuated to engage the tray edge simultaneously* as there is overlap between the two.” Id. 10:25-11:12. (emphasis added). Here, Portelli describes the use of a plurality of discrete, incremental advances of the rams. EX1003, ¶¶218-220.

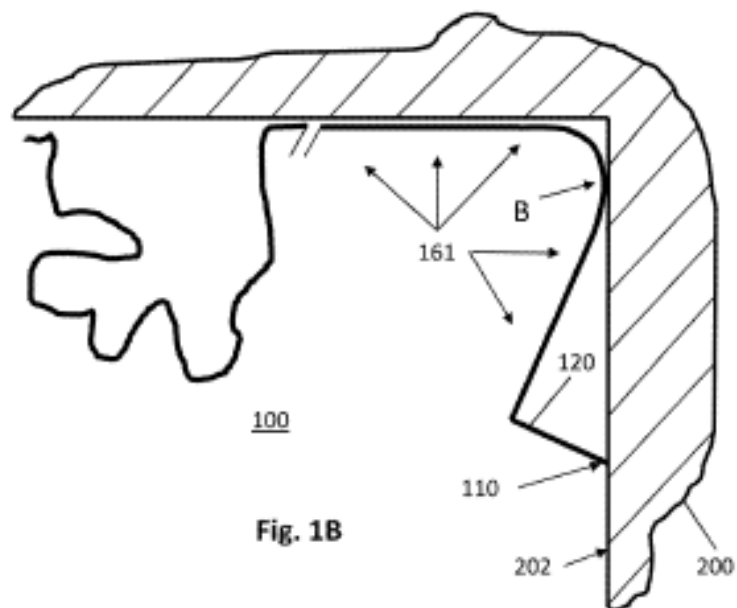
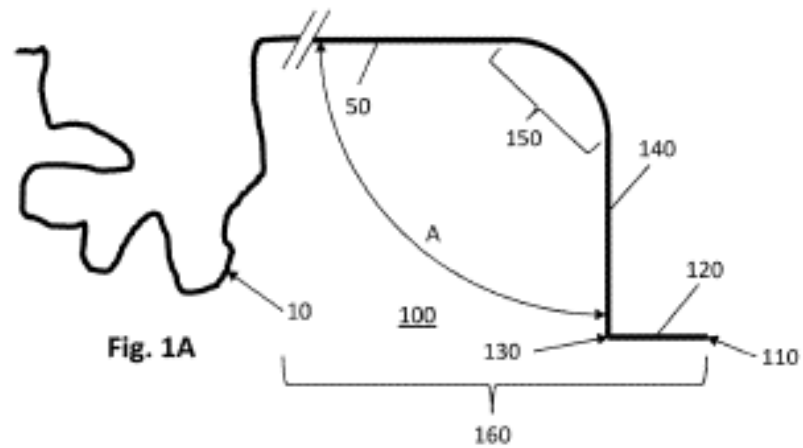
19. Claim 19:

Portelli describes single motion to impinge the deflectable flange and spacer against the ram: “Advantageously *the die is configured so as to engage the edge region of the tray around the full periphery thereof and to roll said peripheral edge region substantially simultaneously in a single step.*” Id. 6:14-16. (emphasis added). EX1003, ¶223.

A POSITA would be very familiar with continuous and smooth machine movements, especially given the availability of servo-controlled equipment for processing thermoplastics before the application for the '222 patent was filed. Such servo drives are understood to have a virtually infinite advancement capability, and are extremely precise and fluid in their movement, meaning “softening sequential portions of the spacer by impinging them against the ram in a single smooth motion” would be routine and within the capability of POSITA and equipment. This is especially true when combined with the curved ram facings disclosed by the prior art. EX1003, ¶224.

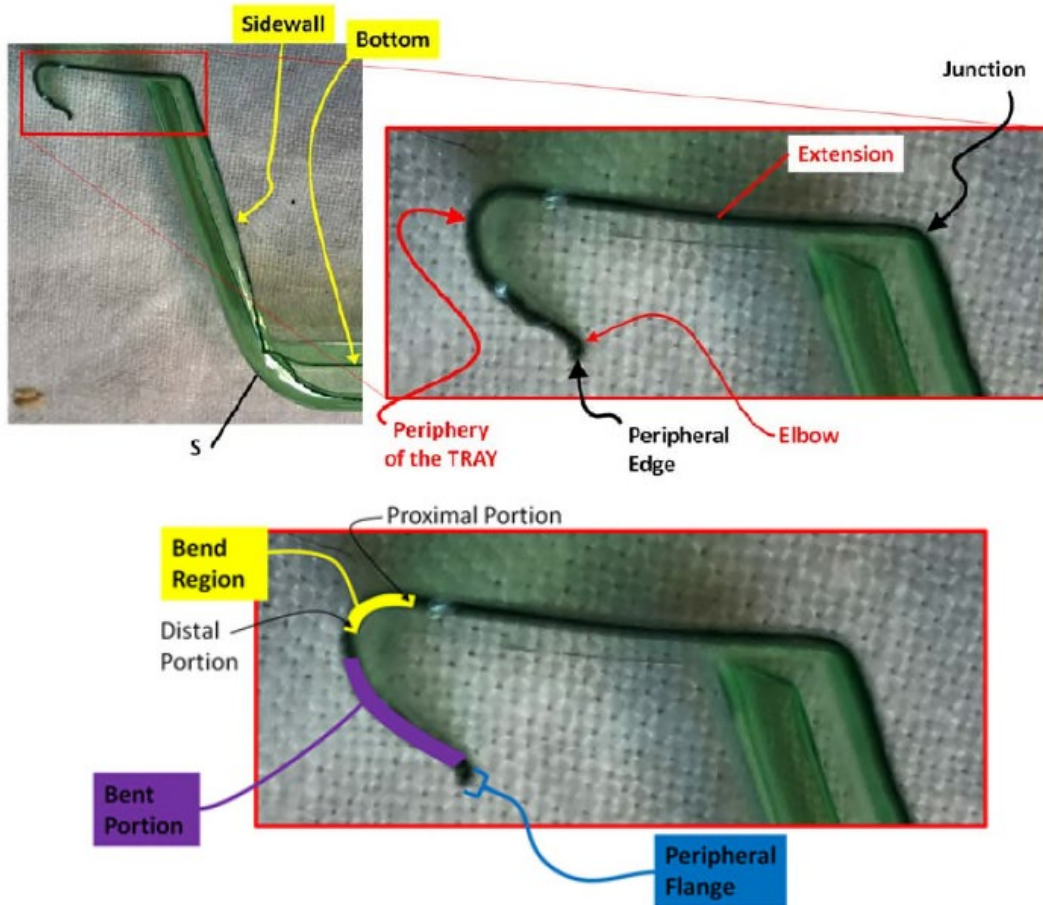
20. Claim 20:

The '222 patent refers to spacer 140, elbow 130, and peripheral flange 120:



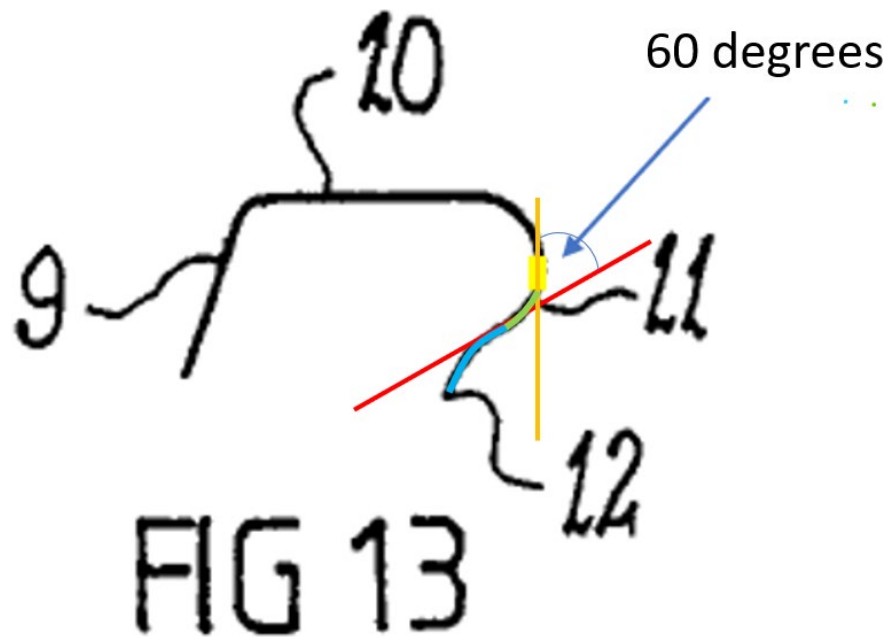
Ex. 1001, Figs. 1A-1B. EX1003, ¶225.

The Patent Owner applied the terms “elbow” and “peripheral flange,” to Petitioner’s article in their First Amended Complaint:



EX1007, p.8. EX1003, ¶226.

Portelli teaches “the elbow connects the peripheral flange to the spacer at an angle of from 60 to 120 degrees.” May measured the angle between those features and determined the angle to be 60 degrees, which meets this claim’s recited “from 60 to 120 degrees”:



Portelli, Fig. 13. EX1003, ¶227.

21. Claim 21

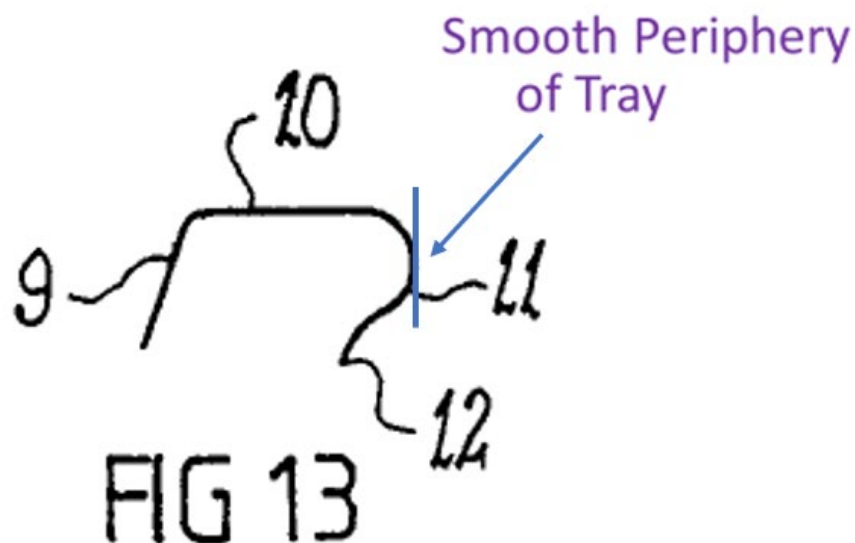
k. 21[Pre]:

See arguments supra for element 1[pre].

To the extent limiting, Portelli discloses a method of making a thermoformed article having a body with a smooth periphery. Specifically, Portelli describes a method of producing a plastic tray (5) having a peripheral edge region (11) terminating in a terminal edge (12) which is deformed inwardly out of a wrap path around the tray (5). *Id.* Abstract; 9:17-24 (Portelli’s container is formed by heating and deforming the peripheral edge region 11 of “a **thermoformed plastic tray** 5, typically having a **sharp terminal edge 12**”); 14:10 (referring to a “**thermoformed tray**”); 15:12-14 (tray includes base member 51 and cover member

52 which are “*thermoformed from plastic*”); 16:15-17 (invention “enables *thermoformed plastic trays* to be provided which are particularly suitable for wrapping in plastic film or wrap”). EX1003, ¶228.

Portelli’s tray includes a smooth periphery at the outermost perimeter of the tray:



Portelli, Fig. 13 (annotated). EX1003, ¶¶229-231. Portelli’s peripheral edge (12) is shown to be displaced away from the periphery of the tray, in this case to the left and downward from the periphery of the tray. *See also* Abstract (tray has “a peripheral edge region (11) terminating in a *terminal edge (12) which is deformed inwardly* out of a wrap path around the tray”); 2:2-8; 3:17-19. A POSITA would have equated Portelli’s “terminal edge (12)” to the ’222 patent’s “peripheral edge.”

A POSITA would equate Portelli’s “peripheral edge region (11)” terminology to the ’222 Patent’s “periphery of the article.” EX1003, ¶231.

l. 21[A]:

See arguments supra for element 1[A]. EX1003, ¶¶232-241.

m. 21[B]:

See arguments supra for element 1[B]. EX1003, ¶¶242-246.

n. 21[C]:

See arguments supra for element 1[C]. EX1003, ¶¶247-261.

o. 21[D]:

See arguments supra for element 1[D]. EX1003, ¶¶262-274.

p. 21[E]:

See arguments supra for element 1[E]. EX1003, ¶¶275-279.

q. 21[F]:

See arguments supra for element 1[F]. EX1003, ¶¶280-284.

r. 21[G]:

See arguments supra for element 1[G]. EX1003, ¶¶285-290.

s. 21[H]:

See arguments supra for element 1[H]. EX1003, ¶¶291-299.

t. 21[i]:

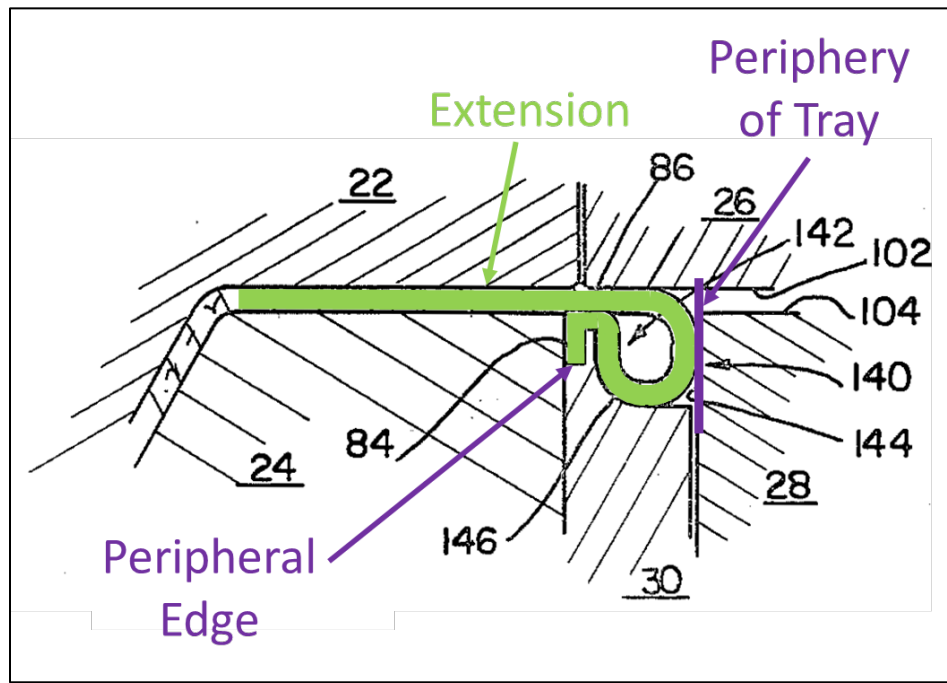
See arguments supra for claim element 1[i] and claim 2. EX1003, ¶¶300-

306.

V. GROUND 2: CLAIMS 1-6 AND 11-18, AND 20-21 ARE OBVIOUS OVER MEADORS IN VIEW OF THE GENERAL KNOWLEDGE OF A POSITA

A. Meadors

Meadors teaches an article formed from thermoplastic. EX1005, 3:40-46; 4:23-25; 6:24-25. Meadors' tray intentionally uses a bent or rolled-over flange or extension resulting in a smooth periphery:



EX1005, Fig. 8; Figs. 6-10. EX1003, ¶¶51-52.

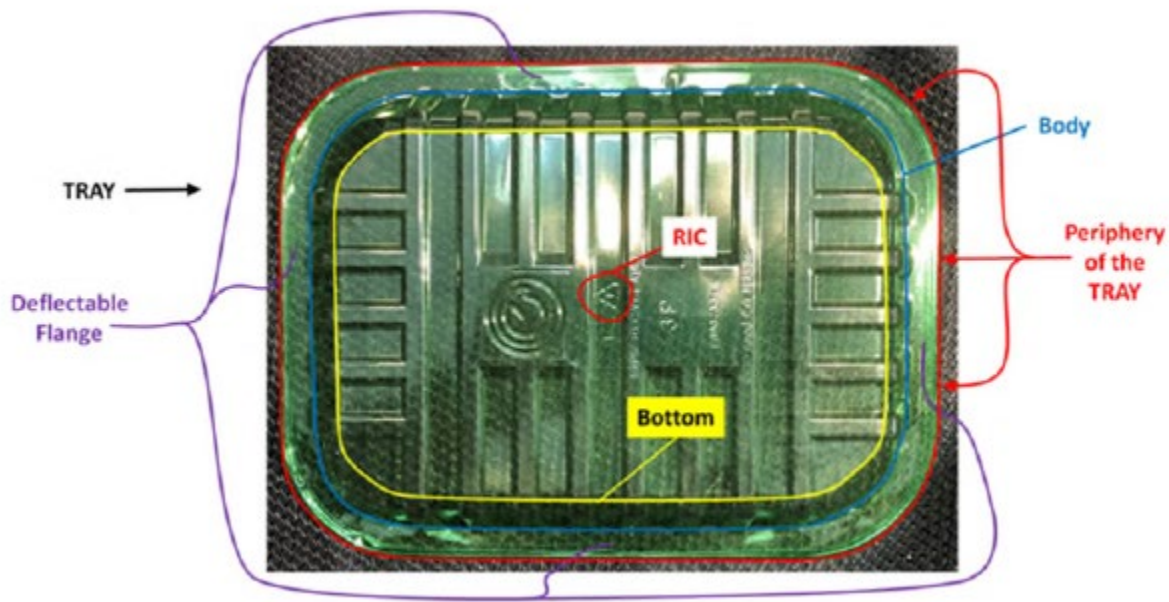
B. Analysis

1. Claim 1

a. 1[pre]:

To the extent limiting, Meadors discloses this limitation.

Patent Owner applied the terms “body” and “periphery” to Petitioner’s article in the First Amended Complaint:



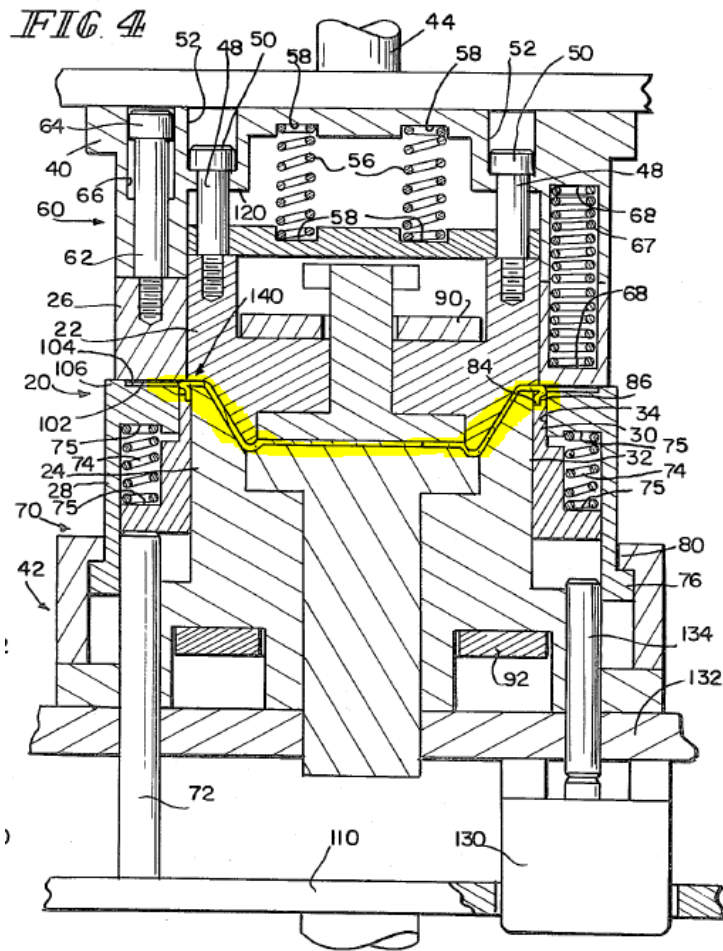
EX1007, pp.7,18. EX1003, ¶313.

Meadors' container can be a rounded rectangular tray with a concave compartment, or body: "An apparatus for forming a blank of sheet material into a plate, *tray*, dish or the like *having a central region* and an outer perimetral edge region") Meadors, 6:24-26; Figs. 1-4, 8. Meadors describes the use of a "perimetrally extending ring 30" to form a "bead or rim 140" on the edge of a **container—e.g., a tray**—formed from a blank 100 which can be rectangular. Meadors, 2:68 (tray-forming mechanism includes a "*perimetrally extending ring 30*"); 3:40-43 ("[B]lank 100 typically is in the form of a disc-like round, *rectangular*, elliptical, etc., flat sheet."). EX1003, ¶314.

Meadors' use of the term "ring" and its associated apparatus component was known in the art of rolling the peripheral edge of a thermoplastic article, and

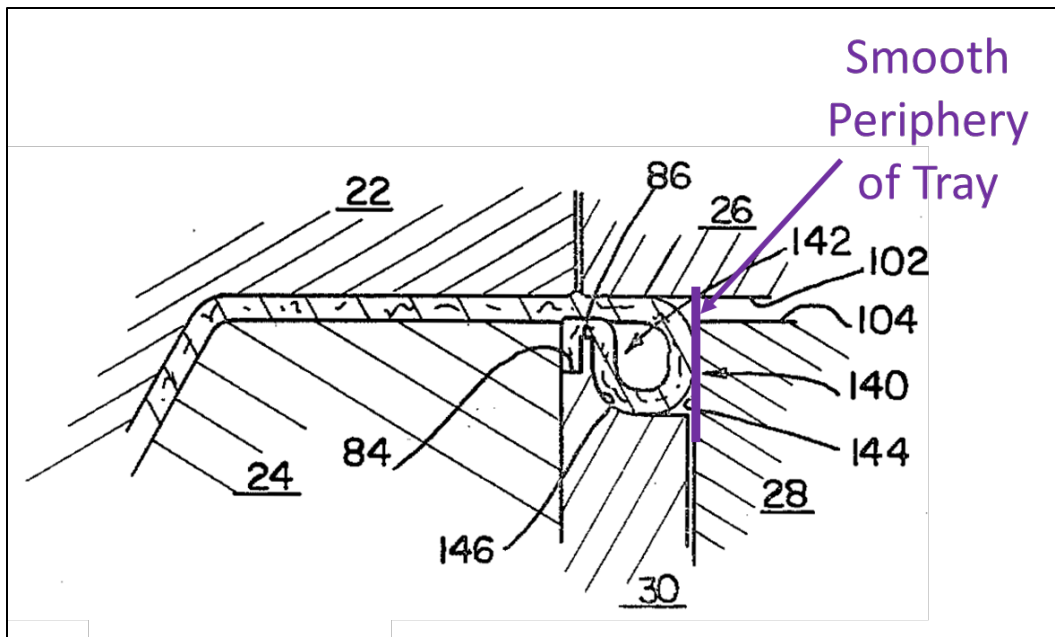
ejecting that formed article from a thermoplastic sheet. Throne, published 1996, teaches “the cavity clamp may provide other functions, for example: ...The clamp may contain a forming **ring** that compresses the rim region. This is called “coining”... Deli container rims are sometimes coined. Coining may be used if the container rim must be rolled to provide rim stiffness, as discussed below. The force required to coin a lip is a function of the compressive strength of the polymer at its instant temperature... The clamp may combine with an ejection **ring** on the cavity to allow separation of the part from the trim. The formed part is held momentarily stationary between the **ring** and the clamp while the mold moves away and the trim is pulled downward. Then the clamp retracts, leaving the part on the ejection **ring**. The trim moves once the part and **ring** assembly have cleared the trim plane.” EX1006, pp. 449-451. EX1003, ¶315

Meadors’ Fig. 4 shows an interim step of Meadors’ method, yielding a shaped article having a body, highlighted yellow below:



Meadors, Fig. 4. EX1003, ¶316.

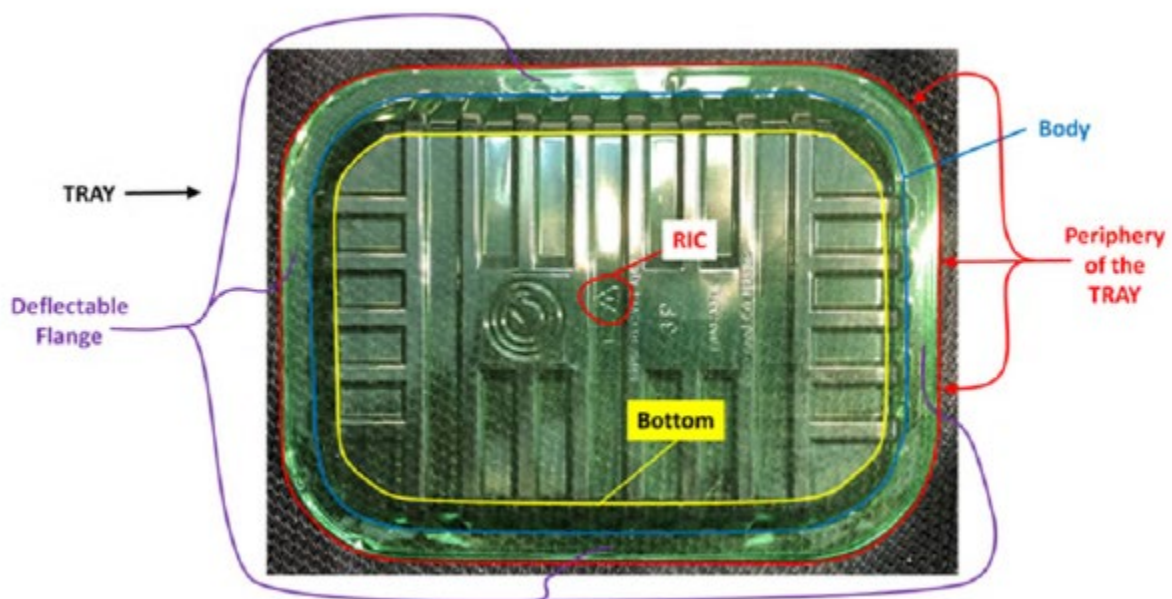
Meadors shows a smooth periphery of the article:



Meadors, Fig. 8 (annotated). EX1003, ¶316.

b. 1[A]:

Patent Owner applied the terms “body” and “deflectable flange” in the First Amended Complaint:

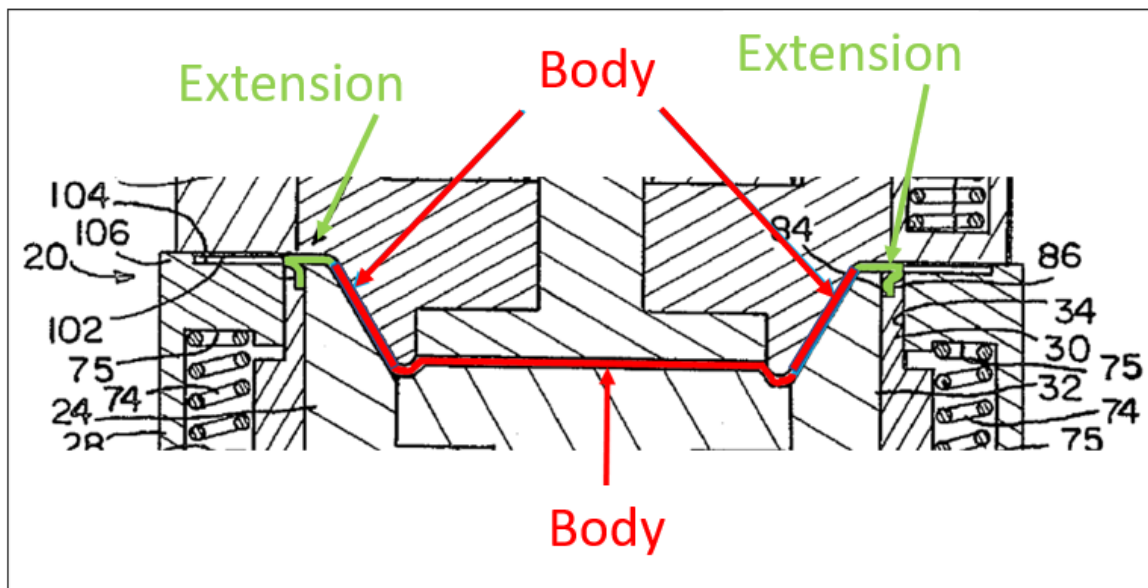


EX1007, pp.7,18. EX1003, ¶319.

