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.

IPR2024-01435

Patent 10,562,222

DECLARATION OF GLENN MAY

TABLE OF CONTENTS

Table of Contents ii
Table of Exhibits vii
I. Introduction 8
II. Qualifications 9
III. Legal Framework 13
A. Standard of Proof 14
B. Claim Construction 14
C. Anticipation 15
D. Obviousness 15
IV. Background of the technology 18
V. Person of Ordinary Skill in the Art 21
VI. The '222 Patent 22
A. Summary of the Specification 22
B. Claims 23
C. Prosecution History 34
VII. Overview of Prior Art 35
A. Portelli 35
B. Meadors 39
VIII. Specific Grounds for Invalidity 42
A. Ground 1: Claims 1-21 are Rendered Obvious Under § 103 by Portelli 42
1. Claim 1 42
2. Claim 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." 118
3. Claim 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." 123
4. Claim 4: "The method of claim 1, wherein the bend region interconnects the spacer with the extension at an angle of about 87-93 degrees." 124
5. Claim 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.” 125

i. Claim 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.” 132

i. Claim 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.” 135

i. Claim 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.” 138

i. Claim 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.” 141

i. Claim 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.” 145

i. Claim 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.” 148

i. Claim 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.” 152

i. Claim 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.” 155

159

i. Claim 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." 162

i. Claim 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 te shaped article after cooling the bent portion."....165

i. Claim 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." 167

i. Claim 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 te 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." 177

184

i. Claim 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." 187

i. Claim 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."....193

i. Claim 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." 195

i. Claim 21: 198

B. Ground 2: Claims 1-6, 11-18, and 20-21 are Rendered Obvious Under § 103 by Meadors 264

1. Claim 1 264

2. Claim 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."....319

3. Claim 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." 322

4. Claim 4: "The method of claim 1, wherein the bend region interconnects the spacer with the extension at an angle of about 87-93 degrees." 323

5. Claim 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."....324

6. Claim 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." 327

7. Claim 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."....331

8. Claim 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."....333

9. Claim 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." 338

10. Claim 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." 342

11. Claim 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.” 349

12. Claim 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.” 351

13. Claim 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.” 356

14. Claim 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.” 361

15. Claim 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.” 372

i. Claim 21: 378

TABLE OF EXHIBITS

Exhibit 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, *Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.*, Case No. 5:20-cv-01054 (C.D. Cal.) (Dkt. 35) (the "First Amended Complaint")
1008	Motion, *Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.*, Case No. 5:20-cv-01054 (C.D. Cal.) (Dkt. 51) (the "Stay Motion")
1009	Order, *Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.*, Case No. 5:20-cv-01054 (C.D. Cal.) (Dkt. 75) (the "Order Granting Stay")
1010	Proposed Schedule, *Clearly Clean Products, LLC and Converter Manufacturing, LLC v. Ningbo Linhua Plastic Co., Ltd.*, Case No. 5:20-cv-01054 (C.D. Cal.) (Dkt. 56-1) (the "Proposed Schedule")
1011	Curriculum Vitae (CV) of Glenn May

1. I, Glenn May, make this declaration in connection with the proceedings identified above.

I. INTRODUCTION

2. I have been retained as an expert on behalf of Ningbo Linhua Plastic Co., Ltd. ("Ningbo" or "Petitioner") in connection with the proceedings identified above. I submit this Declaration on behalf of Petitioner in support of its Petition for *Inter Partes* Review ("IPR") and cancellation of Claims 1-21 ("the Challenged Claims") of U.S. Patent No. 10,562,222 ("the '222 Patent") (Ex. 1001).

3. The opinions in this Declaration are based on my professional training and experience and my review of the exhibits discussed herein.

4. The following opinions are my own, and to the extent the Petition copies or mimics any language from this Declaration, I have been advised that this is because the Patent Trial and Appeal Board does not consider arguments incorporated by reference in the Petition. Therefore, my opinions should not be misconstrued as conclusory attorney argument due to any such overlap with arguments in the Petition.

5. I am being compensated for my services in connection with the proceedings identified above at my regular rate of $600 per hour (plus reimbursement for expenses). My compensation is in no way contingent on the outcome of the proceedings identified above or on any of the opinions I provide below.

II. QUALIFICATIONS

6. I have summarized in this section my educational background, career history, publications, and other relevant qualifications. My curriculum vitae is submitted as Ex. 1011.

7. I have a Bachelor of Science degree in Packaging Science from Michigan State University, where I graduated from the School of Packaging in 1992. I also received a Food Processing certification at the University of California, Davis, from the FDA/FPI (Food Packaging Institute) in Container Closure and Thermal Processing, in 1995. I have also earned Certified Packaging Professional (CPP) status from the Institute of Packaging Professionals ("IoPP").

8. I am an inventor on at least three U.S. patents, including two for packaging.

9. I have over 32 years of experience in packaging design, development, testing, sourcing and troubleshooting for large and small consumer packaged goods ("CPG") users and suppliers in Food, Beverage, Alcohol, Cosmetics, Personal Care, Pet Care, Home Care, Automotive, Nutraceutical & OTC, Electronics, Technology, and Machinery.

10. From 1994 to 1999, following several years as a packaging engineer, I managed the development, testing and implementation of dozens of new packaging concepts for Nestlé's Chocolate & Confections division and for its Petcare division.

I received "Nestlé Very Best" awards for packaging design, development and equipment for various products. My experience included designing and developing thermoplastic trays and containers for fresh pasta products and MAP (modified atmosphere packaging), chocolate and confections, and other products, as well as the tooling and equipment used to produce that and other packaging. I was also selected as a Trainer for Nestlé's Quality Initiatives Problem Solving course.

11. In 1999, I became a Senior Packaging Engineer at The Clorox Co, in its Specialty Products Division, which included its food business. I was subsequently promoted to Project Leader. I led the team that launched the innovative Hidden Valley Ranch Easy Squeeze inverted dressing package with custom flip top closure a unique dispensing valve, for which I was awarded a U.S. patent, AmeriStar Award, and WorldStar Award. My experience included design and development of thermoplastic packaging, tooling and equipment for a variety of products, including food, household products, Brita water filtration products and more.

12. In 2005, I became the Senior Director, Engineering & Packaging Development for Method Products Inc., a successful startup company. There I led the creation of the first 100% post-consumer recycled ("PCR") polyethylene terephthalate ("PET") bottles, the first recyclable laminate film, and many thermoplastic packages and related tooling and equipment.

Ningbo Linhua Plastic Ex. 1003, p. 10