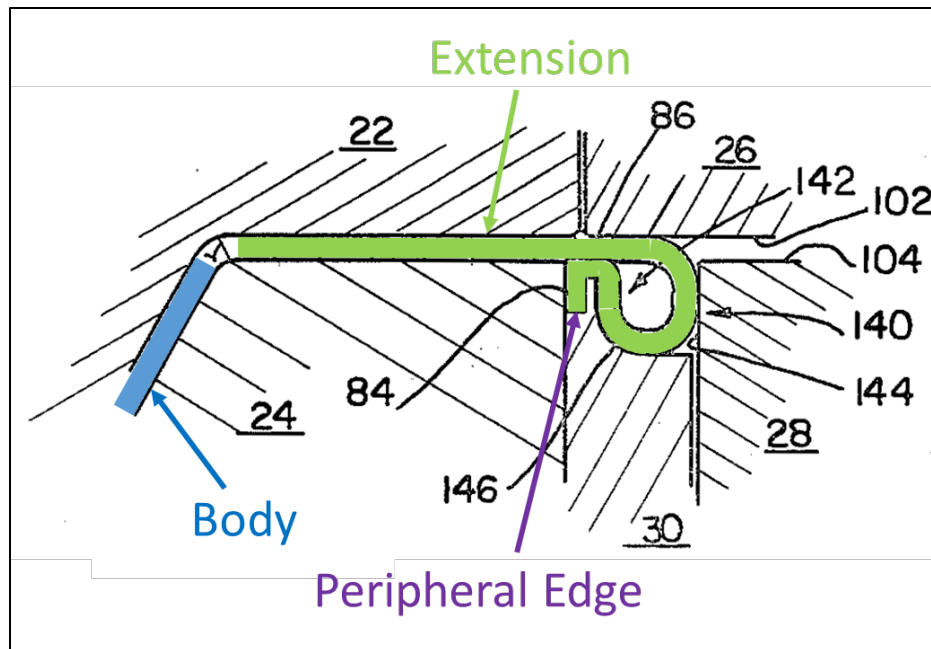
Meadors describes using thermoplastic materials. Meadors, 1:5-9; 3:43-46.

EX1003, ¶320.

Meadors shows a side view of the tray within the forming apparatus, showing a body including an extension with a deflectable flange at a peripheral portion of the body:

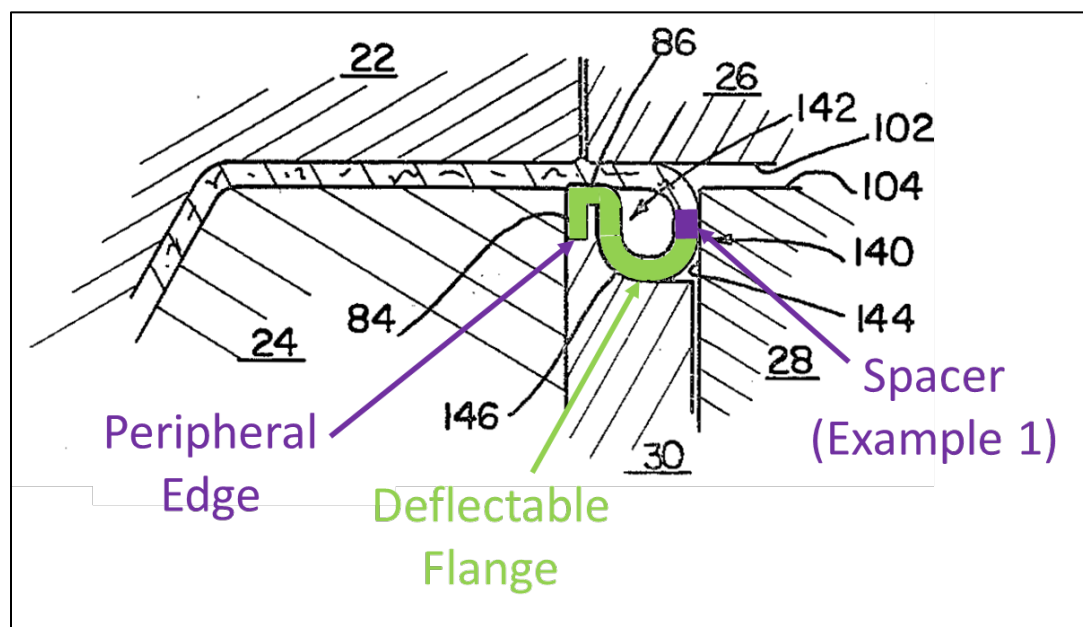


Meadors, Fig. 4.



Meadors, Fig. 8 (annotated); Figs. 1, 2. EX1003, ¶¶321-322.

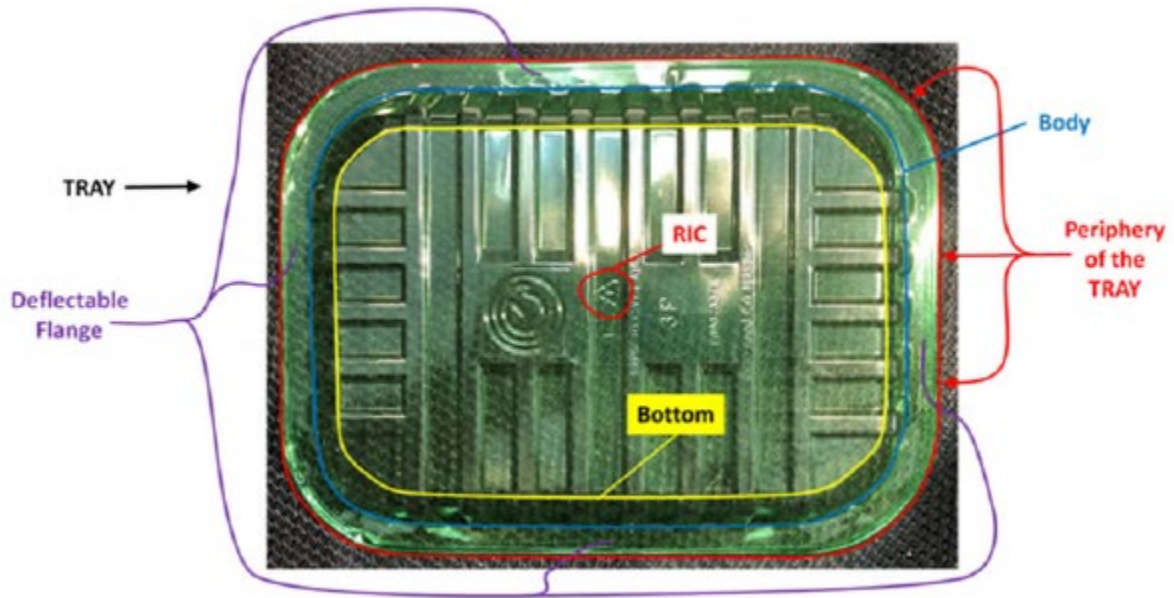
The extension of Meadors' tray includes the curved, rolled-over shape on the right side of Fig. 8. The deflectable flange is shown to be located at the peripheral portion of the body of the thermoplastic article:

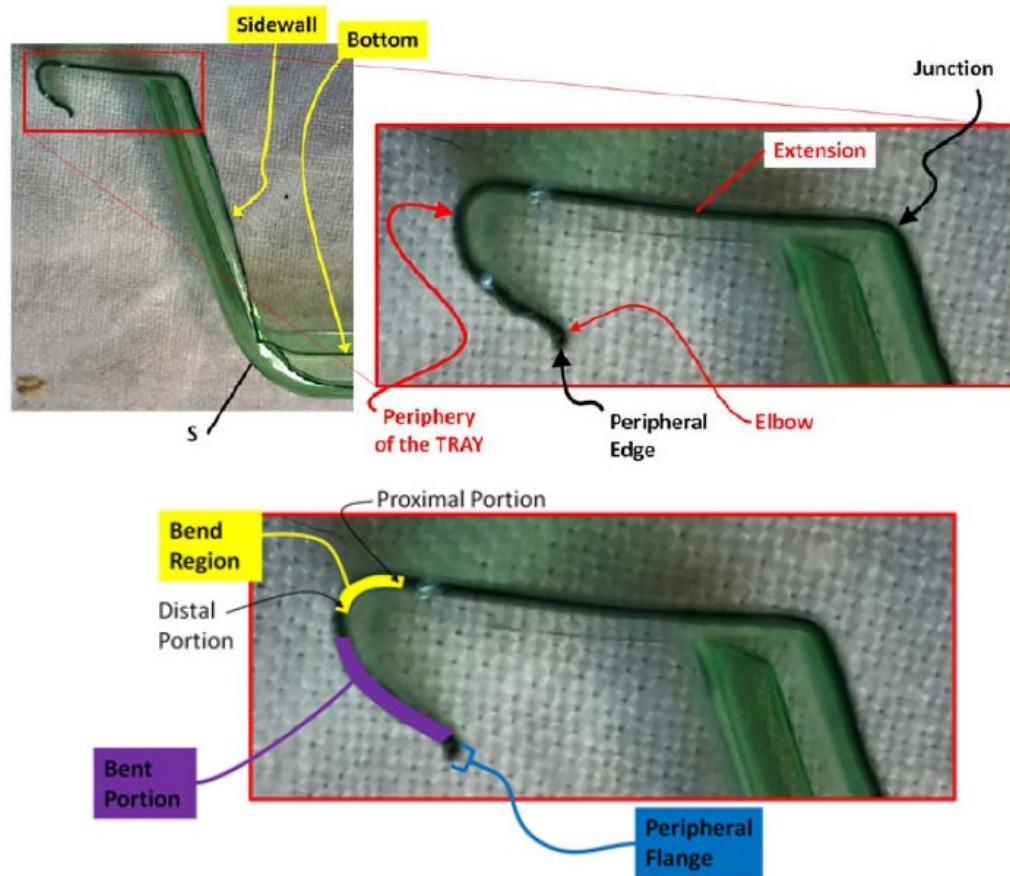


Meadors, Fig. 8. EX1003, ¶323.

c. 1[B]:

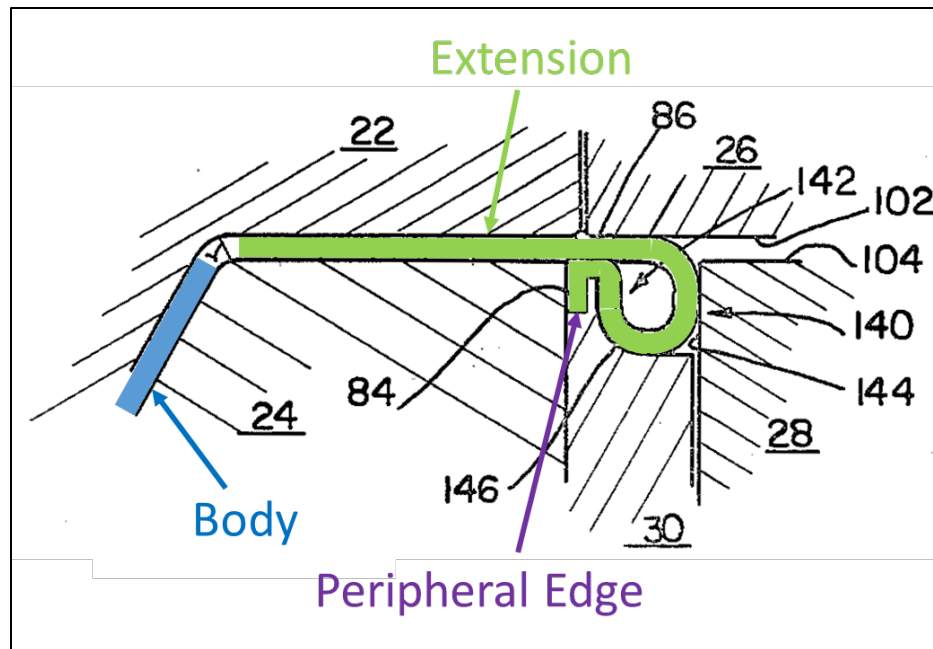
Patent Owner applied the terms “body,” “deflectable flange,” and “extension,” to Petitioner’s article in the First Amended Complaint:





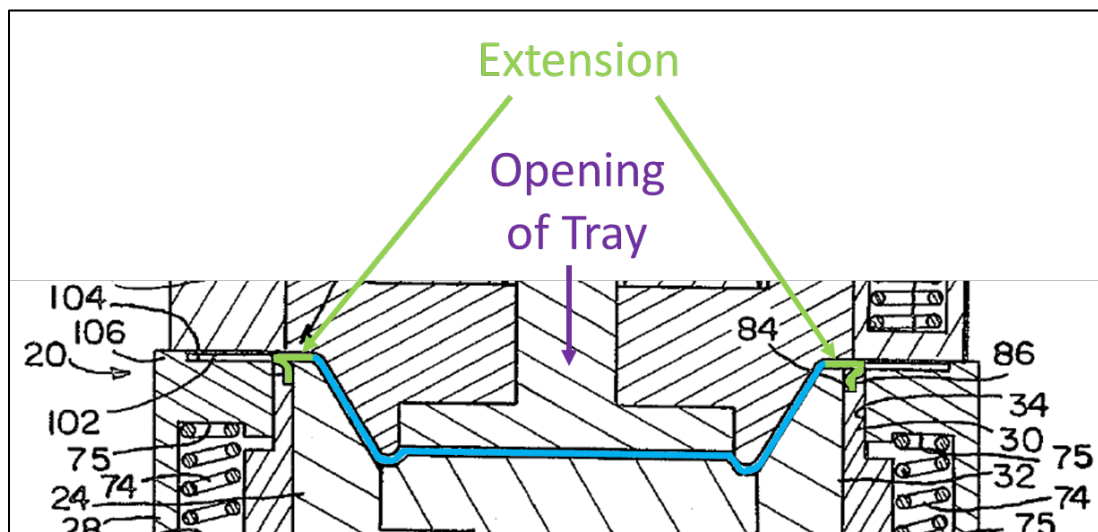
EX1007. pp.7-8. EX1003, ¶325.

Meadors's tray has an extension extending peripherally away from the body. The body includes the sloping sidewall on the left side of Fig. 8. The extension, highlighted in green below, comprises the horizontal portion extending to the right of the body/sidewall:



Meadors, Fig. 8. EX1003, ¶326.

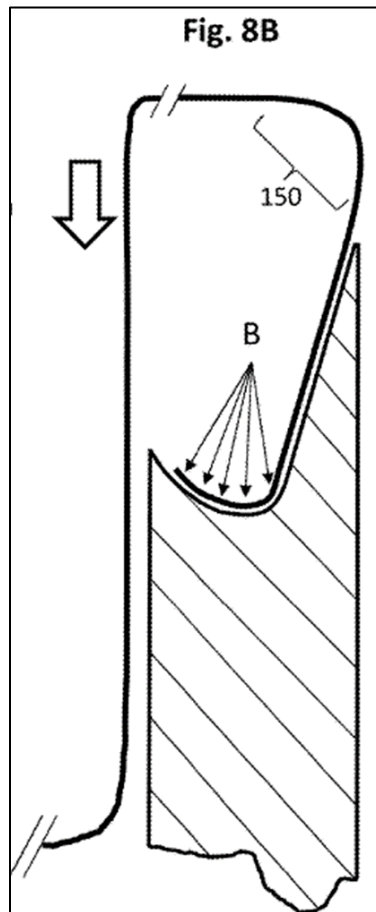
Figure 4 shows the deflectable flange of the tray comprising the extension which extends peripherally away from the body and connects thereto:



Meadors, Fig. 4. EX1003, ¶327-328.

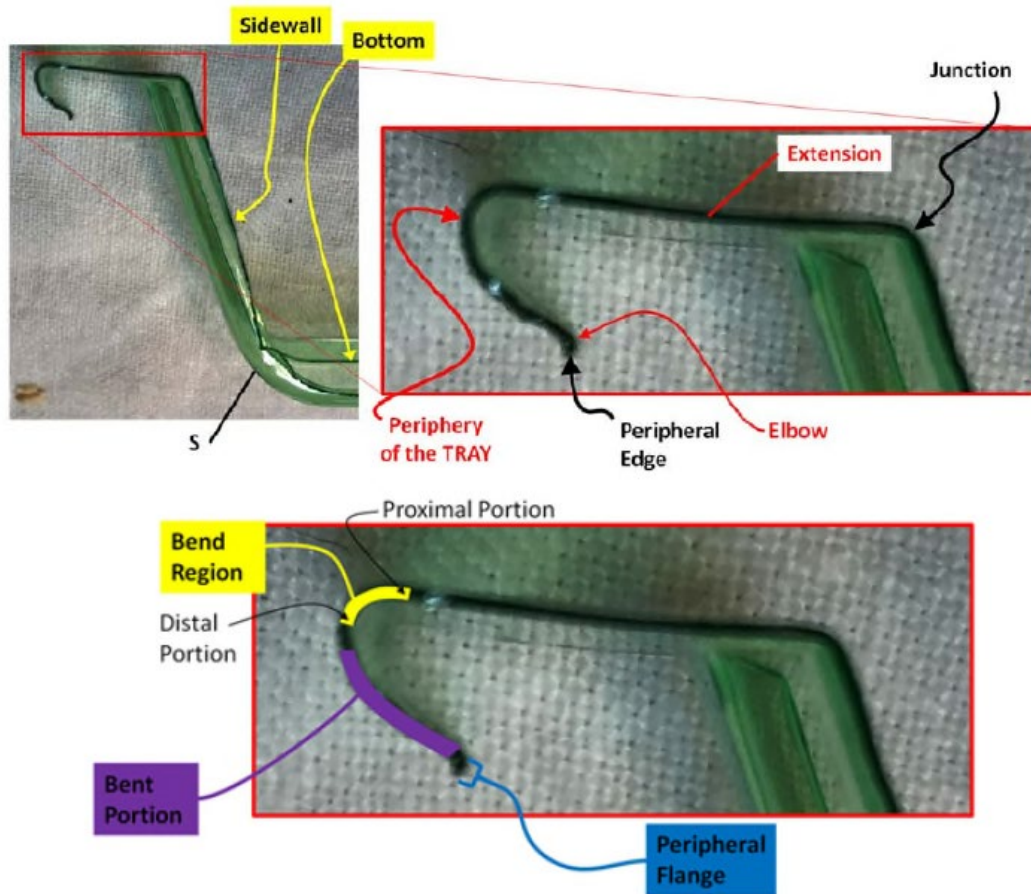
d. 1[C]:

Figure 8B of the '222 patent illustrates “bend region 150” as the first curved portion of the deflectable flange, starting at the end of the straight segment that adjoins the body of the tray at the junction between the body and the extension:



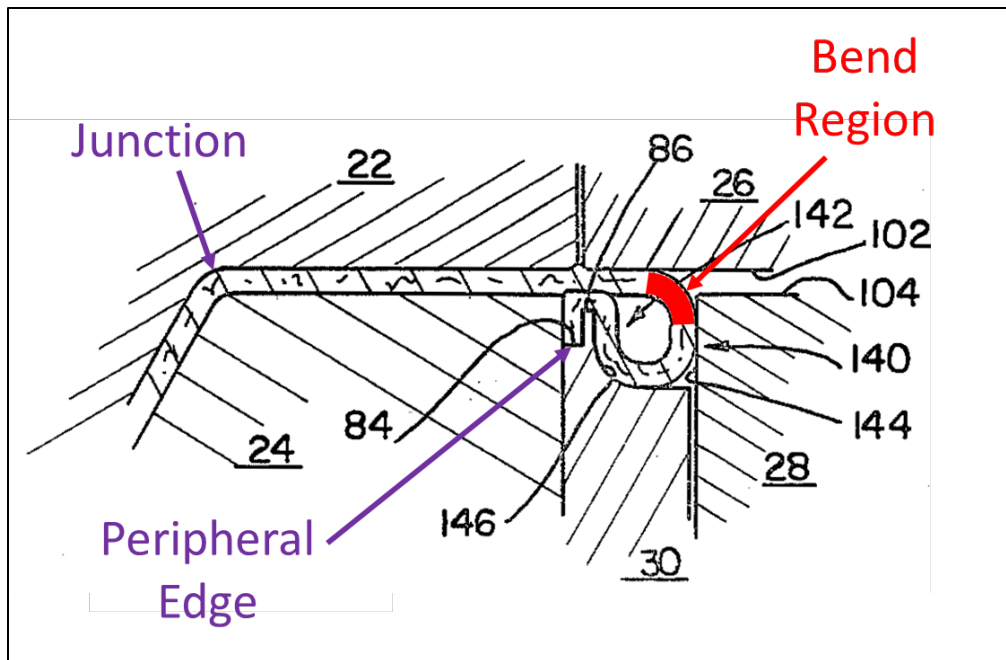
Ex. 1001, 26:63 to 27:26; Fig. 8B. EX1003, ¶330.

Patent Owner applied the terms “extension” and “bend region,” to Petitioner’s article in the First Amended Complaint:



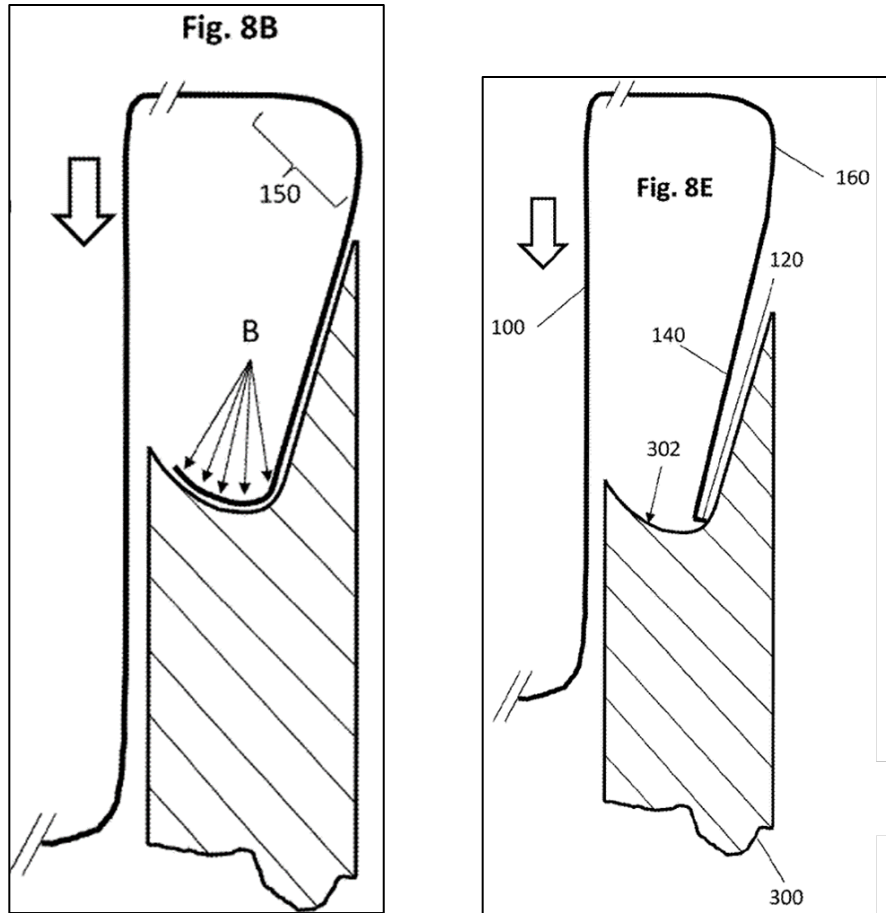
EX1007, p.8. EX1003, ¶331.

The extension in Meadors' tray includes a bend region:



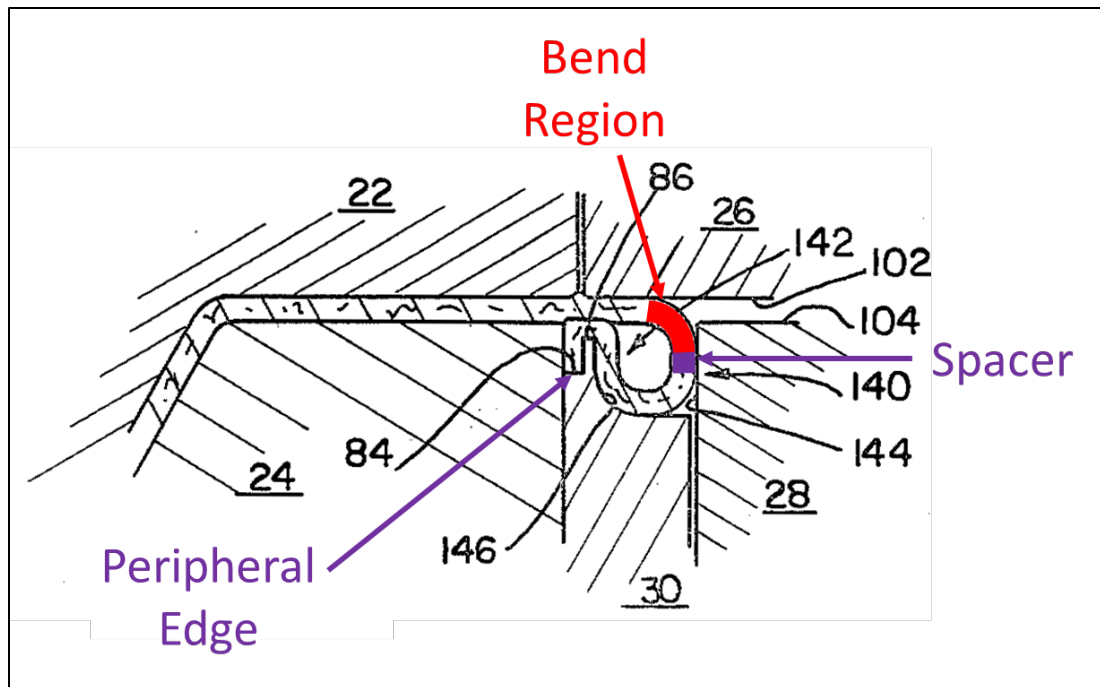
Meadors, Fig. 8. EX1003, ¶332.

Figure 8E of the '222 patent illustrates “spacer 140” as comprising the straight segment immediately below the curved bend region in the upper right of the drawing. The bend region is labeled 150 in Fig. 8B (present but unlabeled in Fig. 8E). “160” denotes the whole deflectable flange. Ex. 1001, 9:16-18:



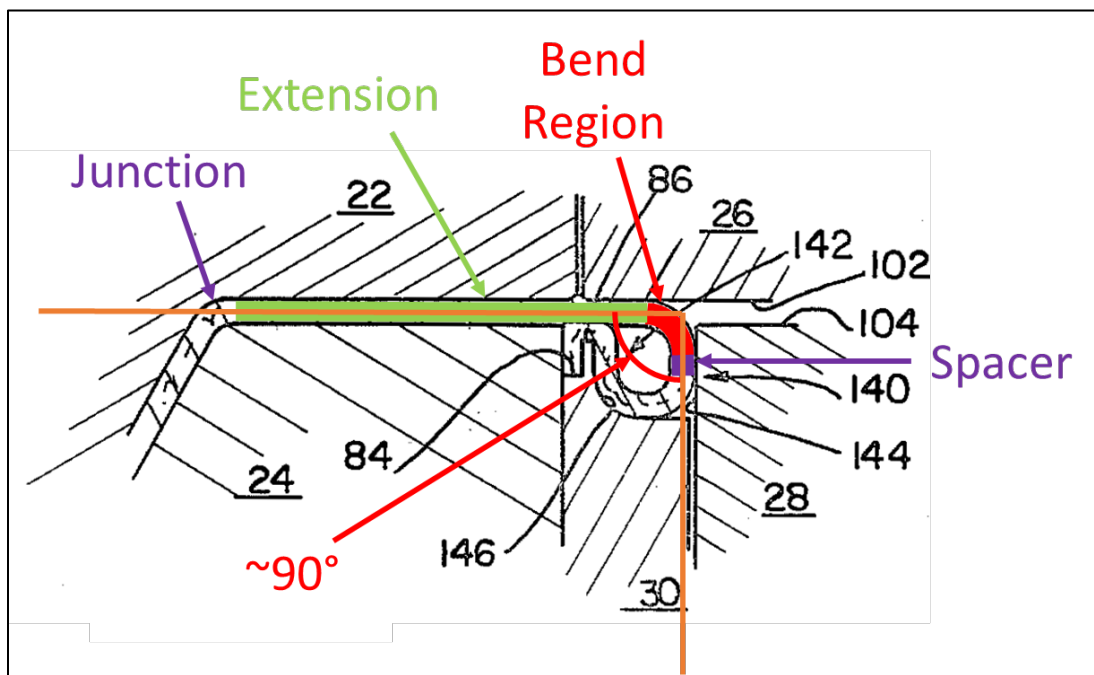
Ex. 1001, 18:32-56, 27:1-28, Figs. 8B, 8E. EX1003, ¶333.

Similarly, the extension in Meadors' tray includes a spacer interposed between the peripheral edge and the bend region. The straight, vertical portion of the rolled-over shape comprises a spacer:



Meadors, Fig. 8 (annotated). EX1003, ¶334.

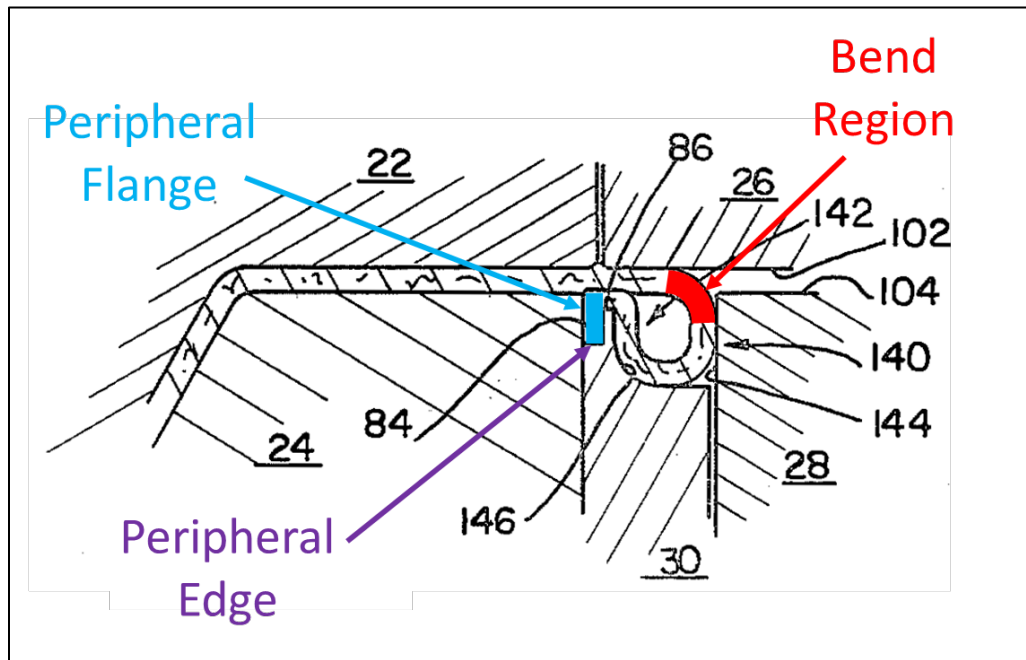
May measured the angle between Meadors' extension and spacer elements and determined the angle to be 90 degrees:



Meadors, Fig. 8. EX1003, ¶335.

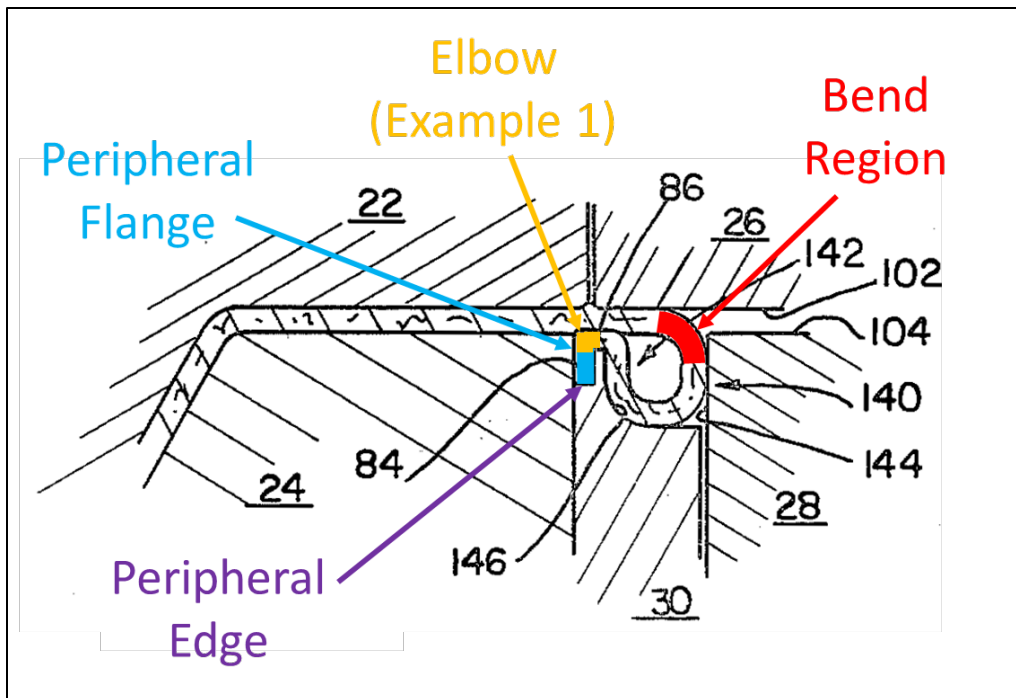
e. 1[D]:

The “peripheral flange” limitation is met by the vertical segment slightly to the right of center in Fig. 8:



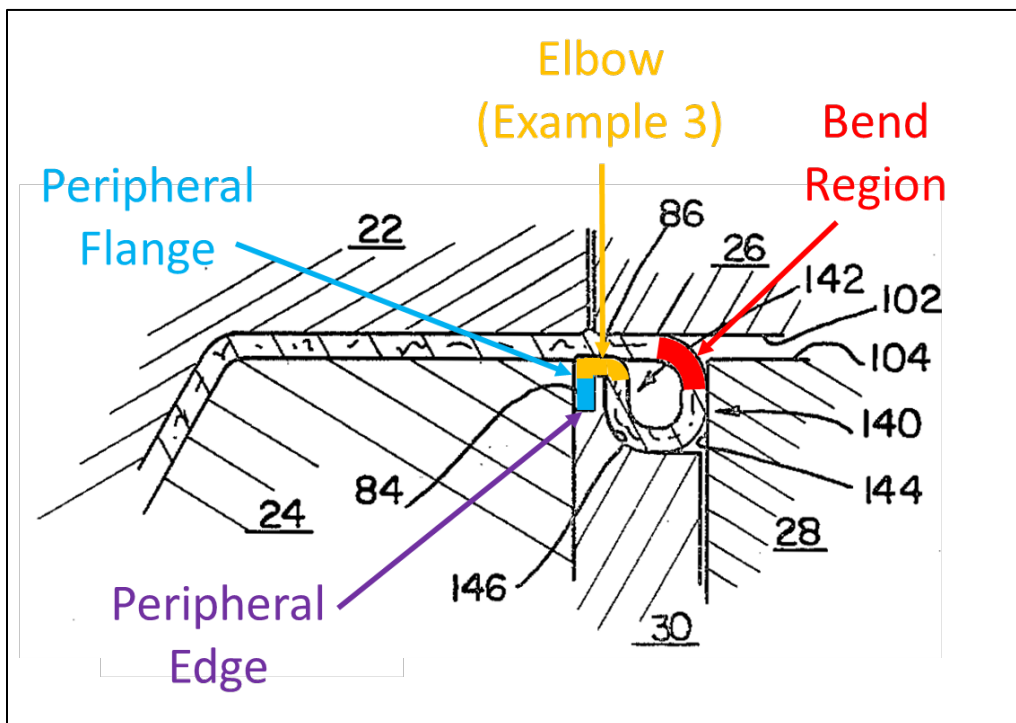
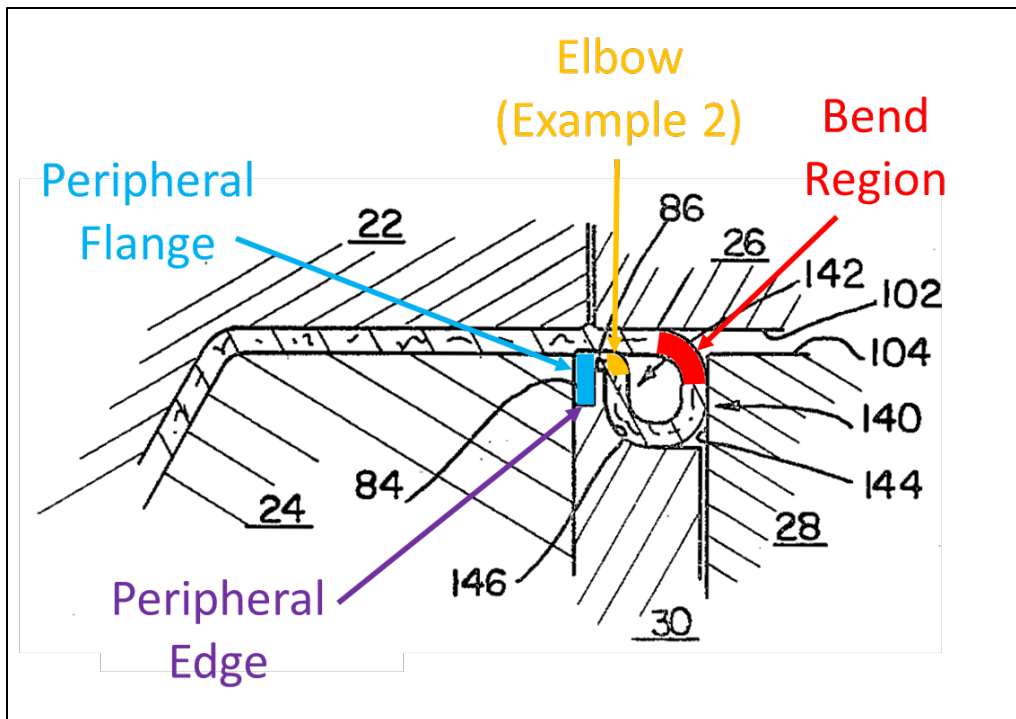
Meadors, Fig. 8. EX1003, ¶339.

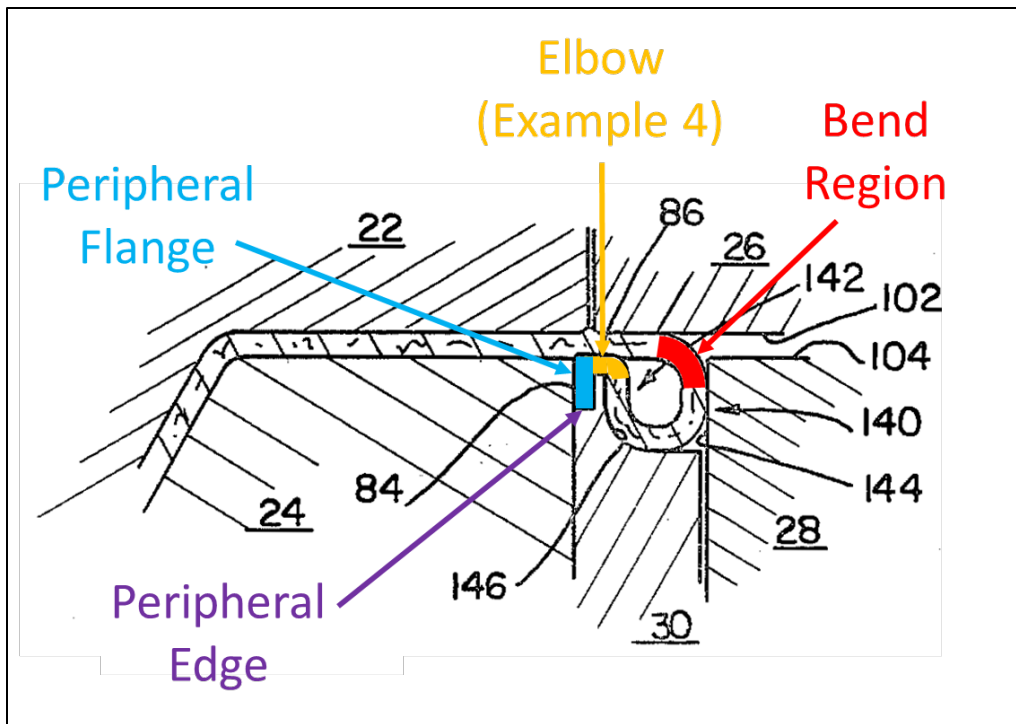
The peripheral flange of Meadors’ tray is connected to the bend region by an elbow:



Meadors, Fig. 8. EX1003, ¶340.

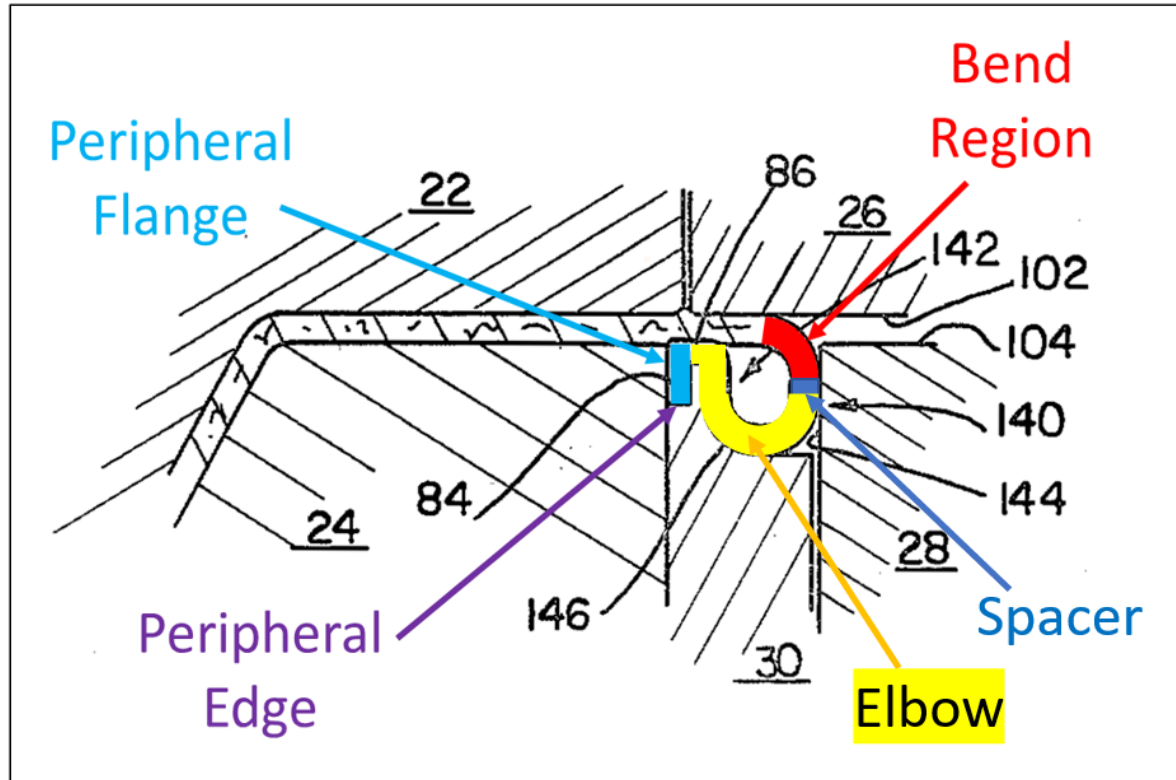
The “elbow” limitation can also be met by the bend slightly farther to the right of the peripheral flange, by a combination of the two bends, or by a combination of the bend further to the right and the straight segment immediately to its left:





Meadors, Fig. 8. EX1003, ¶341.

Another example of an elbow:

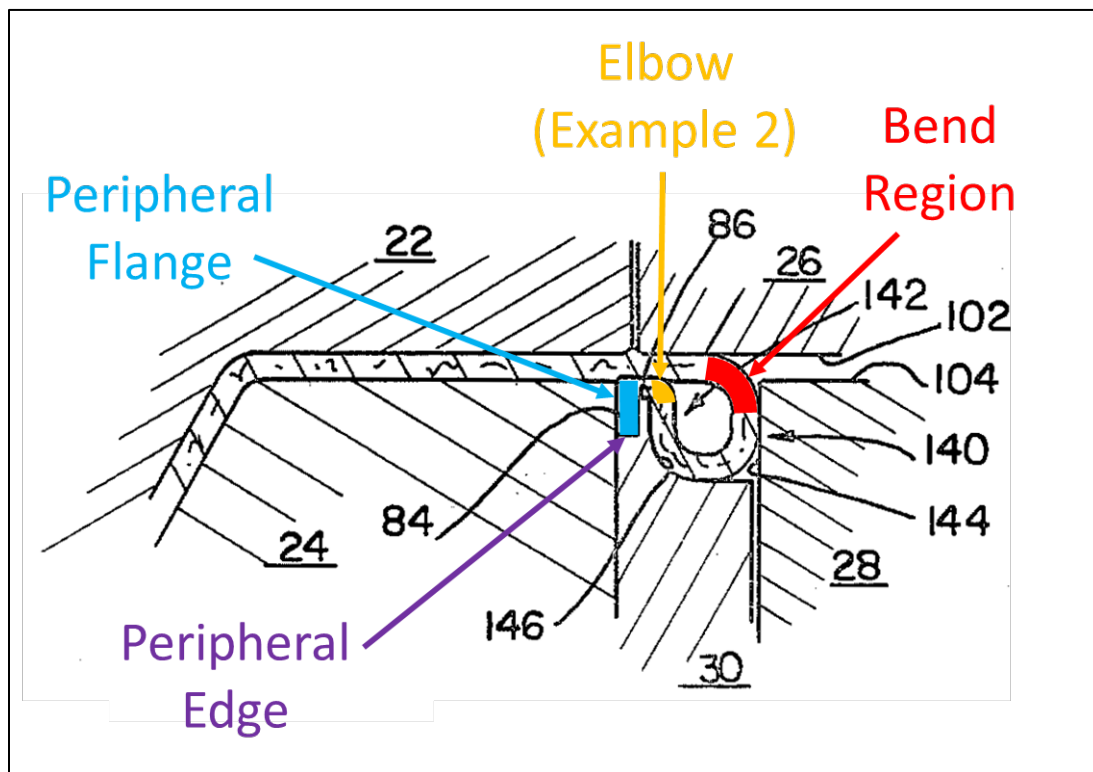
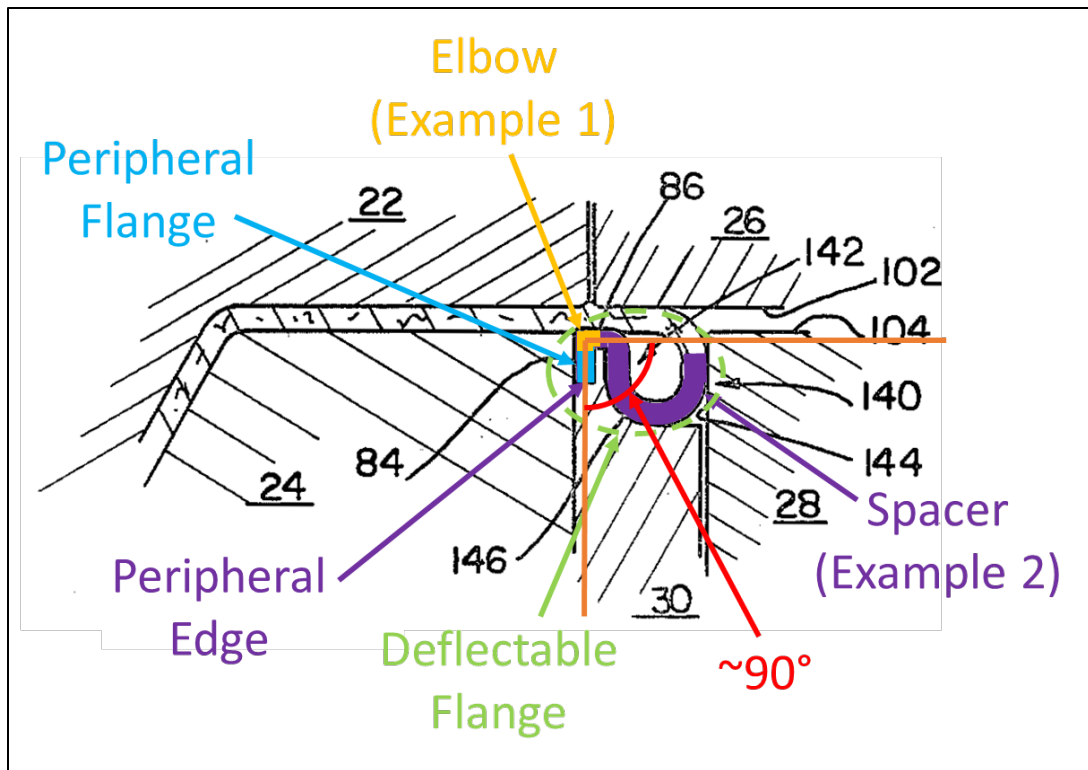


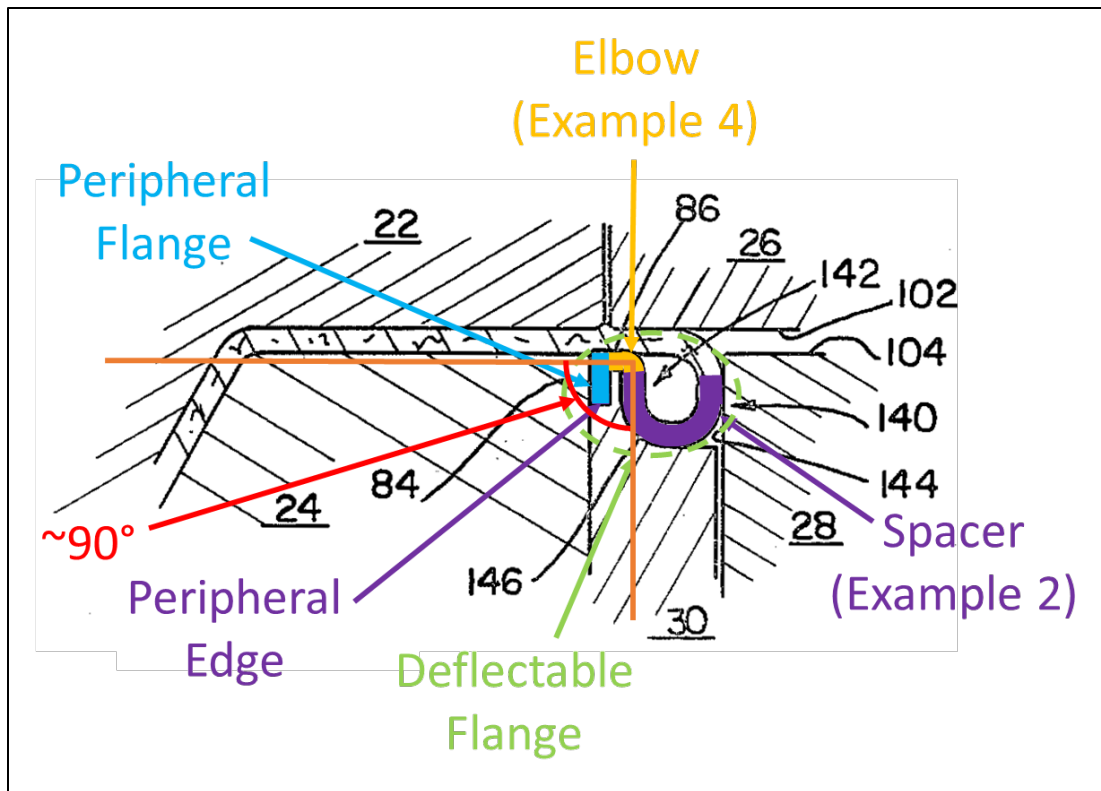
Meadors, Fig. 8. EX1003, ¶342. In this example, Meadors teaches a spacer connected with a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peripheral flange being connected at an elbow. EX1003, ¶343.

The spacer can additionally include the remainder of the extension from straight segment to peripheral edge:



3 \ Spacer
(Example 2)



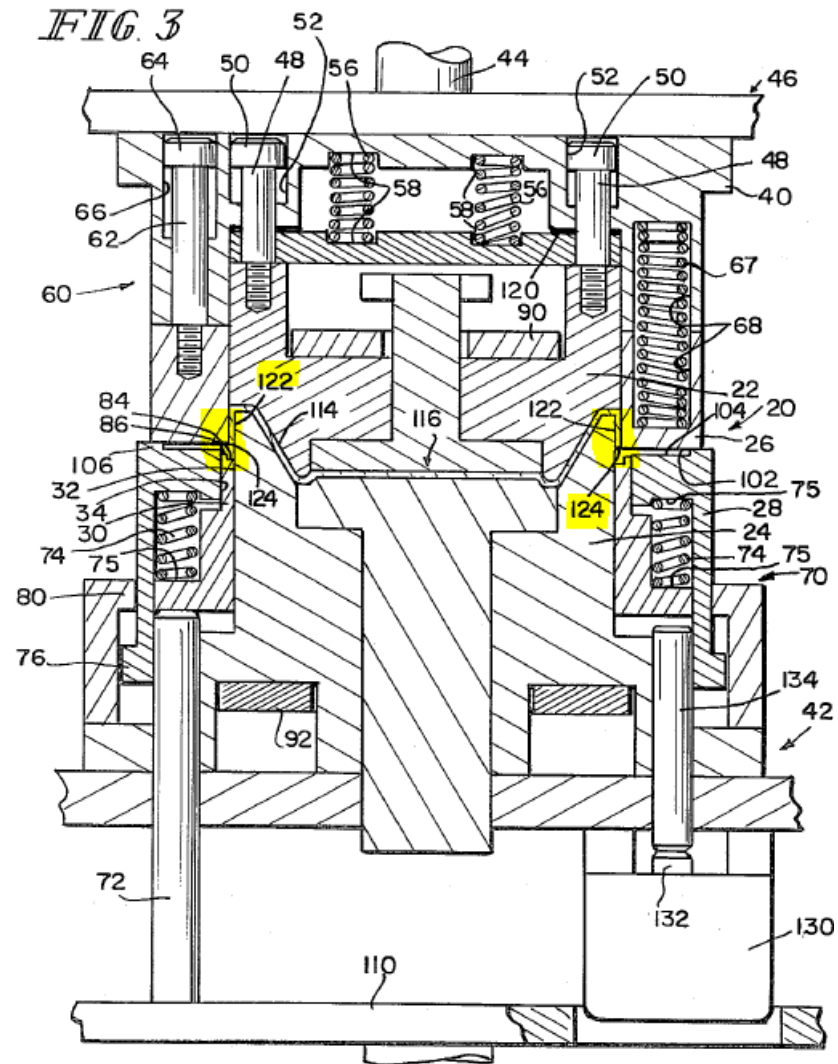


Meadors, Fig. 8. EX1003, ¶345. In each of these examples, the elbow has a 90-degree bend. Thus, it connects the peripheral flange to the remainder of the spacer at an angle other than 180 degrees. EX.1003, ¶346.

f. 1[E]:

Meadors teaches impinging a ram against the peripheral flange to deflect the spacer towards the extension: “It will be appreciated that, through this step in the method, article 116 has been formed to provide a downwardly extending flange 122 surrounding the central region 114 and attached at its vertically upper extent to the region 114. The flange 122 provides a distal free edge 124 at its vertically lower extent.” Meadors, 4:19-30. This first step prepares the peripheral flange for further impingement. Meadors further states, “FIG. 3 is a vertically sectioned side

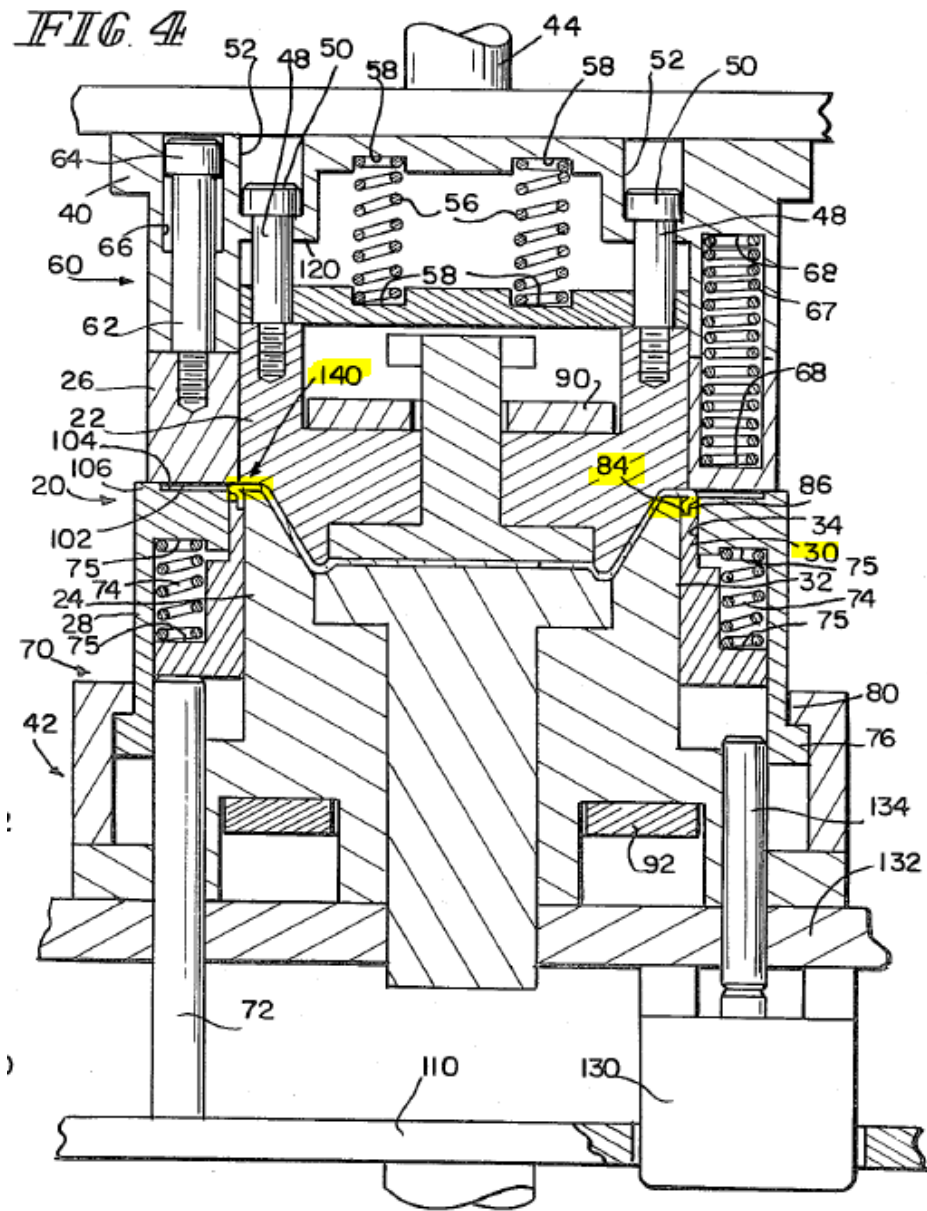
elevational view of the apparatus of FIGS. 1-2 after performing a step of the method subsequent to that illustrated in FIG. 2.” Fig. 3 illustrates “impinging a ram against the peripheral flange to deflect the spacer towards the extension” (yellow highlighting).



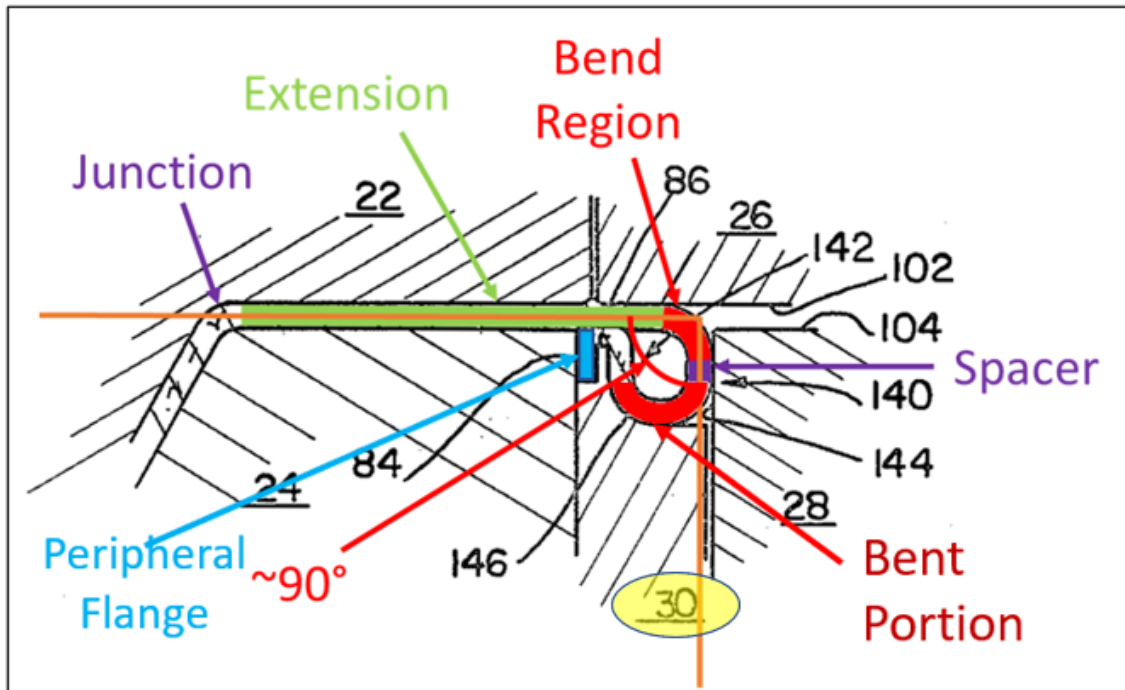
Meadors, Fig. 3 (annotated). EX1003, ¶349.

Meadors describes his Figs. 3-4 as beginning the bead-forming step, i.e. the rolling of the flange. He discloses a ram (“ring 30”) that impinges (“begins its

upward travel” and “The distal free edge 124 of article 116 is captured in groove 84”) the flange: “As the **vertically upward travel of ring 30** continues, the flange 122 is squashed, or crushed, into a double-thickness bead or **rim 140**.” Id. 4:31-39. Meadors’ flange includes an extension, peripheral flange and spacer, where spacer is deflected towards the extension by the ram (ring 30), as seen in Meadors Fig. 4, and detailed in Meadors Fig. 8:



Meadors, Fig. 4.



Meadors, Fig. 8. EX1003, ¶350.

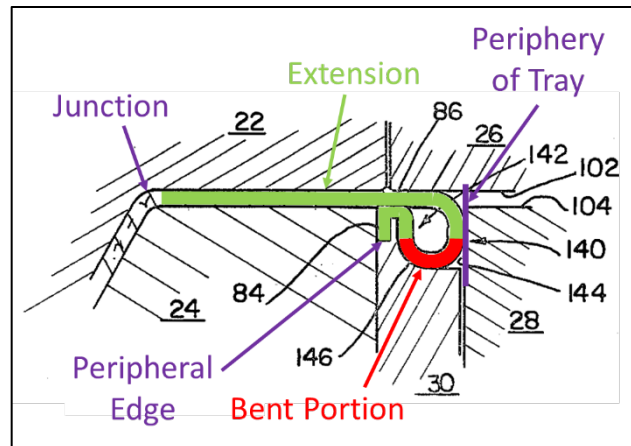
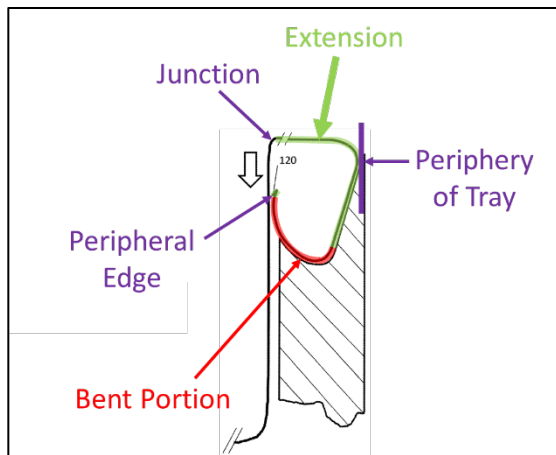
In both Meadors Figs. 4 and 8, the spacer is deflected *towards* the extension.

EX1003, ¶¶351-352.

g. 1[F]:

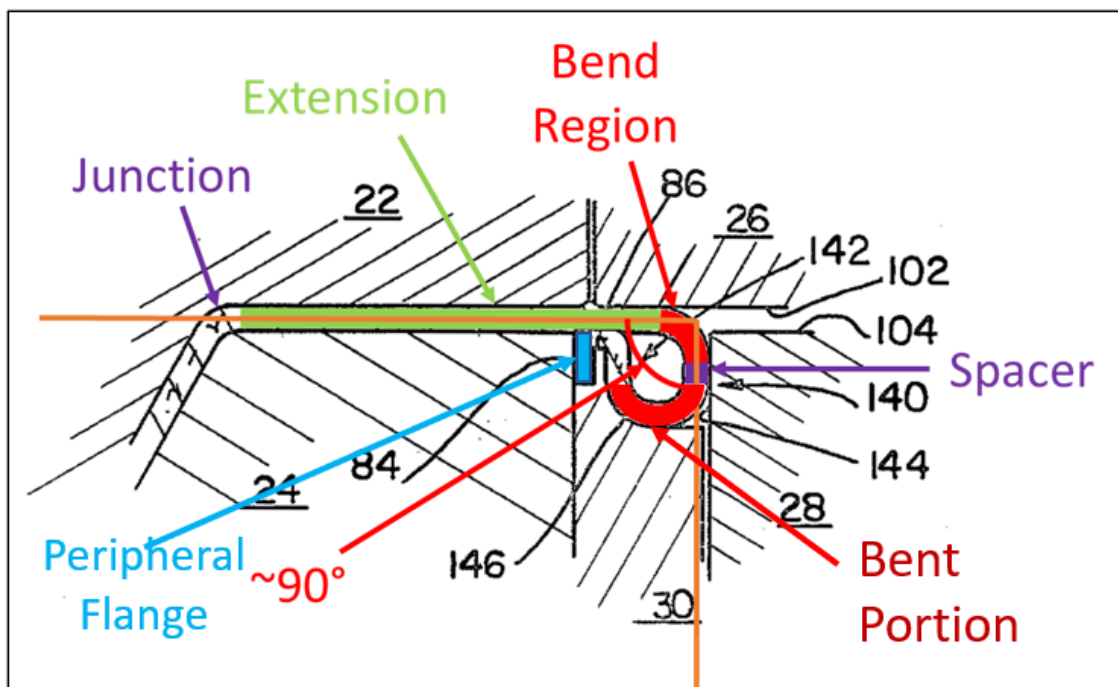
The embodiment in Fig. 8K of the '222 Patent is (1) representative of the article recited in Claim 1, and (2) substantially similar to the article illustrated in

Meadors Fig. 8:



Ex. 1001, Fig. 8K (annotated). Meadors, Fig. 8 (annotated). EX1003, ¶355.

Meadors discloses a bent portion, bend region and spacer:

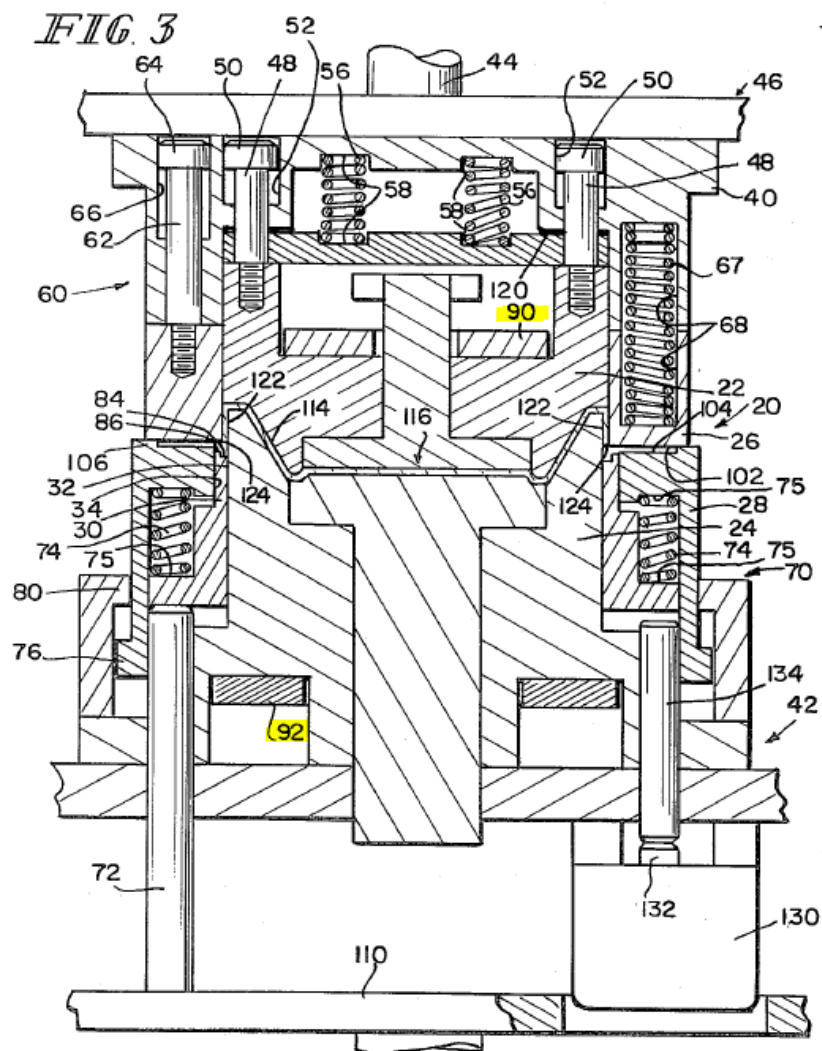


Meadors, Fig. 8 (annotated). Therefore, Meadors teaches the bent portion being selected from the group consisting of the extension, the bend region, and the spacer.

EX1003, ¶356-357.

h. 1[G]:

Meadors describes using thermoplastic materials. Meadors, Abstract; 1:5-9; 3:43-46 (“The material may be of any known type, including, but not limited to, *paper* (e.g., milk carton stock), *thermoplastic material* (e.g., *acrylonitrile butadiene styrene*), or other suitable material.”). Meadors further recites regarding forming the rolled edge, “At this point, it may be **desirable to apply heat** through coils 90, 92 to ‘iron’ and heat-set the material in the article 116.” Id, 4:19-25. Meadors Figure 3 shows the referenced heated tooling elements, which would transfer heat to the forming dies and to the other metal tooling impinging the flange, including the ram (ring 30) which directly contacts the bent portion shown in Meadors Fig. 8, thereby heating the bent portion. EX1003, ¶¶359-360.

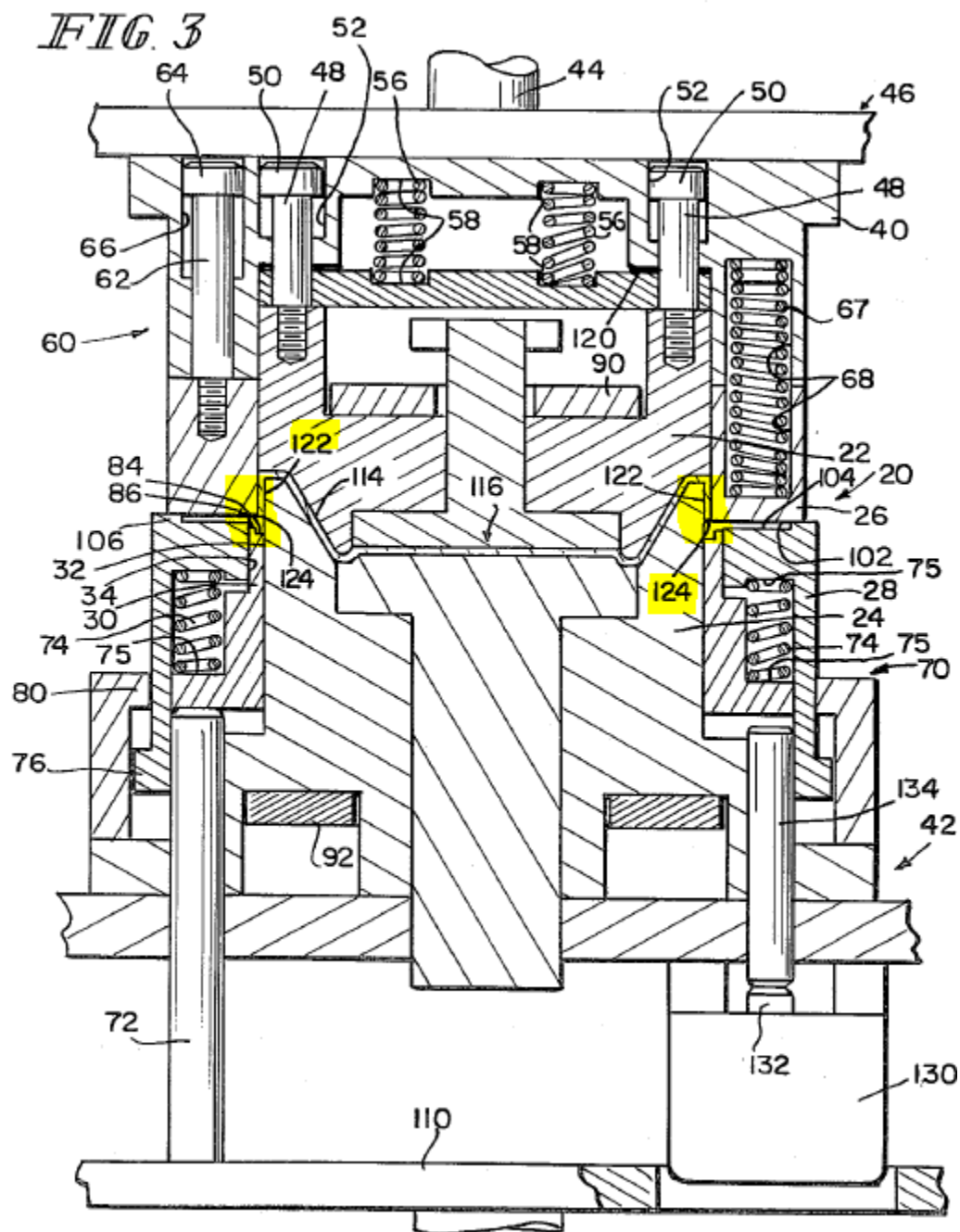


Meadors, Fig. 3.

A POSITA would have understood that Meadors' references to thermoplastics and application of heat through conductive metal tooling to the flange 122, to mean that the bent portion is to be heated to at least the glass transition temperature (or softening point), as that would be necessary to displace the peripheral edge of a thermoplastic sheet. EX1003, ¶361.

i. 1[H]:

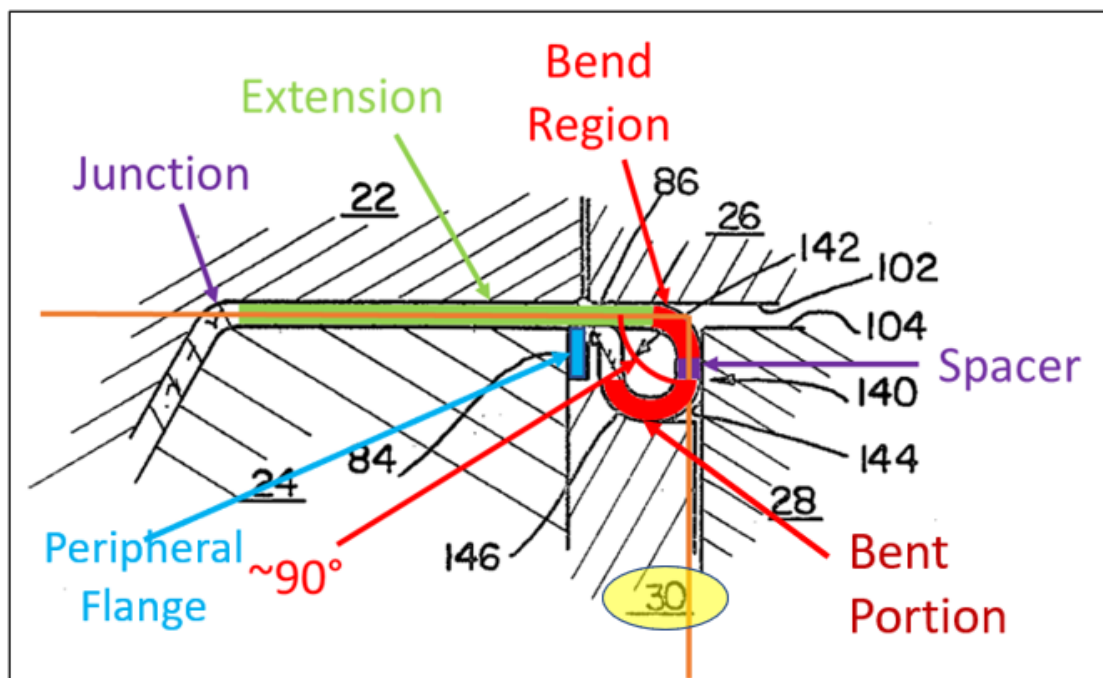
Per Meadors, “It will be appreciated that, through this step in the method, article 116 has been formed to provide a downwardly extending flange 122 surrounding the central region 114 and attached at its vertically upper extent to the region 114. The flange 122 provides a distal free edge 124 at its vertically lower extent.” Id. 4:19-30. This first step prepares the peripheral flange for further impingement:



Meadors, Fig. 3 (annotated). EX1003, ¶362.

Meadors describes Figures 3-4 as beginning the bead-forming step, i.e. the rolling of the flange. A ram (“ring 30”) impinges (“begins its upward travel” and “The distal free edge 124 of article 116 is captured in groove 84”) the flange. “As

the vertically upward travel of ring 30 continues, the flange 122 is squashed, or crushed, into a double-thickness bead or **rim 140.**” Id. 4:31-39. Meadors discloses the required “*further impinging the ram against the deflectable flange to further deflect the spacer toward the extension,*” through recitation of “As the vertically upward travel of ring 30 continues,” as well as illustrations of incremental impingement of the deflectable flange (free edge 124) in Figs. 3 (above) and 4 (below), where spacer is deflected towards the extension by ring 30, as detailed in Meadors Fig. 8 (also below):



Meadors, Fig. 8 (annotated). EX1003, ¶363.

j. 1[i]:

Meadors teaches disengaging the ram from the deflectable flange by repeatedly referencing “reciprocably” mounting associated forming components of tooling or apparatus. For example, Meadors mentions reciprocally mounted upper die base 40, die member 22, heads 50, draw pads 26 and 28. *Id.* 3:11-33.

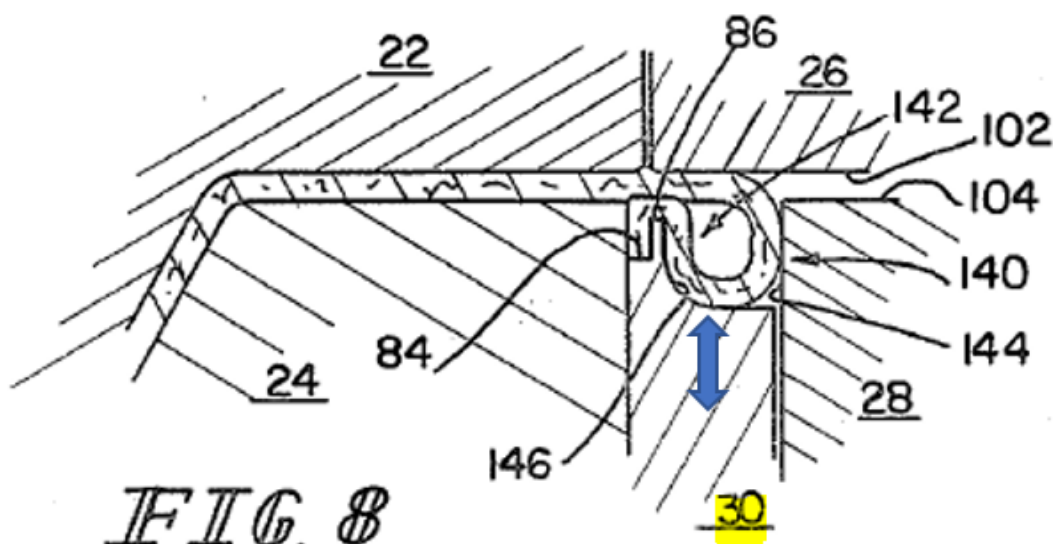
Meadors, further details the use of die springs 56 and 74. *Id.* 3:4-33. Meadors describes these components in the context of a cyclic and repeatable method and process for forming rolled flanges in a thermoplastic article. EX1003, ¶366.

A POSITA would have understood that Meadors use of the term “reciprocably” refers to the ability for the apparatus components to return or retract

to their initial position to repeat a cycle, i.e. “disengaging.” The same is true regarding the use of “springs” (Id. 3:22, 28), which are designed to compress and rebound, thereby returning to their original position for each cycle. To support this interpretation by a POSITA, Throne teaches “the cavity clamp may provide other functions, for example: ...The clamp may contain a forming **ring** that compresses the rim region. This is called “coining”... Deli container rims are sometimes coined. Coining may be used if the container rim must be rolled to provide rim stiffness, as discussed below. The force required to coin a lip is a function of the compressive strength of the polymer at its instant temperature... The clamp may combine with an ejection **ring** on the cavity to allow separation of the part from the trim. The formed part is held momentarily stationary between the **ring** and the clamp while the mold moves away and the trim is pulled downward. **Then the clamp retracts**, leaving the part on the ejection **ring**. The trim moves once the part and **ring** assembly have cleared the trim plane.” Throne, p.449-451. Throne is describing a common practice whereby an apparatus is disengaging after impinging a thermoplastic article, in this case after a rolled flange is formed about the periphery of such an article. EX1003, ¶367.

Meadors Fig. 8 is shown here with ram (ring 30) highlighted and blue arrow annotation indicating the ram’s ability to move vertically in both directions, upward for engaging the deflectable flange, and downward for disengaging the

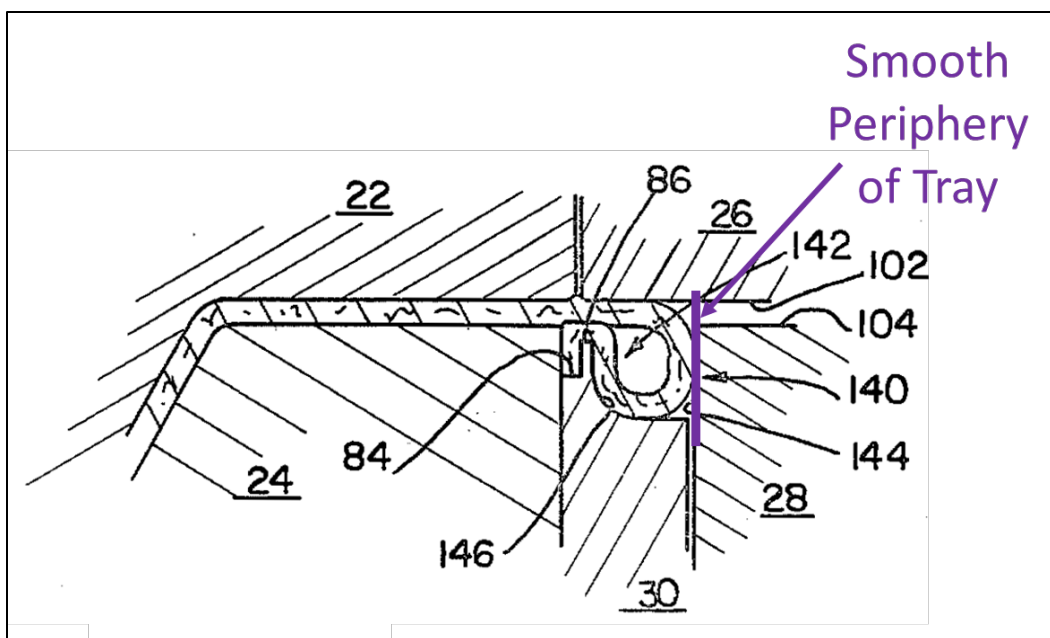
deflectable flange.



Meadors, Fig. 8. EX1003, ¶368.

Meadors' refers to Figs. 2-3, stating "At this point, it may be desirable to apply heat through coils 90, 92 to "iron" and heat-set the material in the article 116." Id. 3:22-25. The term "heat-set" would be understood by a POSITA to mean that the rolled flange shapes Meadors teaches in his Figures, including the bent portion of Fig. 8, would remain after the tooling components of Meadors' apparatus are disengaged. EX1003, ¶369.

Since the cooled, rolled-over shape at the outer perimeter of Meadors's tray—seen at the right side of Fig. 8—is continuous and smooth, the tray has a smooth periphery:



Meadors, Fig. 8 (annotated). EX1003, ¶370.

2. Claim 2:

A POSITA would understand that the heat Meadors suggests applying “at this time” (Id. 4:22-26, i.e. the time of rolling the flange) can be and would be selectively applied and discontinued, as it is widely understood that heated tooling for a thermoplastic article can be instantaneously energized and de-energized through common means such as thermocouple controlled heating elements.

EX1003, ¶372.

De-energizing Meadors coils 90, 92 will cause adjacent tooling to cool, resulting in the bent portion of the article to be cooled below the “glass transition” temperature. Additionally, at the time of the ‘222 patent application, common equipment and tooling used for forming, shaping and molding thermoplastic

articles was typically equipped with water cooling systems whereby chilled water was circulated through the tooling to quickly cool selected areas of the component. A POSITA would have been motivated to use such a process for cooling the bent portion prior to disengaging the ram from the deflectable flange as it would ensure that the flange was held in the desired position, i.e. until the “double thickness bead or rim 140” was cooled and solidified. Meadors discloses, “The bead 140 is finished as illustrated in Fig. 5, and enlarged in Fig. 6” (Id. 4:51-52), where **Meadors illustrates ring 30 *still* engaged with rim 140** (this would also be true for the ring 30 shown in contact with the bent portion of Meadors Fig. 8). Figs. 5 and 6 are shown here for reference.

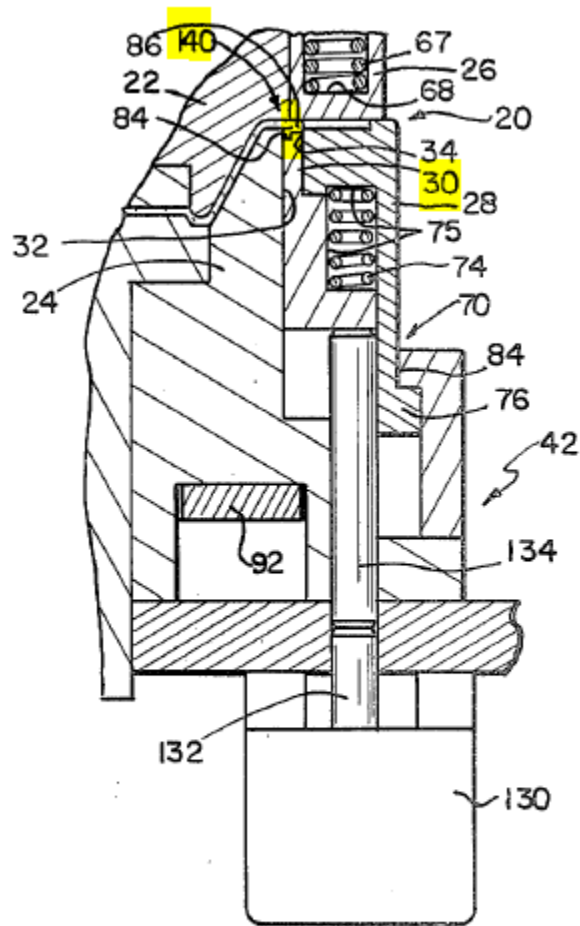


FIG 5

Meadors, Fig. 5 (annotated).

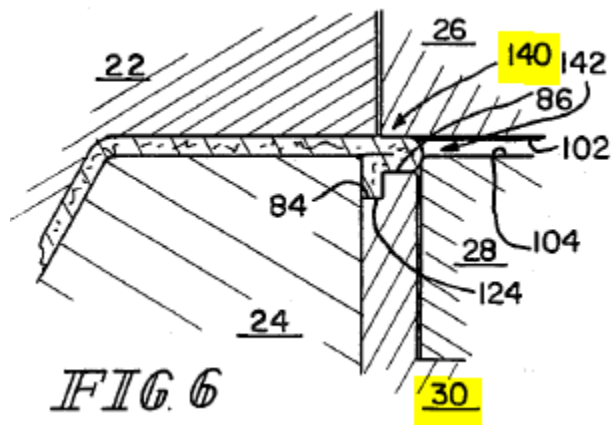


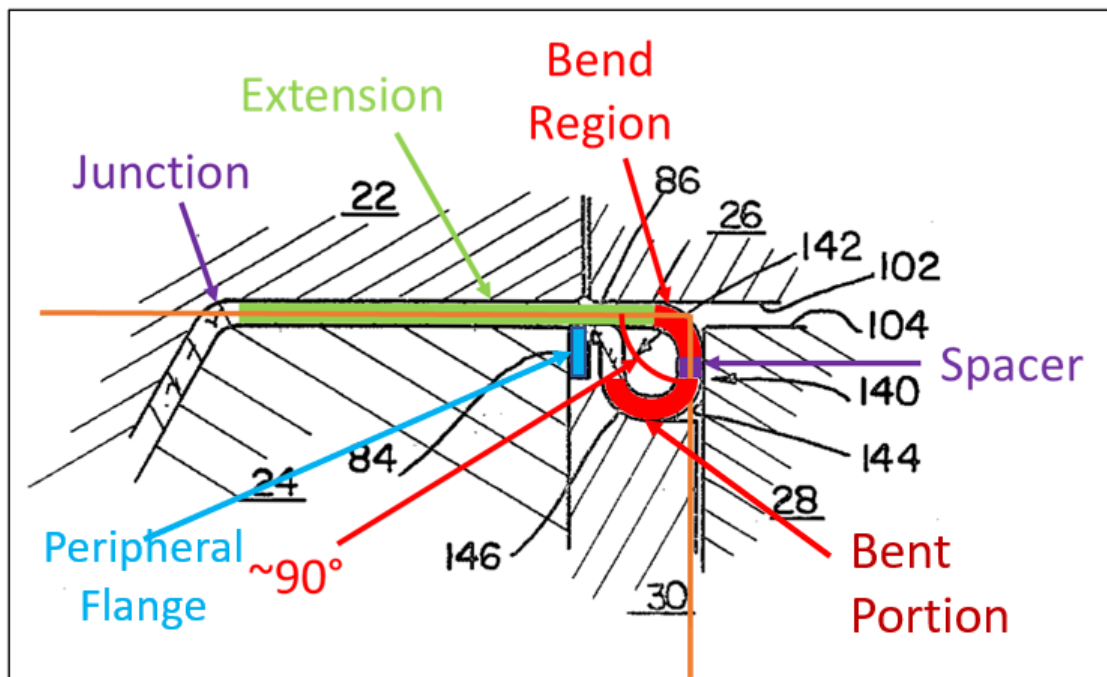
FIG 6

Meadors, Fig. 6 (annotated). EX1003, ¶373.

Furthermore, Meadors refers to Figs. 2-3, stating “At this point, it may be desirable to apply heat through coils 90, 92 to “iron” and heat-set the material in the article 116.” Id. 3:22-25. The term “heat-set” would be understood by a POSITA to mean that the rolled flange shapes Meadors teaches in his Figures, including for example, Fig. 8, would remain once the bent portion is cooled below the glass transition temperature prior to disengaging the ram from the deflectable flange.

3. Claim 3:

Meadors discloses an extension, bend region and spacer, in accordance with the ‘222 patent and Patent Owner’s First Amended Complaint, as shown in annotated Fig. 8 below:



Meadors, Fig. 8. EX1003, ¶375,

Meadors Fig. 8 discloses a bend region which interconnects the spacer with the extension at an angle of 90 degrees, which is not less than 75 degrees, but less than 105 degrees. EX1003, ¶376.

4. Claim 4:

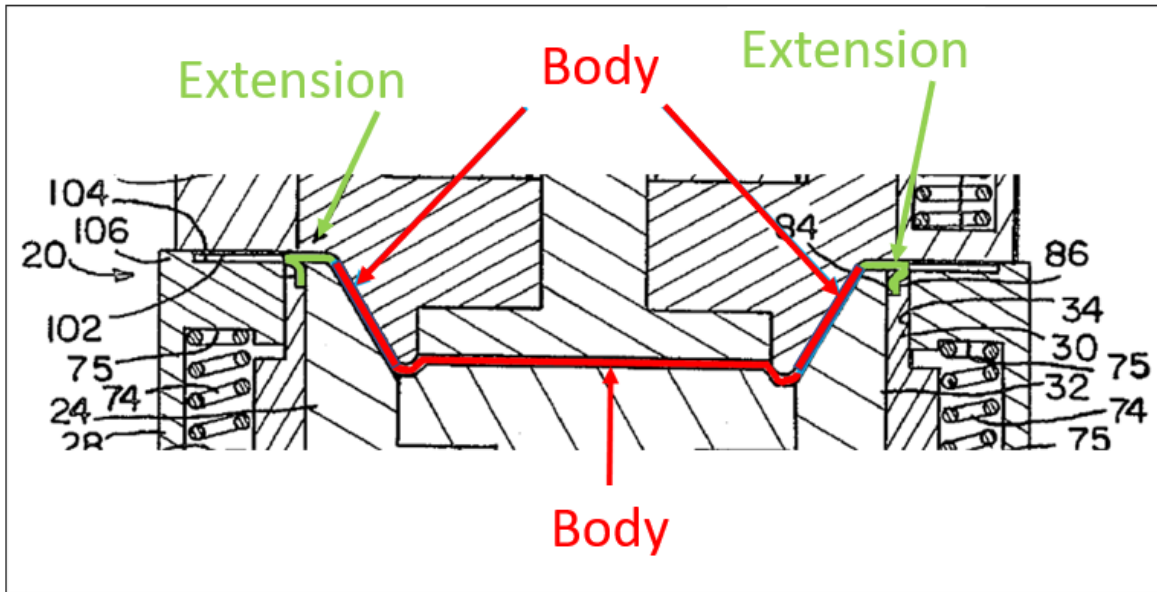
See arguments supra for claim 3. EX1003, ¶377.

5. Claim 5:

The shape of Meadors's container can be a rounded rectangular tray with a body and a deflectable flange about its entire periphery. Id. 2:14-24. Meadors' reference to the "perimetral edge of the blank surrounding the central region" is understood to mean "a thermoplastic shape with a body and a deflectable flange about its entire periphery." EX1003, ¶¶378-379.

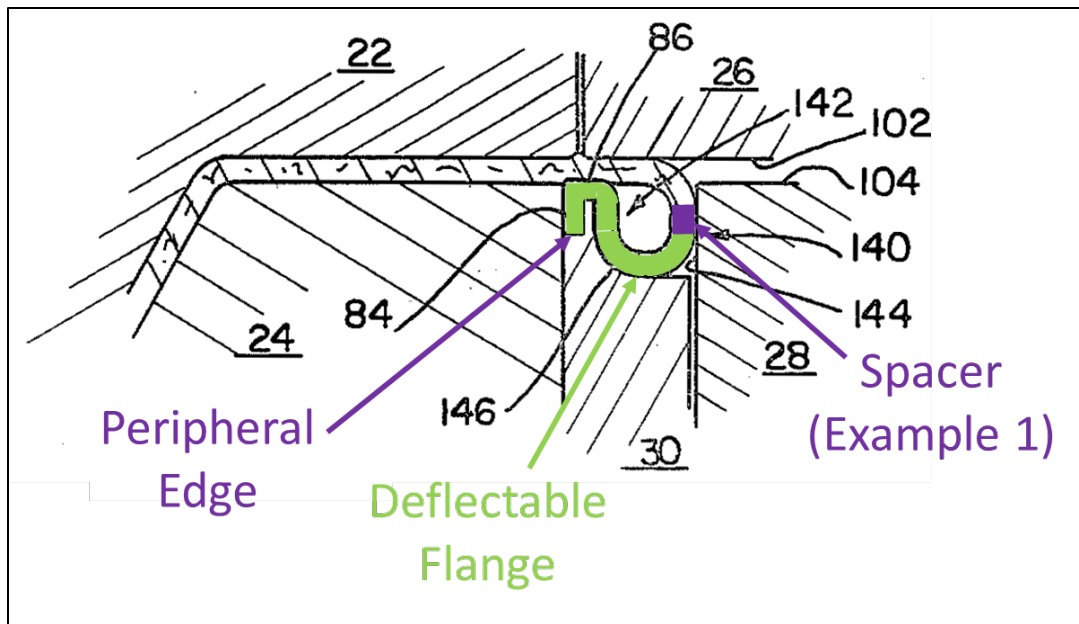
Meadors further describes the use of a "**perimetrically** extending ring 30" to form a "bead or rim 140" on the edge of a container—e.g., a tray—formed from a blank 100 which can be rectangular. Id. 2:68 (tray-forming mechanism includes a "**perimetrically extending ring 30**"); 3:40-43; 4:36-39; 6:24-26; Figs. 1-4, 8. EX1003, ¶380.

Fig. 4 of Meadors illustrates a side view of the tray within the forming apparatus, showing a body including an extension with a deflectable flange about its periphery:



Meadors, Fig. 4 (excerpted, annotated). EX1003, ¶381.

The extension of Meadors' tray includes the curved, rolled-over shape on the right side of Fig. 8. The straight, vertical portion of that rolled-over shape comprises a spacer, in which case the deflectable flange comprises the combination of the spacer, the bottom of the curve, and the remainder of the extension leading to and including the peripheral edge. Thus, Meadors teaches a thermoplastic article formed into a shape comprising the body and having the deflectable flange about its entire periphery:

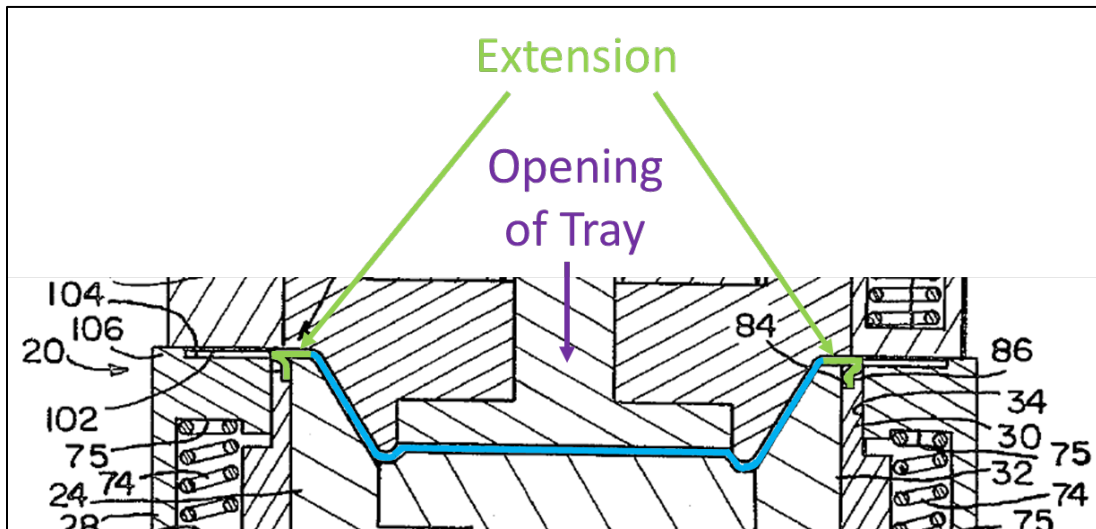
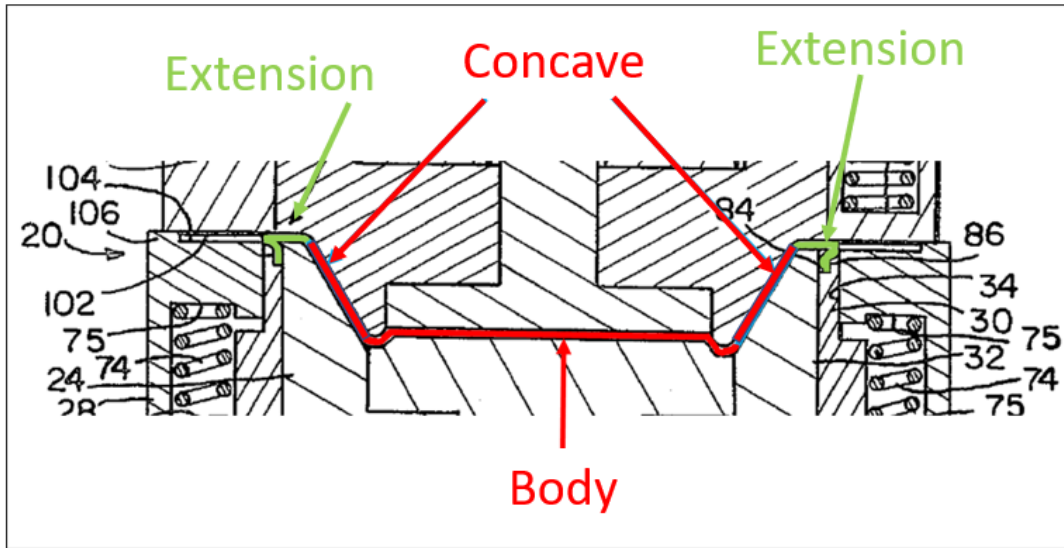


Meadors, Fig. 8 (annotated). EX1003, ¶382.

6. Claim 6:

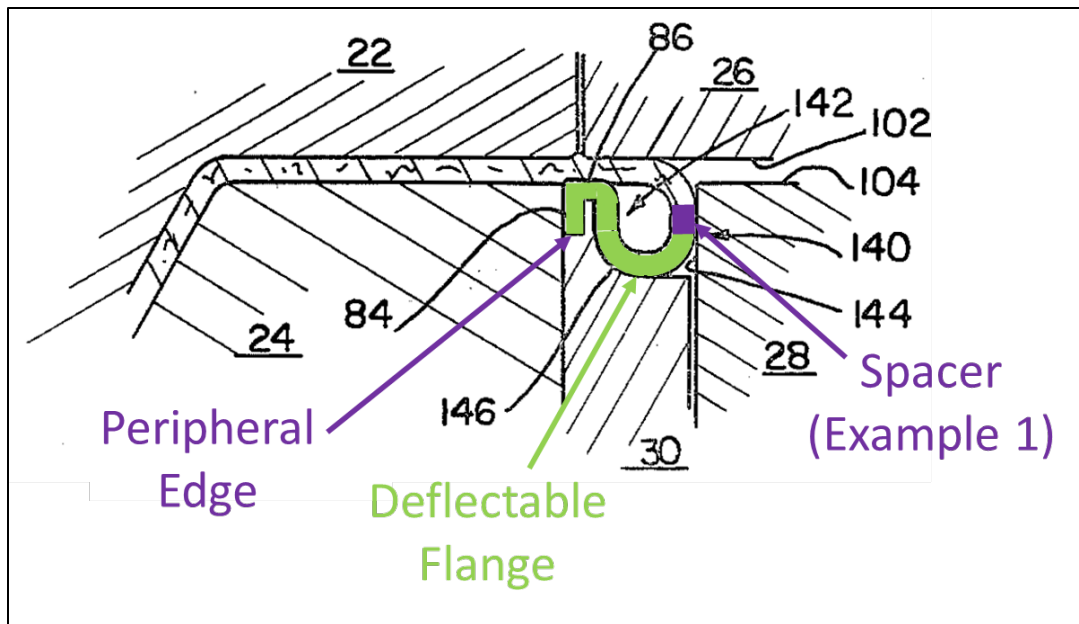
See arguments supra for claim 5. EX1003, ¶¶383-386.

A POSITA would have interpreted the cross-sectional side view of Meadors' tray in Fig. 4 as having a concave compartment with an opening and a deflectable flange about the entire periphery of the opening:



Meadors, Fig. 4 (excerpted, annotated). EX1003, ¶387.

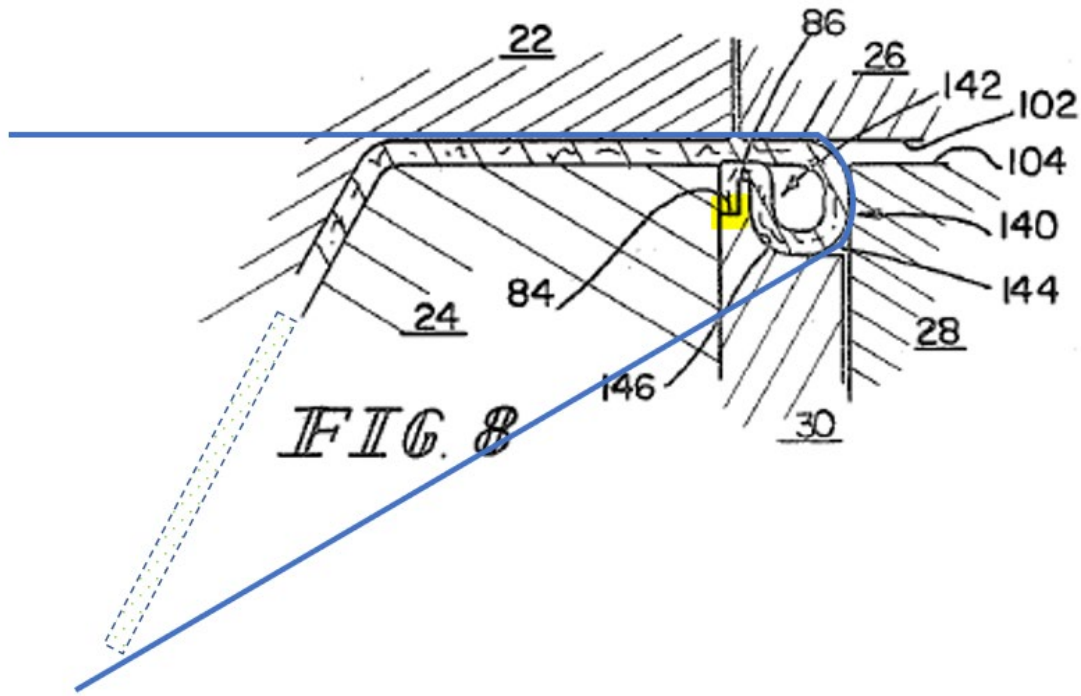
The extension of Meadors' tray includes the curved, rolled-over shape on the right side of Fig. 8. As noted previously, Meadors rolled-over shape comprises a deflectable flange:



Meadors, Fig. 8 (annotated). EX1003, ¶388.

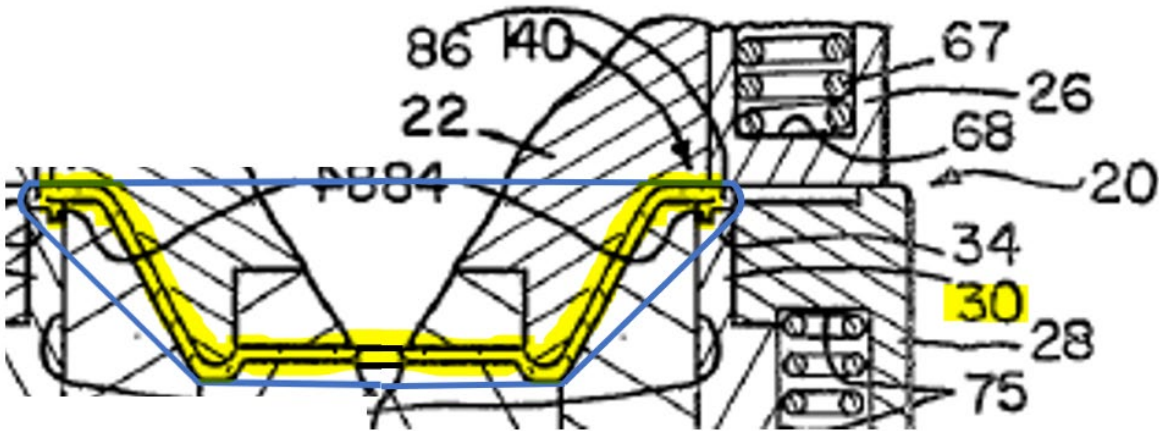
7. Claim 11:

Meadors Figure 8 discloses impingement of the deflectable flange (including peripheral edge Meadors “distal free edge” highlighted yellow below). Meadors’ deflectable flange is sufficiently deflected away from the periphery by ring 30 such that a flexible film (blue) that tautly over-wraps the shaped article after cooling the bent portion does not contact the peripheral edge:



Meadors, Fig. 8 (annotated showing continued sidewall and deflectable flange sufficiently deflected such that a flexible film (added in blue) does not contact the peripheral edge (yellow). EX1003, ¶¶390-392.

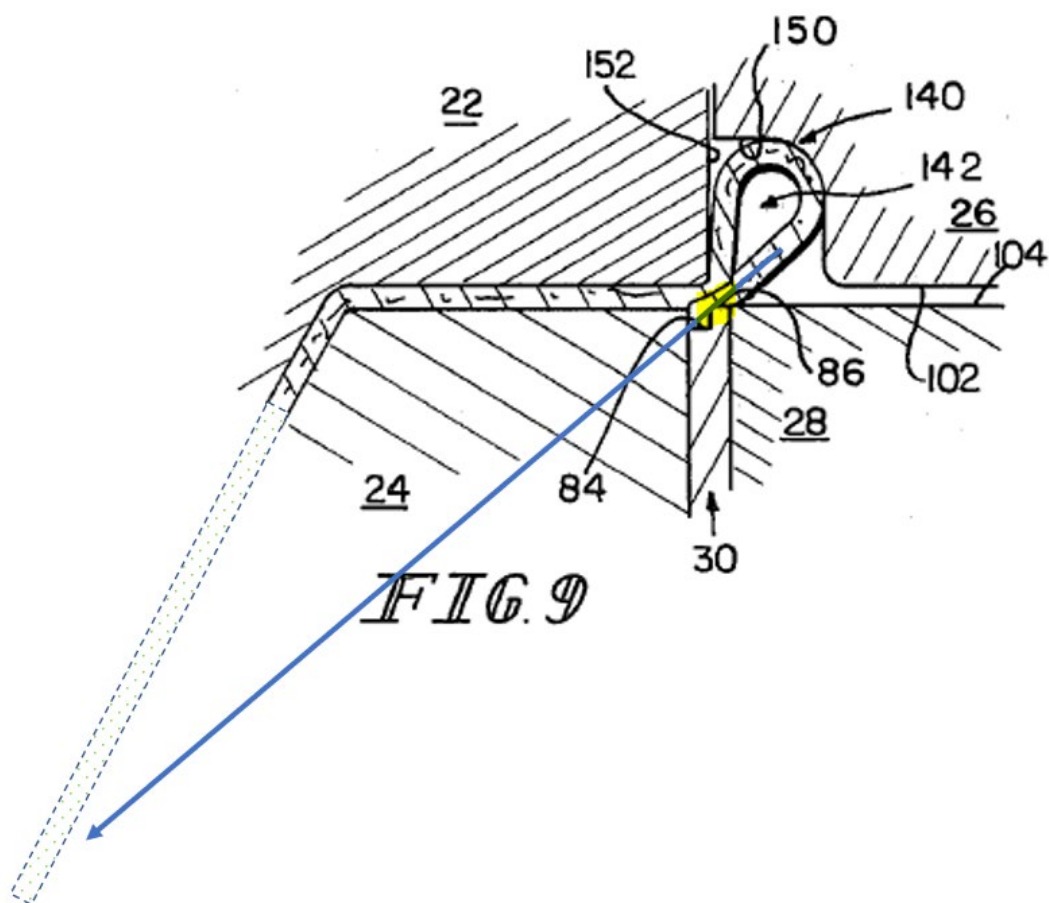
This can be further envisaged by considering Meadors Fig. 5. Here, May shows an excerpt of the article taught by Meadors Fig. 5, and replicated it with a mirror image to show what the container profile would look like, with deflectable flange sufficiently deflected away from the periphery by ring 30 such that a flexible film (blue) that tautly over-wraps the shaped article after cooling the bent portion does not contact the peripheral edge:



Meadors, Fig. 5 (excerpted, annotations added and modified to show mirror image of yellow highlighted article and indicating a flexible film (blue) would not contact peripheral edge). EX1003, ¶393.

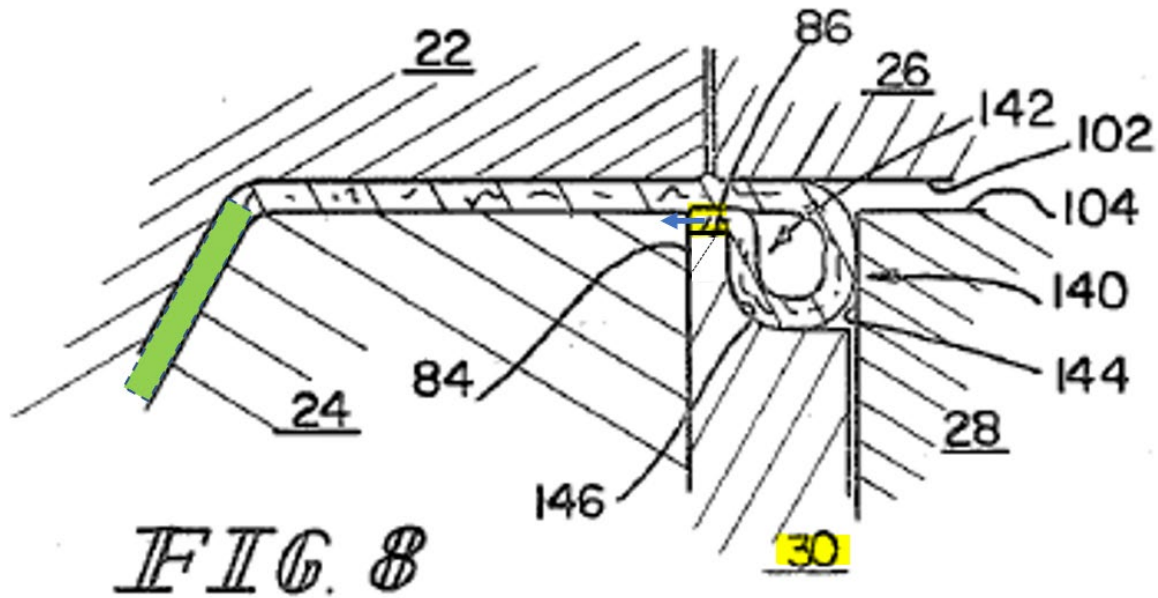
8. Claim 12:

Meadors Figure 9 shows examples of die mechanism 20 members 22, 24, 26, 28, 30, and further teaches impinging a ram against the deflectable flange to deflect the peripheral edge sufficiently that the peripheral edge (yellow) points at (blue arrow) the body, as shown below. Note that while there is a small step in the ram (ring 30), the overall trajectory or vector of the peripheral edge points at the body of the article, annotated here with a cavity deeper than the rolled flange, a proportion which a POSITA would be very familiar with in such shaped thermoplastic articles:



Meadors, Fig. 9 (annotated). EX1003, ¶¶395-397.

Moreover, a POSITA would have understood that flattening the left-most portion of ring 30 would result in the peripheral edge (highlighted yellow) pointing at the body (green):



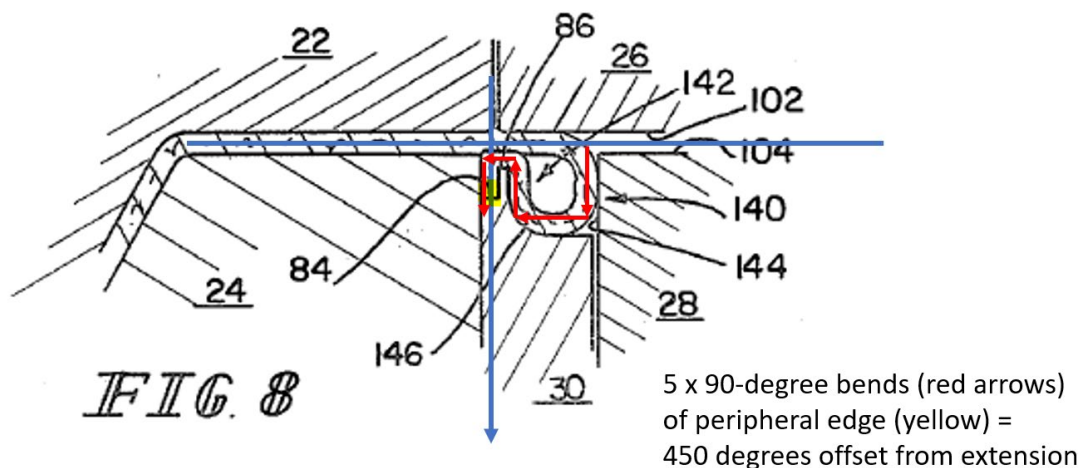
Meadors, Fig. 8 (annotations added and ring 30 modified to deflect peripheral edge sufficiently that peripheral edge (yellow) points at the body (green)). EX1003, ¶¶398-399.

A POSITA would have been motivated to make such a simple tooling modification to yield the above-described bead 140 as it would ensure that the peripheral edge *would not contact an over wrap regardless of how shallow the depth of Meadors article*. For example, Meadors includes reference to “forming a blank of sheet material into a *plate*, tray, dish or the like having a central region and an outer perimetral edge region.” Id. 6:24-6. In other words, a POSITA would understand that impinging against the deflectable flange to deflect the peripheral edge sufficiently that the peripheral edge points at the body after cooling the bent

portion would help further ensure that the sharp peripheral edge was displaced out of the wrap path, regardless of thermoplastic article shape or depth. EX1003, ¶400.

9. Claim 13:

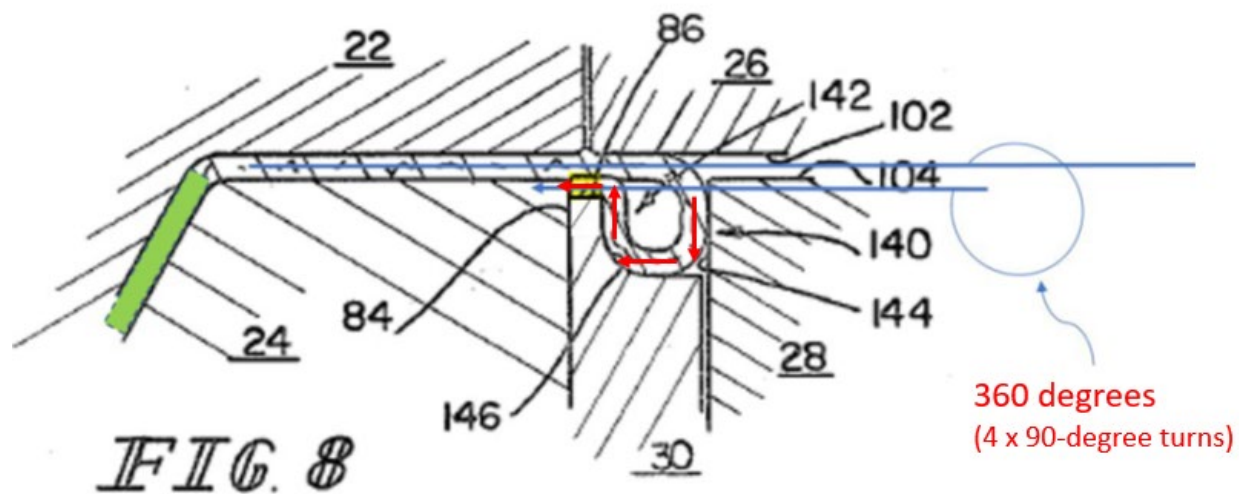
Meadors teaches the displacement of a peripheral edge which is offset from the extension by 450 degrees, as indicated in annotations below where each of the five red arrows represents a 90-degree bend of Meadors' peripheral edge (5 bends x 90 degrees = 450 degrees offset from extension):



Meadors, Fig. 8 (annotations added showing modified ram (ring 30) impinged against deflectable flange to deflect the peripheral edge 450 degrees, i.e. not less than 180 degrees). EX1003, ¶¶401-403.

Alternatively, a POSITA would understand that through a slight modification of the shape of Meadors ring 30, i.e. a flattening the left-most portion of the ram ("ring 30"), the peripheral edge would be deflected sufficiently that a plane through

the thermoplastic at the peripheral edge would be offset from the plane of the extension by an angle of 360 degrees, i.e. not less than 180 degrees, as seen here:



Meadors, Fig. 8 (annotations added showing modified ram (ring 30) impinged against deflectable flange to deflect the peripheral edge 360 degrees, i.e. not less than 180 degrees). EX1003, ¶404.

A POSITA would have been motivated to make such simple tooling modifications to further ensure that the peripheral edge *would not contact an over wrap regardless of how shallow the depth of Meadors article*. EX1003, ¶¶405-406.

10. Claim 14:

Meadors discloses a variety of bead 140 configurations including those detailed in Figs. 5-10. *Within each of those Figures*, Meadors shows that the deflectable flange is deflected to differing degrees at selected portions of the ram:

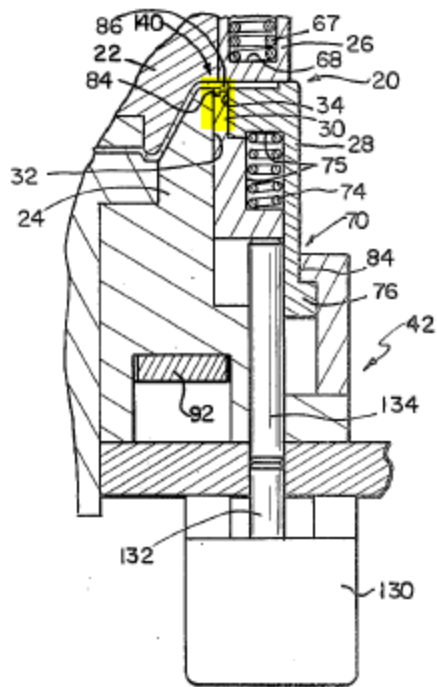


FIG 5

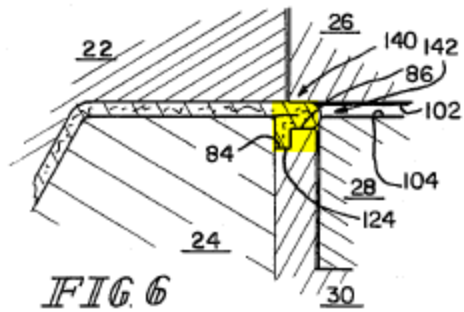


FIG 6

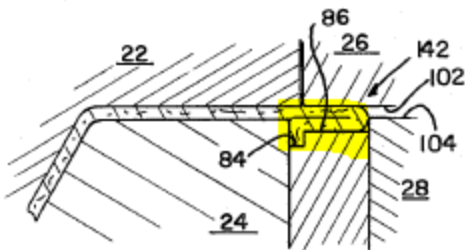


FIG 7

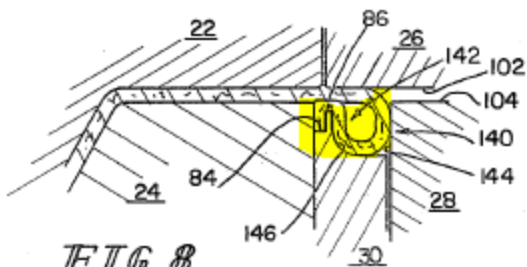


FIG 8

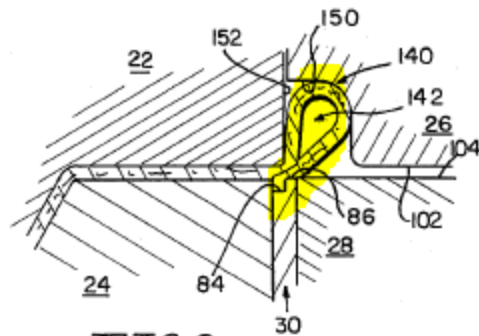


FIG 9

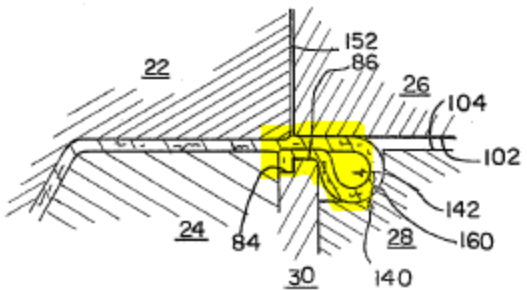
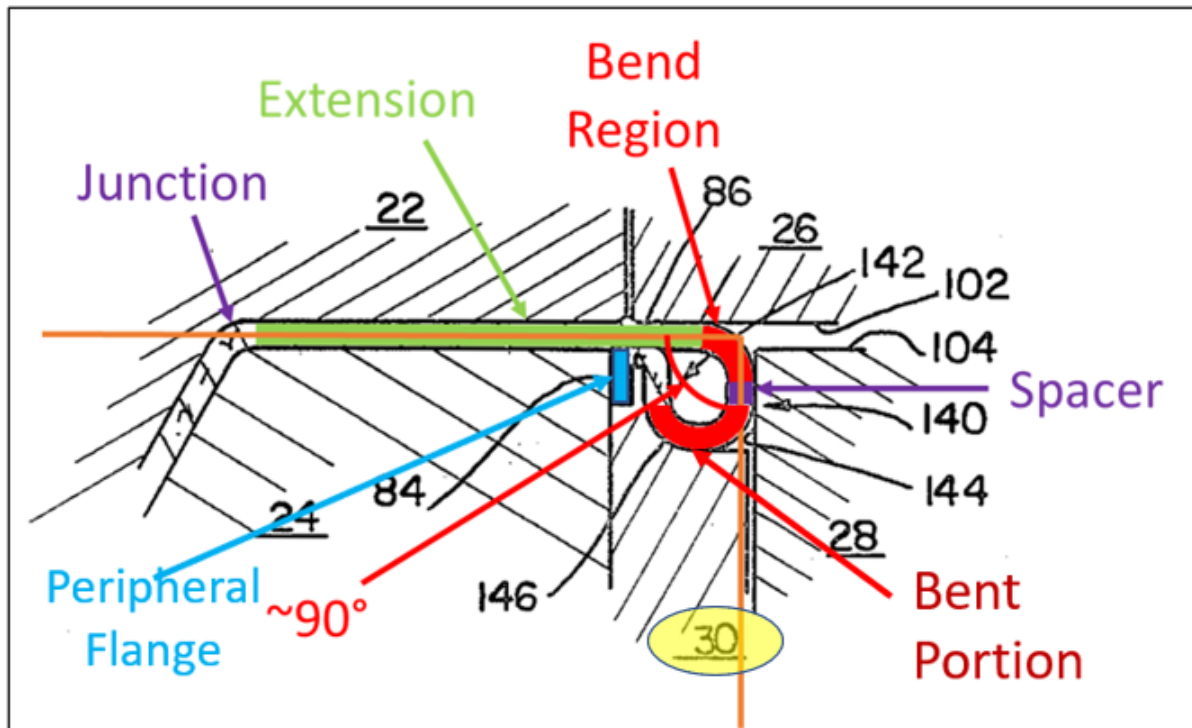


FIG 10

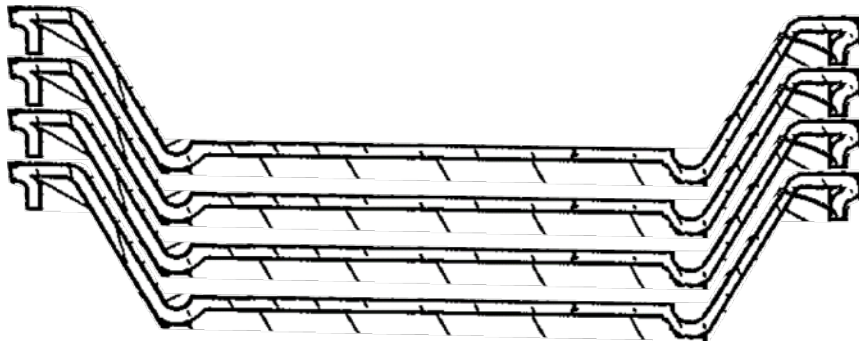
Meadors, Figs. 5-10. EX1003, ¶408.

Meadors Fig. 8 shows differing heights and geometries for the various features of the deflectable flange, i.e. a bend region, a bent portion (shown below) as well as an elbow, all deflected to differing degrees at selected portions of the ram (ring 30):



Meadors, Fig. 8 (annotated). EX1003, ¶411.

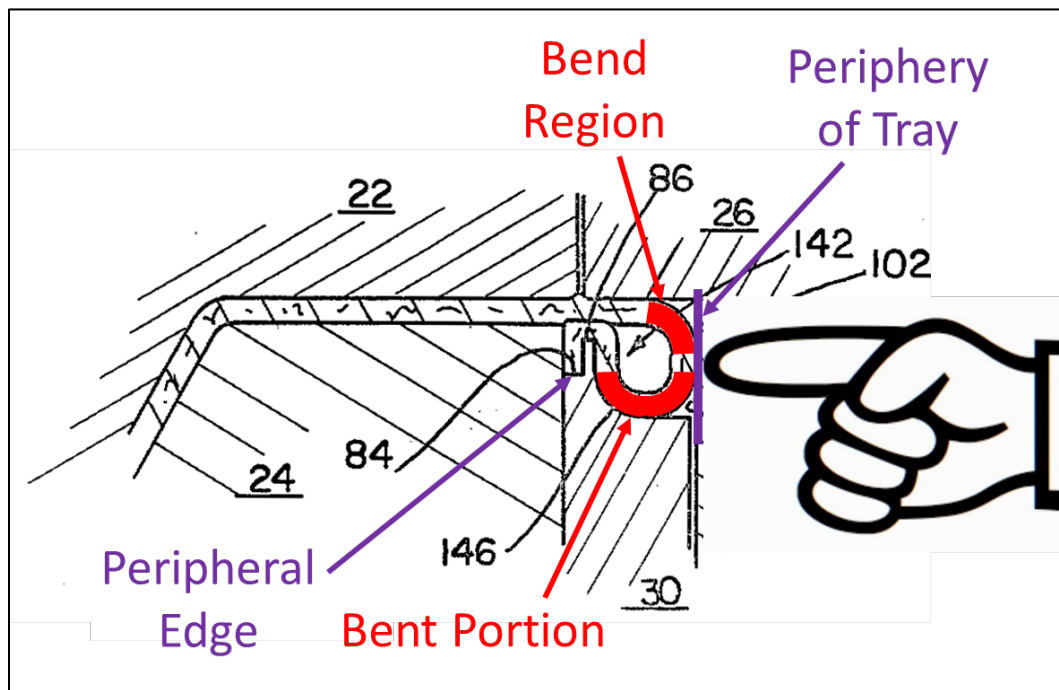
Meadors' article is configured such that yielding at least one portion is useable as a stacking extension. This can be demonstrated by duplicating and visually stacking in a nested conformation copies of the articles illustrated in various Meadors Figures, including the sidewall and the extension:



Meadors, Fig. 4 (excerpted with duplicate shapes added). EX1003, ¶¶412-414.

11. Claim 15:

A person running a finger along the periphery or outer perimeter of Meadors's tray would not perceive the peripheral edge:



Meadors, Fig. 8 (annotated). EX1003, ¶¶415-417.

12. Claim 16:

Meadors further discloses a ram being urged against the peripheral flange of his tray in stating, “The **draw pads cooperatively capture the perimetral edge** of the blank surrounding the central region **to form the edge into an axially extending flange** having a proximal end attached to the central region and a distal end axially spaced from the proximal end. The ring includes means defining a **groove for capturing the distal end against radial movement.**” Id. 2:18-26. A POSITA would understand that Meadors’ references to “capturing the perimetral edge... to form the edge into an axially extending flange” and “a groove for capturing the distal end against radial movement” would necessitate and constitute “the ram being urged against the peripheral flange by applying force to at least the extension in the direction of the ram, wherein the extension extends laterally in a plane about the entire periphery of the opening of a concave compartment in the body.” EX1003, ¶419.

Meadors illustrates and explains that **draw pad 28** and associated components are positioned in a lower die base 42 (Id. 3:4-6), and that a plug (“punch 22”) substantially fills the article opening and is inserted therein prior to urging the ram (draw pad 28) against the peripheral flange, whereby the plug (punch 22) inhibits inward displacement of the deflectable flange into the opening (Id. 2: 66, also Figs. 5, 6, 8), as shown below:

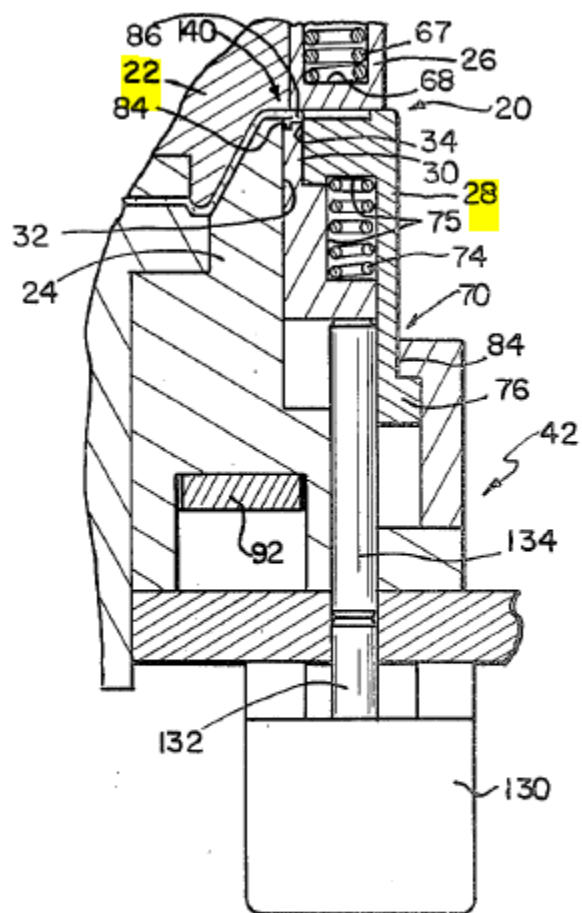


FIG 5

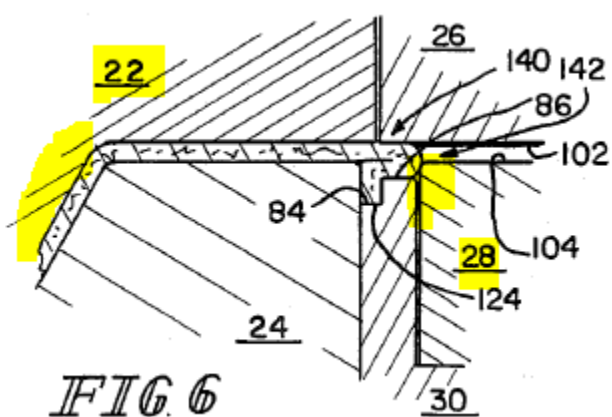
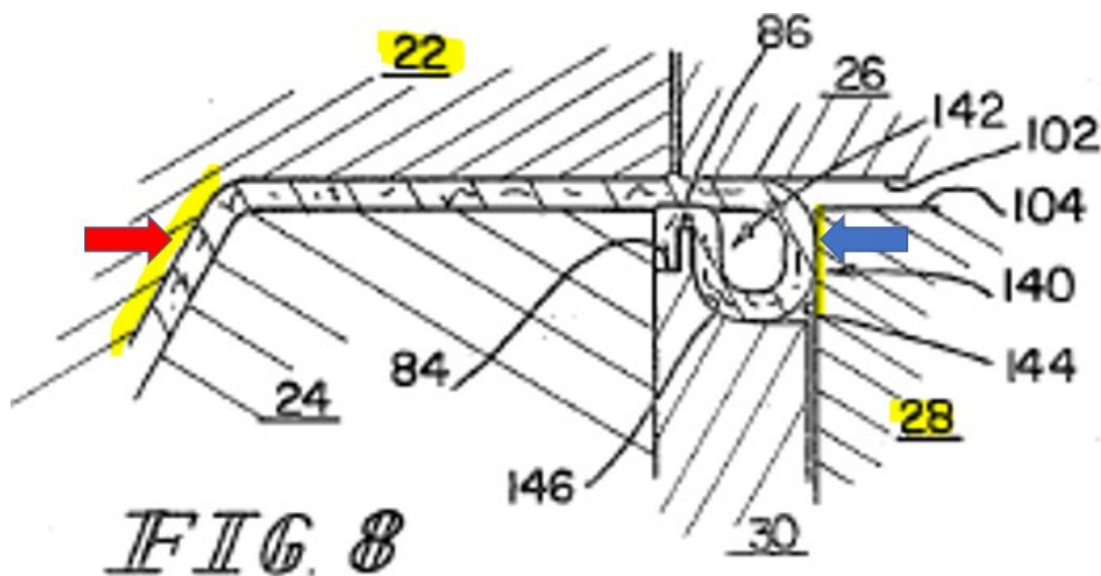


FIG 6

Meadors, Figs. 5-6 (annotations added showing ram (draw pad 28) urging the ram against the peripheral flange, whereby plug (punch 22) inhibits inward displacement of deflectable flange into tray opening). EX1003, ¶421.

Meadors Figure 8 illustrates the **ram** (draw pad 28) **being urged against the peripheral flange by applying force to at least the extension in the direction of the ram** (blue arrow below). Meadors further illustrates in Fig. 8 another ram (ring 30) being urged against the peripheral flange by applying force to at least the extension in the direction of the ram. Figure 8 also discloses a **plug** (punch 22) **inhibiting inward displacement of deflectable flange into the tray opening** (red arrow below). Like all Meadors Figures, Fig. 8 also shows the extension extends laterally in a plane about the periphery of the opening of a concave compartment in the body.



Meadors, Fig. 8 (annotations added showing ram (draw pad 28) urging against the peripheral flange (blue arrow), whereby plug (punch 22) inhibits inward displacement (red arrow) of deflectable flange into tray opening). EX1003, ¶422.

Meadors explains regarding Fig. 2 that “punch 22 is lowered into forming engagement with horn 24 to form the central recess 114 of a container 116 from blank 100” and “The initial forming step is completed as... **the recess 114 is contacted on one side by punch 22.**” Id. 4:7-15. Notably, Meadors explains that this occurs before ram (draw pad 28) is urged against the peripheral flange, since it is punch 22 which initially forms the concave portion of the article before the flange is later rolled over in subsequent steps (Figs 3-4). Therefore, Meadors teaches insertion of the plug (punch 22) prior to urging ram against peripheral flange. EX1003, ¶423.

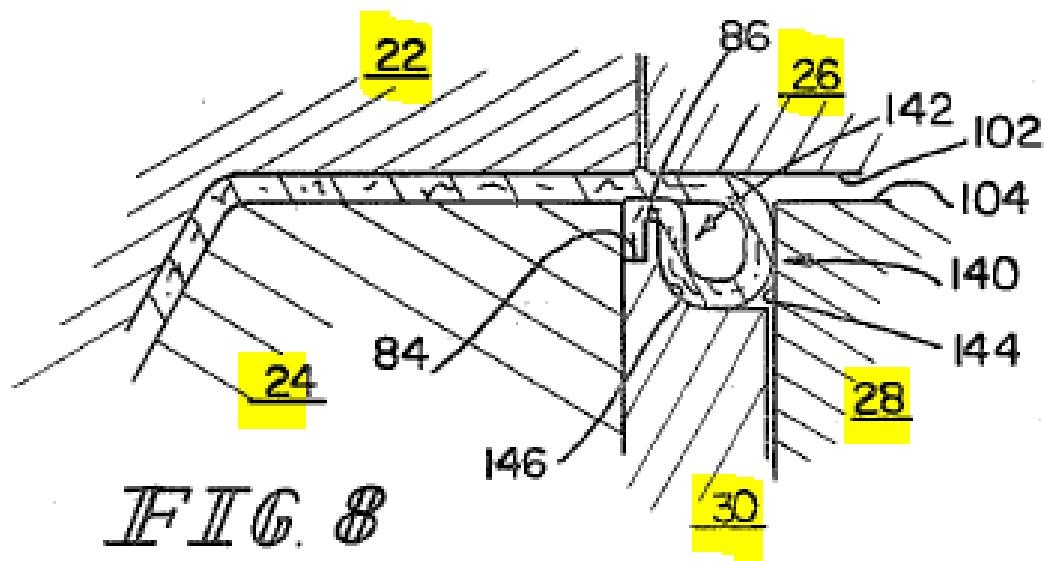
13. Claim 17:

See arguments *supra* for claim 1, including element 1E. regarding Meadors’ disclosure of a contoured ram impinging against the deflectable flange to deflect the peripheral edge away from the periphery of the shaped article, which for reference is illustrated in Figs. 3, 4 and 8, among other Figs., specifications, and claims, as noted earlier. EX1003, ¶424.

Meadors states, “**The ring [ring 30] includes means defining a groove for capturing the distal end against radial movement.** Means are provided for

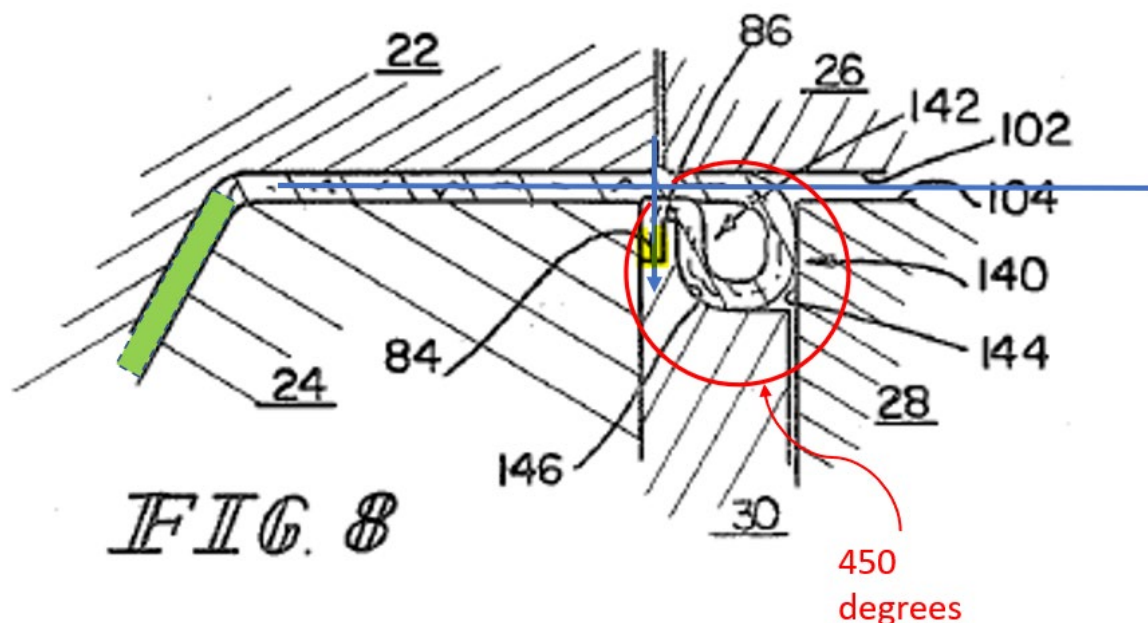
moving the ring and first and second draw pads cooperatively with the **distal end of the flange engaged in the first groove** to form a multiple thickness bead between the flange proximal and distal ends.” Id. 2:24-30.” Meadors’ reference to the groove in the ring constitutes “an upper face of the ram, the upper face having a contour that deflects inwardly toward the body.” EX1003, ¶425.

Meadors discloses variety of bead 140 configurations using contoured rams, including those detailed in Figs. 5-10. “As will be appreciated, the actual amount of crush or squash in the bead 140 is determined and controlled by the void 142 formed by the die mechanism 20 members 22, 24, 26, 28, 30. **This permits a wide range of control both during formation, and in the final configuration, of the multiple-thickness bead 140.** Id. 4:53-58. Meadors Fig. 8 shows examples of die mechanism 20 members 22, 24, 26, 28, 30, highlighted here for reference.



Meadors, Fig. 8 (annotated). EX1003, ¶426.

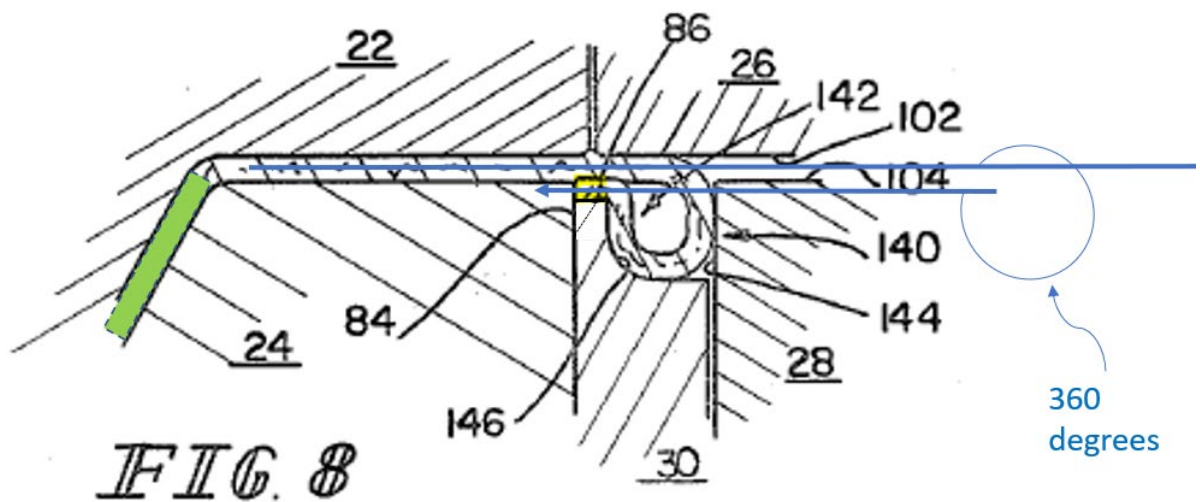
Meadors Fig 8 shows a peripheral edge (highlighted yellow below) which has been turned approximately 450 degrees (5 x rounded 90-degree deflections, i.e. **more than “at least 180 degrees**) relative to its orientation prior to the impingement, due at least in part to the **contoured upper surface of a ram** (ring 30). The image below shows the measurement of the peripheral edge deflection **inwardly toward the article’s body**:



Meadors, Fig. 8 (annotations added showing ram (ring 30) impinging against deflectable flange to deflect the peripheral edge 450 degrees relative to orientation prior to impingement, i.e. more than “at least 180 degrees.”). EX1003, ¶427.

Alternatively, and from Meadors disclosures, including Fig. 8 and references to modifications of “die mechanism 20 members,” a POSITA would readily

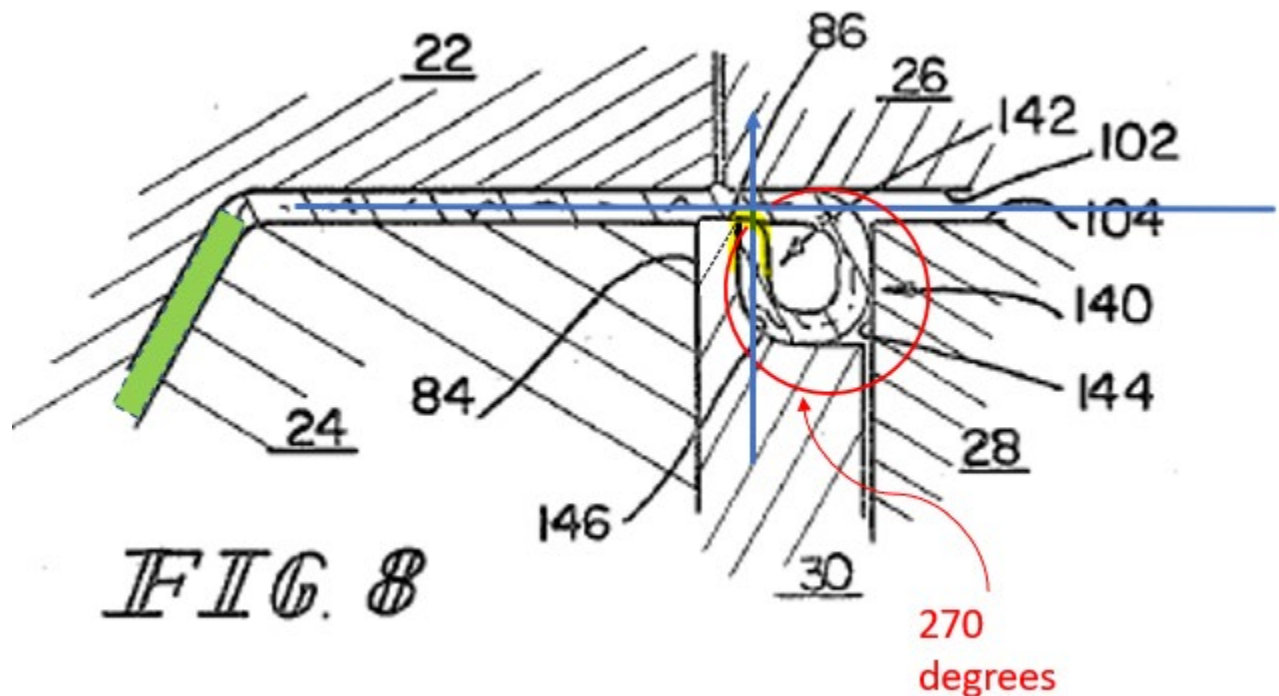
understand that through a slight modification of the shape of Meadors ring 30, i.e. a flattening the left-most portion of the ram (“ring 30”), the peripheral edge would be deflected sufficiently that a plane through the thermoplastic at the peripheral edge would be offset from the plane of the extension by an angle of 360 degrees (four deflections x 90 degrees each) relative to its orientation prior to the impingement., i.e. more than “at least 180 degrees,” as shown here:



Meadors, Fig. 8 (annotations added showing modified ram (ring 30) impinged against deflectable flange to deflect the peripheral edge 360 degrees relative to its orientation prior to the impingement, i.e. more than “at least 180 degrees.”). EX1003, ¶428.

Furthermore, a POSITA would readily understand that through an alternative-but still minor modification of the shape of Meadors ring 30, i.e. a further heightening of the left-most portion of the ram (“ring 30”), the peripheral edge would

be deflected sufficiently that a plane through the thermoplastic at the peripheral edge would be offset from the plane of the extension by an angle of 270 degrees (3 x rounded 90-degree displacements) relative to its orientation prior to the impingement., i.e. more than “at least 180 degrees”:

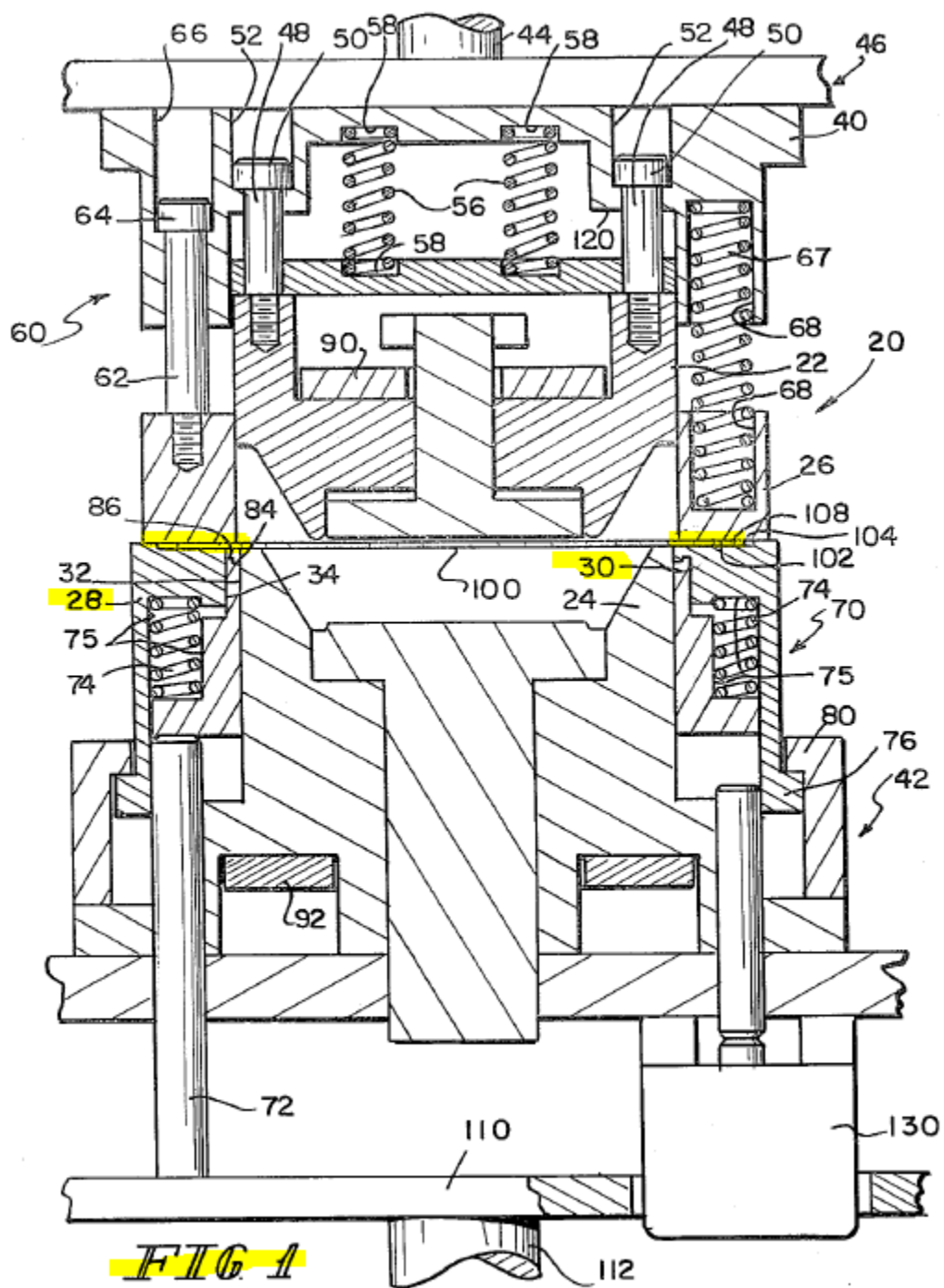


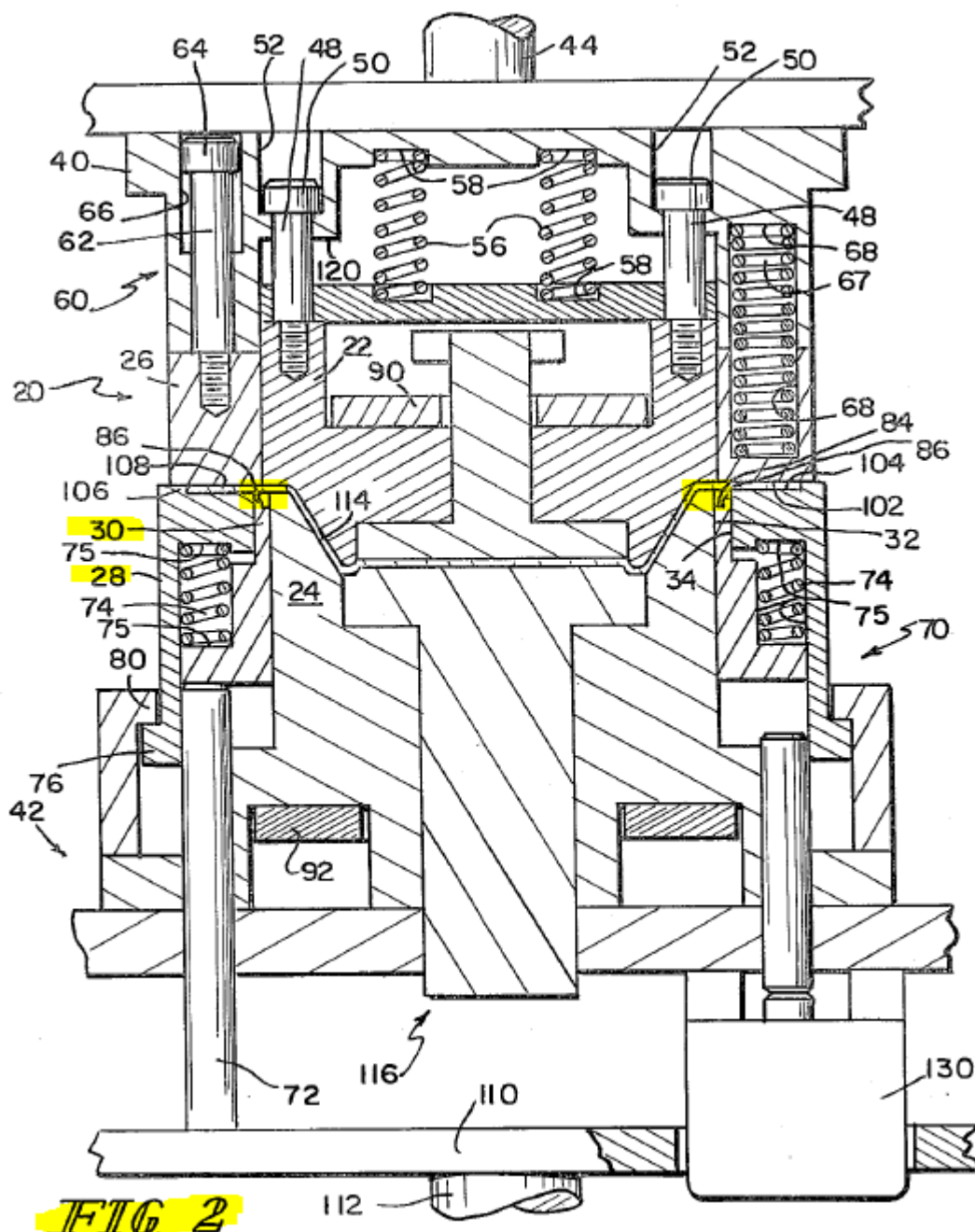
Meadors, Fig. 8 (annotations added showing modified ram (ring 30) impinging against deflectable flange to deflect the peripheral edge 270 degrees relative to its orientation prior to impingement, i.e. more than “at least 180 degrees”). EX1003, ¶429.

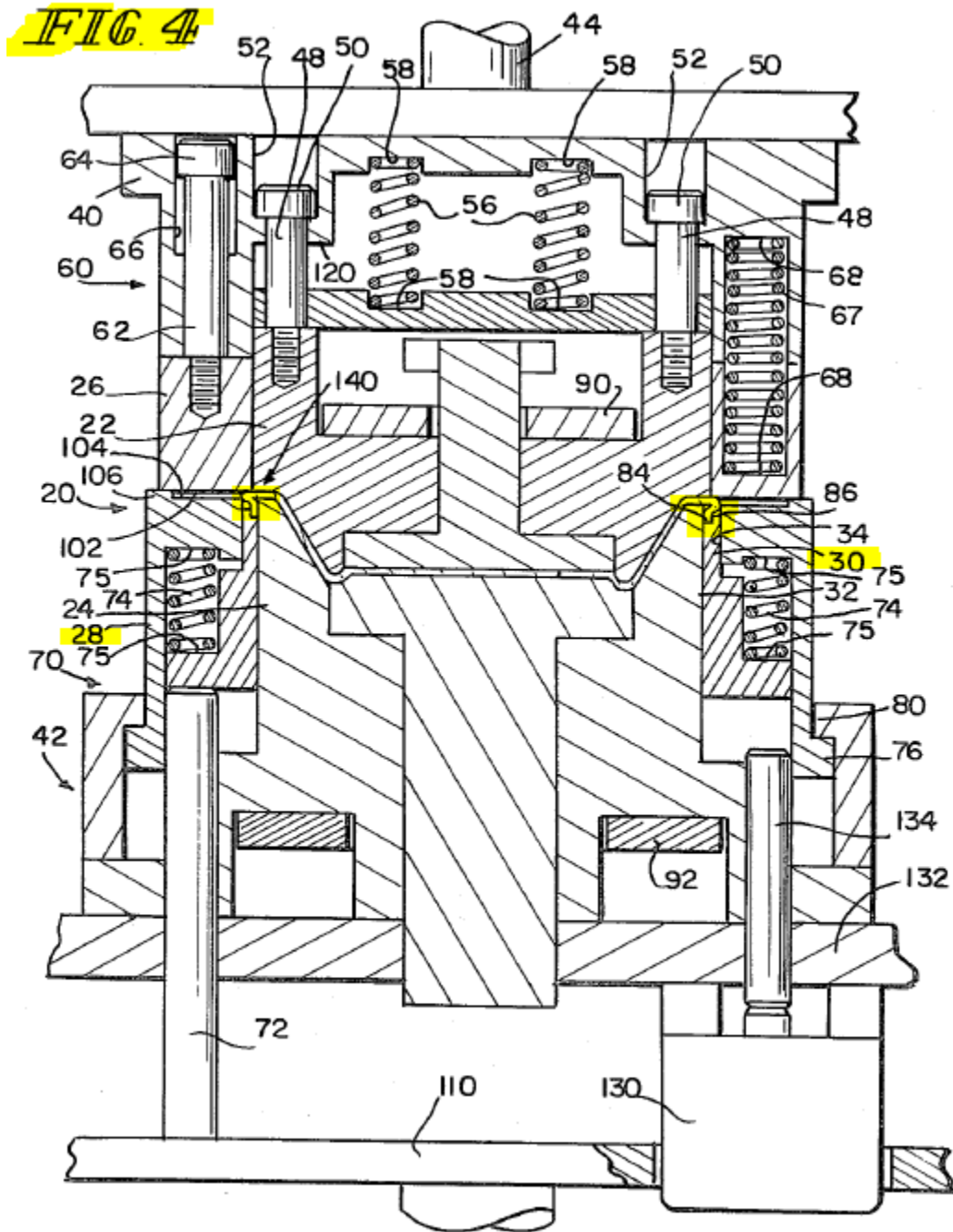
A POSITA would be motivated to make such simple tooling modifications to further ensure that the peripheral edge *would not contact an over wrap* **regardless of how shallow the depth of Meadors article.** EX1003, ¶¶430-431.

14. Claim 18:

Meadors teaches the use of a plurality of discrete, incremental advances in Figures 1-4, where the ram tooling, including draw pad 28, are incrementally urged against the flange to roll the peripheral edge away from the article's periphery, as shown here:







Meadors, Fig. 8 (annotated showing plurality of discrete, incremental advances of impinging ram). EX1003, ¶¶432-438.

In describing Figures 1-5, Meadors characterizes a plurality of discrete, incremental advances:

FIG. 1 is a vertically sectioned side elevational view of an apparatus for performing the method of the present invention at the beginning of a step of the method;

FIG. 2 is a vertically sectioned side elevational view of the apparatus of FIG. 1 about to begin a subsequent step of the method;

FIG. 3 is a vertically sectioned side elevational view of the apparatus of FIGS. 1-2 after performing a step of the method subsequent to that illustrated in FIG. 2;

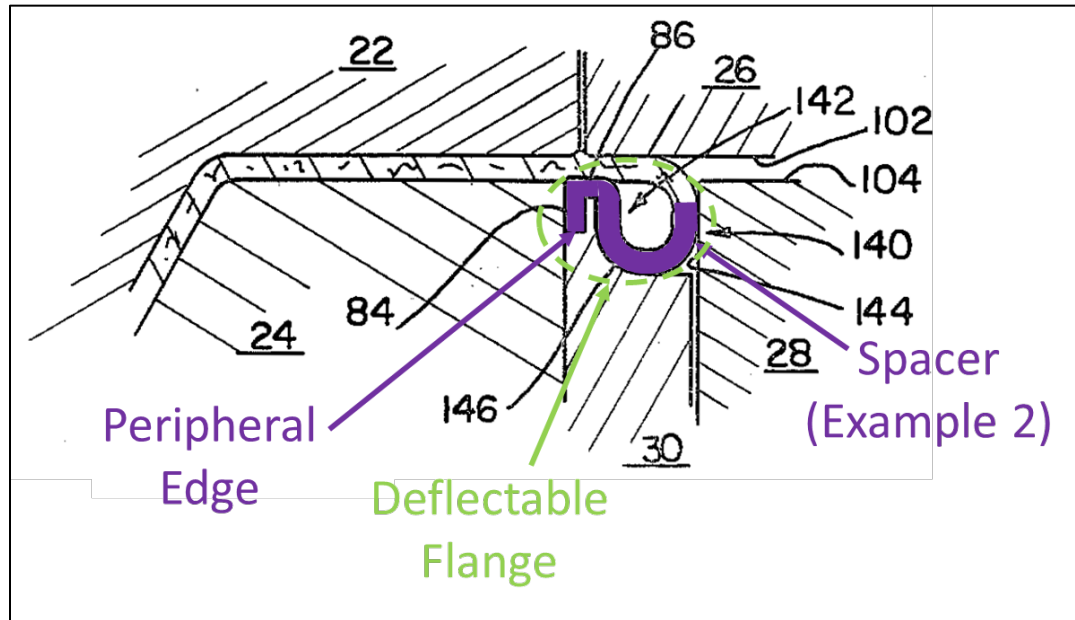
FIG. 4 is a vertically sectioned side elevational view of the apparatus of FIGS. 1-3 after performing a step of the method subsequent to that illustrated in FIG. 3;

FIG. 5 is a fragmentary vertically sectioned side elevational view of the apparatus of FIGS. 1-4 after performing a step of the method subsequent to the step illustrated in FIG. 4;”

Meadors, 2:33-52. EX1003, ¶439.

15. Claim 20:

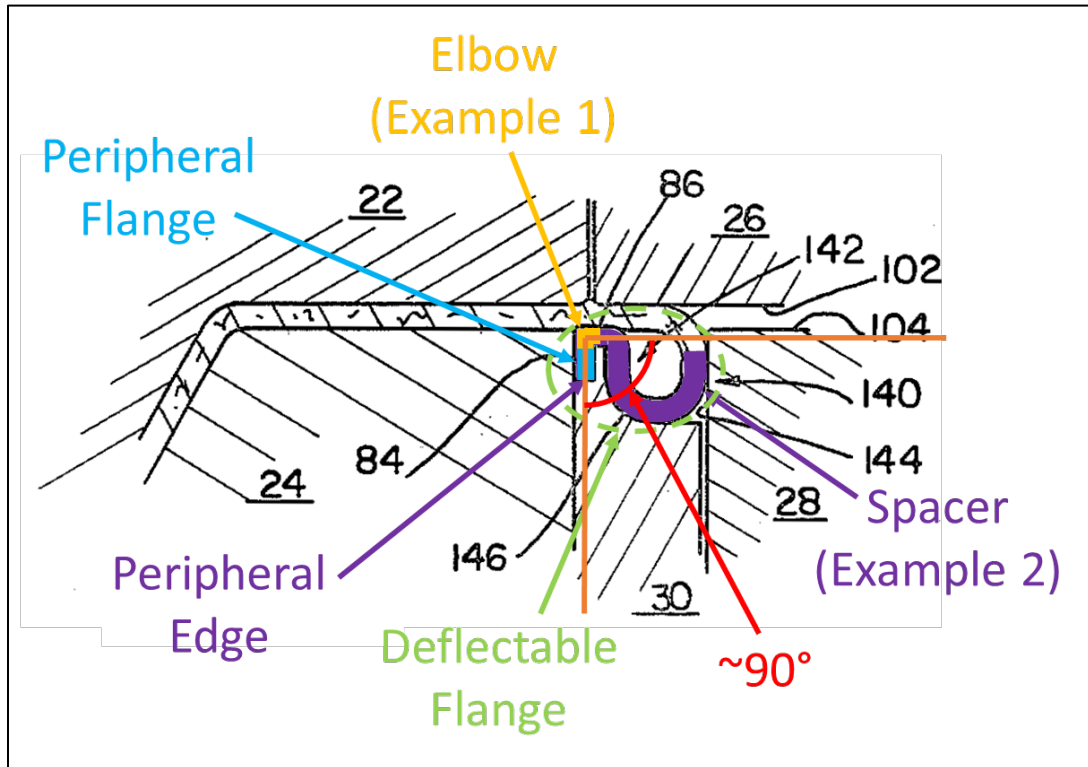
Meadors Fig. 8 shows that the **spacer** can include the remainder of the extension from that straight segment to the peripheral edge:

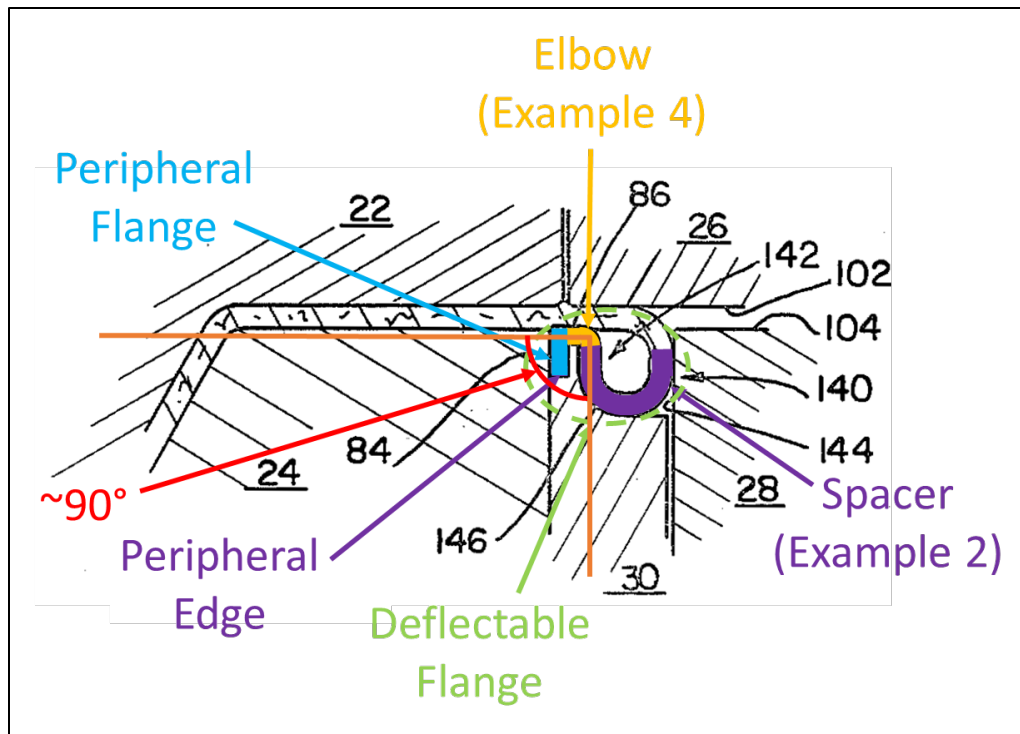


Meadors, Fig. 8 (annotations added showing spacer example 2, which includes peripheral edge). EX1003, ¶¶444-448.

Here, the peripheral flange and the elbow are inclusive of the spacer. The spacer in Meadors' tray can comprise the straight segment at the far right of the extension plus the remainder of the extension from that straight segment to the peripheral edge. If so, the spacer includes: (a) a peripheral flange at the peripheral edge of the deflectable flange—the vertical segment slightly to the right of center in Fig. 8, and (b) an elbow connecting the peripheral flange to the remainder of the spacer. The elbow can be the corner directly touching the peripheral flange—

Elbow Example 1 below—or the horizontal segment directly touching the peripheral flange plus the corner directly to the right of that segment—Elbow Example 4 below:





Meadors, Fig. 8 (annotated). EX1003, ¶449.

In each of Elbow Examples 1 and 4 above, the elbow has a 90-degree bend, which is between 60 to 120 degrees. Thus, Meadors teaches the elbow connects the peripheral flange to the spacer at an angle of from 60 to 120 degrees. EX1003, ¶450.

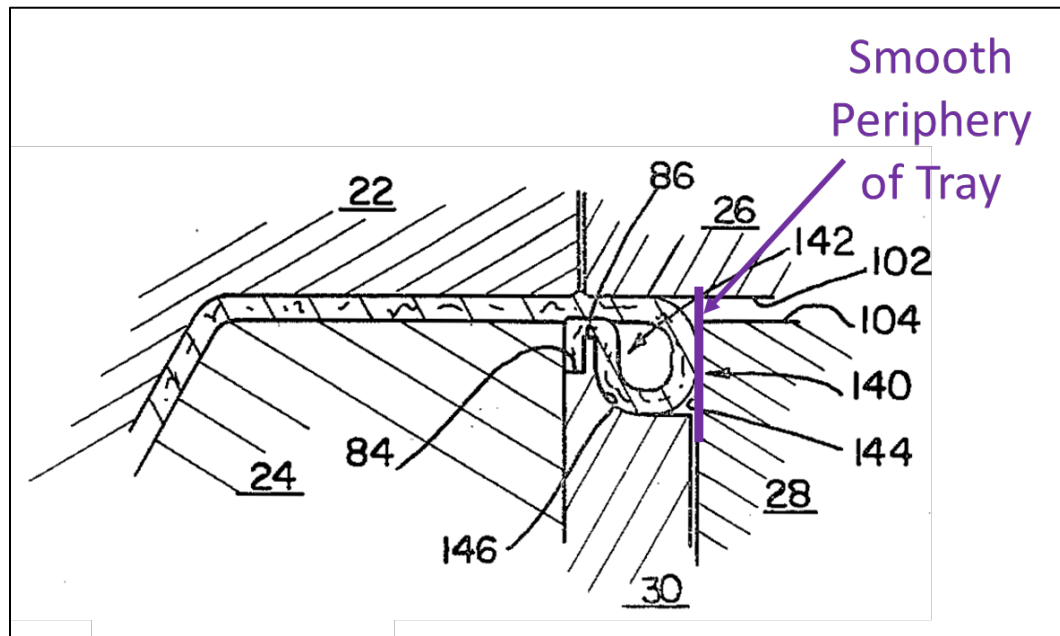
16. Claim 21

k. 21[Pre]:

See arguments supra for element 1[pre].

To the extent limiting, Meadors teaches a method of forming a smooth periphery on a thermoformed article that is made from a thermoplastic and that has a sharp peripheral edge. Since the peripheral edge is sufficiently deflected away

from the periphery of Meadors tray, the periphery—seen at the right side of Fig. 8—is continuous and smooth:

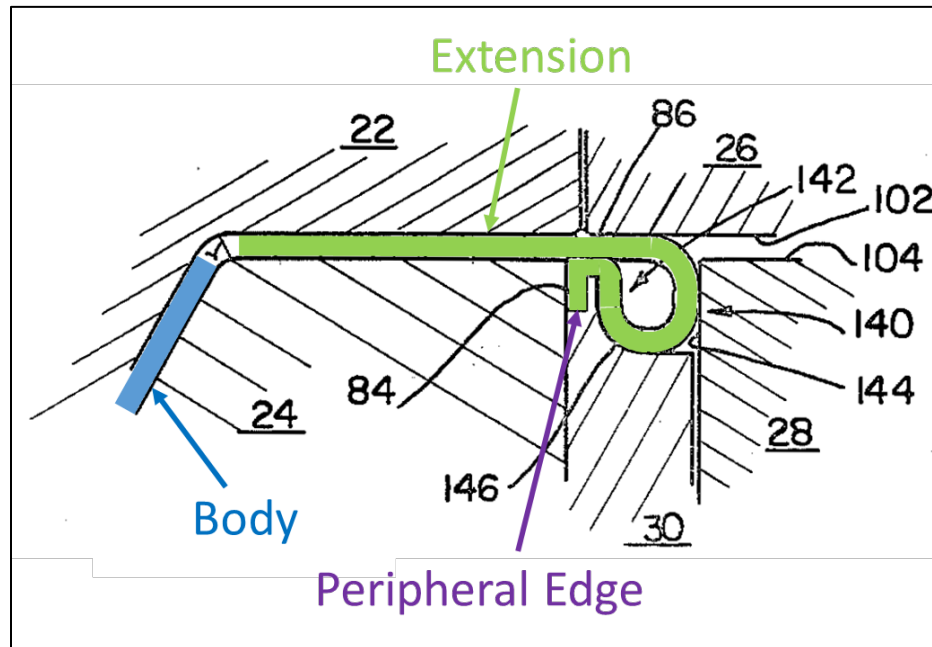


Meadors, Fig. 8 (annotated).

Meadors describes using thermoplastic materials for his article, as it is made entirely of plastic (or, for some embodiments, paper). Meadors, Abstract; 1:5-9; 3:43-46.

A POSITA would readily recognize Meadors' method, apparatus, references to the use of thermoplastic materials and application of heat, and at least Figs. 1-4 as describing a thermoforming process to thermoform an article. Regarding the type of article, Meadors states, "An apparatus for forming a blank of sheet material into a plate, tray, dish or the like having a central region and an outer perimetral edge region." Meadors, 6:24-26; Figs. 1-4, 8.

Meadors Fig. 8 discloses the extension, highlighted in green below:



Meadors, Fig. 8 (annotations added showing peripheral edge).

l. 21[A]:

See arguments supra for element 1[A]. EX1003, ¶¶456-462.

m. 21[B]:

See arguments supra for element 1[B]. EX1003, ¶¶463-466.

n. 21[C]:

See arguments supra for element 1[C]. EX1003, ¶¶467-473.

o. 21[D]:

See arguments supra for element 1[D]. EX1003, ¶¶474-481.

p. 21[E]:

See arguments supra for element 1[E]. EX1003, ¶482.

q. 21[F]:

See arguments supra for element 1[F]. EX1003, ¶483.

r. 21[G]:

See arguments supra for element 1[G]. EX1003, ¶484.

s. 21[H]:

See arguments supra for element 1[H]. EX1003, ¶485.

t. 21[i]:

See arguments supra for claim element 1[i] and claim 2. EX1003, ¶486.

VI. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

A. The PTAB’s Discretion under Section 314(a)

Patent Owner has accused Petitioner of infringing the ’222 patent in *Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.*, Case No. 5:20-cv-01054 (C.D. Cal.). *See* EX1007, First Amended Complaint at 14-22.

The Board balances six factors in considering discretionary denial under 35 U.S.C. § 314(a) when parallel litigation exists. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) at 6. Here, the factors (“*Fintiv* factors”) favor institution.

Factor 1 – whether a stay exists or is likely to be granted if a proceeding is instituted – weighs against discretionary denial because the parallel litigation is currently stayed. EX1009 (the “Order Granting Stay”).

U.S. Patent Nos. 10,562,680 (the “’680 patent”); 9,908,281 (the “’281 patent”); and 10,189,624 (the “’624 patent”) (collectively, “Related Patents”) were already subject to *inter partes* review, and all challenged claims of the Related Patents were held unpatentable by the PTAB:

Asserted Patent	Unpatentable Claims from IPRs	Asserted Claims
’281 Patent	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 20, 21, 22, 24, 25, 26, 27, 28, 29	1, 2, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 20, 21, 22, 24, 26, 27, 28, 29
’624 Patent	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 29	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 29
’680 Patent	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 15, 16, 17, 18, 19, 20, 21, 22, 23
’222 Patent	N/A	1, 2, 3, 5, 6, 11, 12, 14, 15, 16, 17, 20, 21

See EX1008 (the “Stay Motion”) at 6 (summarizing and comparing all unpatentable claims of the Related Patents with the claims asserted against Petitioner). The Related Patents and the ’222 patent are all in the same patent family and share largely the same specification. EX1008 at 2.

Petitioner moved to stay the parallel litigation pending Patent Owner’s appeals of the final written decisions to the Federal Circuit. EX1008 at 3. Petitioner’s Stay Motion was granted. EX1009.

The Federal Circuit just affirmed the unpatentability of the challenged claims in the Related Patents earlier this week. *See Converter Mfg. v. Tekni-Plex*,

Inc., No. 2023-1801, 2024 WL 4113058, at *1 (Fed. Cir. Sept. 9, 2024).

Therefore, if this IPR petition is granted, the parallel litigation is likely to remain stayed given the significant overlap in the '222 patent specification, and the fact that all but one asserted claim in all the Related Patents currently remains in the case.

Factor 2 – proximity of the court’s trial date to the Board’s projected statutory deadline – weighs against discretionary denial because the parallel litigation is already stayed, and therefore, no operative trial date has been set. And when a trial date is eventually set, it will necessarily be scheduled well ahead of the Board’s projected statutory deadline because the parties had only submitted a proposed schedule with their Joint Rule 26(f) discovery plan a few months prior to the Mar. 18, 2024 Order Granting Stay. *See* EX1010 (“Proposed Schedule”).

Factor 3 – investment in the parallel proceeding – weighs against discretionary denial because the parallel litigation is stayed, and fact discovery remains stalled in its very early stages. Moreover, the parties and the court have saved considerable resources by staying the case pending Patent Owner’s appeal to the Federal Circuit, which just affirmed the unpatentability of all of the challenged claims in the Related Patents.

Factor 4 – overlap in the parallel proceeding – is neutral because whether any patent invalidity issues will overlap between the district court case and this

petition has yet to be determined because no invalidity contentions have been made in the district court case.

Factor 5 – overlapping parties – is neutral because it is “far from an unusual circumstance that a petitioner in *inter partes* review and a defendant in a parallel district court proceeding are the same[.]” *See Sand Revolution II LLC v. Continental Intermodal Group-Trucking LLC*, IPR2019-01393 (PTAB June 16, 2020) (Paper 24) at 12-13.

Factor 6 – other considerations including the merits – weighs against discretionary denial. As shown above, the merits of the Petition are strong, and the Challenged Claims are invalid. None of the grounds asserted herein were previously considered by either the USPTO or the district courts. *Cf. Comcast Cable Commn’s, LLC v. Rovi Guides, Inc.*, IPR2019-00231 (PTAB May 20, 2019) (Paper 14) at 11 (obviousness challenges not “previously considered by the Office or any court” weigh in favor of not denying institution). Moreover, the ’222 Patent is currently asserted in a district court case. Institution of this IPR provides the opportunity for narrowing and simplifying the litigation for the district court, which has already been considerably simplified now that the Federal Circuit has just affirmed the unpatentability of all challenged claims in the Related Patents.

Accordingly, the Board should decline to exercise its discretion under *Fintiv* and institute trial.

B. The PTAB's Discretion under Section 325(d)

Discretionary denial under § 325(d) is not warranted. The '222 patent was allowed without substantive prosecution, and only Portelli was cited by the applicant in an IDS. EX1002, IDS (Sept. 4, 2019) at 3. The Examiner did not initial Portelli to indicate that Portelli was considered prior to issuing a notice of allowance. EX1002, References Cited by Applicant and Considered by Examiner (Oct. 2, 2019) at 3.

Because none of the cited prior art was substantively considered during prosecution, and there was no substantive prosecution generally, the Board should decline to exercise its discretion to deny institution under § 325(d). *See Amgen Inc. v. Alexion Pharm., Inc.*, Case No. IPR2019-00740, slip op. at 65 (PTAB Aug. 30, 2019) (Paper 15) (“The Board has consistently declined exercising its discretion under Section 325(d) when the only fact a Patent Owner can point to is that a reference was disclosed to the Examiner during the prosecution.”); *Amneal Pharms. LLC v. Alkermes Pharma Ireland Ltd.*, IPR2018-00943, slip op. at 40 (PTAB Nov. 7, 2018) (Paper 8) (declining to deny institution under § 325(d) because prior art was only listed on the face of the patent and there was no evidence that it was evaluated during examination); *Digital Check Corp. d/b/a ST Imaging v. E-Imagedata Corp.*, IPR2017-00178, slip op. at 12-13 (PTAB Apr. 25, 2017) (Paper 6) (acknowledging that prior art references were cited in an IDS, but

granting institution because “there is no indication in the record that the Examiner rejected any claims based on either reference or that the Examiner or applicant substantively discussed either reference during prosecution”).

VII. COMPLIANCE WITH FORMAL REQUIREMENTS

A. Mandatory Notices Under 37 C.F.R. §§ 42.8(b)(1)-(4)

1. Real Party-In-Interest

Petitioner certifies that it is the real party-in-interest.

2. Related Matters

Patent Owner has accused Petitioner of infringing the '222 patent in *Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.*, Case No. 5:20-cv-01054 (C.D. Cal.). *See* EX1007, First Amended Complaint at 14-22.

3. Lead and Backup Counsel

Petitioner provides the following counsel information. Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this Petition.

LEAD COUNSEL	BACK-UP COUNSEL
John Handy Registration No. 68,906 RIMON PC Suite 900 1765 Greensboro Station Place Tower I McLean, VA 22102 703-559-7360 (phone)	Jason Xu <i>Pro hac vice forthcoming</i> RIMON PC Suite 500 1050 Connecticut Ave, N.W. Washington, DC 20036 202-470-2141 (phone)

4. Service Information

Petitioner consents to service by email on the following email addresses:

john.handy@rimonlaw.com; jason.xu@rimonlaw.com.

Pursuant to 37 CFR § 42.105(b), Patent Owner's counsel, in an email exchange with Petitioner's counsel on Sept. 6, 2024, has consented to service by email on the following email addresses: jfarco@norris-law.com; jkelly@norris-law.com; gcolby@clearlyclean.com.

B. Standing

Pursuant to 37 C.F.R. § 42.104(a), Petitioner certifies that the '222 patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting an *inter partes* review challenging the Challenged Claims on the grounds identified in this Petition.

C. Fees

The Office is hereby authorized to charge the fee set forth in 37 C.F.R. § 42.15(a) and any additional fees that might be due in connection with this Petition to Deposit Account No. 50-5992.

VIII. CONCLUSION

For the foregoing reasons, Petitioner requests that the Board institute trial and cancel the Challenged Claims of the '222 patent.

DATE: Sept. 13, 2024

Respectfully submitted,

/s/ John Handy

John Handy
Registration No. 68,906
Counsel for Petitioner

CERTIFICATE OF WORD COUNT UNDER 37 C.F.R. § 42.24(d)

Under the provisions of 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the word count for this Petition totals 13,999 words, excluding the parts of the brief exempted by 37 C.F.R. § 42.24(a), as calculated by Microsoft Word, which is less than the 14,000 allowed under 37 C.F.R. § 42.24(a)(i).

DATE: Sept. 13, 2024

Respectfully submitted,

/s/ John Handy

John Handy
Registration No. 68,906
Counsel for Petitioner

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(b), the undersigned hereby certifies that a copy of the foregoing Petition for *Inter Partes* Review and all supporting Exhibits was served via email as agreed to by the parties.

DATE: Sept.13, 2024

Respectfully submitted,

/s/ John Handy

John Handy
Registration No. 68,906
Counsel for Petitioner

APPENDIX A: CHALLENGED CLAIMS

Claim	Limitation
1[Pre]	A method of making a shaped article having a body with a smooth periphery, the method comprising
1[A]	forming a thermoplastic into a shape comprising the body and a deflectable flange at a peripheral portion of the body,
1[B]	the deflectable flange comprising an extension that extends peripherally away from the body and connects thereto
1[C]	a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer that is connected with
1[D]	a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peripheral flange being connected, at an angle other than 180 degrees, at an elbow;
1[E]	impinging a ram against the peripheral flange to deflect the spacer toward the extension, whereby the magnitude of the angle between the spacer and the extension is decreased on account of at least one portion of the deflectable flange becoming bent, relative to its pre-impingement position,
1[F]	the bent portion being selected from the group consisting of the extension, the bend region, and the spacer;
1[G]	heating the bent portion to at least the glass transition temperature of the thermoplastic; and
1[H]	after impinging the ram against the peripheral flange and heating the bent portion to at least the glass transition temperature, further impinging the ram against the deflectable flange to further deflect the spacer toward the extension prior to

Claim	Limitation
1[i]	disengaging the ram from the deflectable flange, whereby the bent portion remains deflected from its pre-impingement position even upon discontinuation of the impingement to yield the body with a smooth periphery.
2	The method of claim 1, wherein the bent portion is cooled below the glass transition temperature prior to disengaging the ram from the deflectable flange.
3	The method of claim 1, wherein the bend region interconnects the spacer with the extension at an angle not less than 75 degrees, but less than 105 degrees.
4	The method of claim 1, wherein the bend region interconnects the spacer with the extension at an angle of about 87-93 degrees.
5	The method of claim 1, wherein the thermoplastic is formed into a shape comprising the body and having the deflectable flange about its entire periphery.
6	The method of claim 1, wherein the thermoplastic is formed into a shape comprising the body having a concave compartment with an opening and the deflectable flange about the entire periphery of the opening.
7	The method of claim 6, further comprising sealing the compartment using a film that contacts the smooth periphery of the body about the entire periphery of the opening.
8	The method of claim 7, wherein the compartment is sealed by over-wrapping the body with the film and sealing the film to itself to envelop the body.
9	The method of claim 7, wherein the compartment is sealed by applying the film across the opening of the compartment and sealing the film about the periphery of the opening.

Claim	Limitation
10	The method of claim 9, wherein the film is thermoformable and is disposed in a softened state around the smooth periphery of the body and cooled below its softening temperature such that the film that must be stretched outwardly about the smooth periphery of the body in order to displace the film from the opening.
11	The method of claim 1, wherein the ram is impinged against the deflectable flange to deflect the peripheral edge away from the periphery of the shaped article sufficiently that a flexible film that tautly over-wraps the shaped article after cooling the bent portion does not contact the peripheral edge.
12	The method of claim 1, wherein the ram is impinged against the deflectable flange to deflect the peripheral edge sufficiently that the peripheral edge points at the body after cooling the bent portion.
13	The method of claim 1, wherein the ram is impinged against the deflectable flange to deflect the peripheral edge to a position at which a plane through the thermoplastic at the peripheral edge is offset from the plane of the extension by an angle of not less than 180 degrees after cooling the bent portion.
14	The method of claim 1, wherein the deflectable flange is deflected to differing degrees at selected portions of the ram, whereby the height of the deflected peripheral flange differs at peripheral portions corresponding to the selected portions after cooling the bent portion, yielding at least one portion useable as a stacking extension.
15	The method of claim 1, wherein the ram is impinged against the deflectable flange sufficiently to deflect the peripheral edge to a position at which the peripheral edge cannot be perceived by a person running a finger along the periphery of the shaped article after cooling the bent portion.

Claim	Limitation
16	The method of claim 1, wherein the ram is urged against the peripheral flange by applying force to at least the extension in the direction of the ram, wherein the extension extends laterally in a plane about the entire periphery of the opening of a concave compartment in the body and wherein a plug that substantially fills the opening is inserted therein prior to urging the ram against the peripheral flange, whereby the plug inhibits inward displacement of the deflectable flange into the opening.
17	The method of claim 1, wherein the ram impinges against the peripheral flange at an upper face of the ram, the upper face having a contour that deflects inwardly toward the body, whereby greater impingement of the deflectable flange against the upper surface of the ram deflects the peripheral edge increasingly toward the body, and wherein the upper face is curved sufficiently that increasing impingement of the deflectable flange against the ram turns the peripheral edge at least about 180 degrees relative to its orientation prior to the impingement.
18	The method of claim 1, wherein sequential portions of the spacer are softened by impinging the sequential portions against the ram in a plurality of discrete, incremental advances.
19	The method of claim 1, wherein sequential portions of the spacer are softened by impinging the sequential portions against the ram in a single smooth motion.
20	The method of claim 1, wherein the elbow connects the peripheral flange to the spacer at an angle of from 60 to 120 degrees.
21[Pre]	A method of forming a smooth periphery on a thermoformed article that is made from a thermoplastic and that has a sharp peripheral edge, the method comprising

Claim	Limitation
21[A]	forming a deflectable flange about the peripheral edge of the article,
21[B]	the deflectable flange comprising an extension that extends peripherally away from the article and connects thereto
21[C]	a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer that is connected with
21[D]	a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peripheral flange being connected, at an angle other than 180 degrees, at an elbow;
21[E]	impinging a ram against the peripheral flange to deflect the spacer toward the extension, whereby the magnitude of the angle between the spacer and the extension is decreased on account of at least one portion of the deflectable flange becoming bent, relative to its pre-impingement position,
21[F]	the bent portion being selected from the group consisting of the extension, the bend region, and the spacer;
21[G]	heating the bent portion to at least the glass transition temperature of the thermoplastic;
21[H]	after impinging the ram against the peripheral flange and heating the bent portion to at least the glass transition temperature, further impinging the ram against the deflectable flange to further deflect the spacer toward the extension prior to
21[i]	cooling the bent portion below the glass transition temperature, whereby the bent portion remains deflected from its pre-impingement position even upon discontinuation of the impingement; and disengaging the ram from the deflectable flange to yield the article with a smooth periphery.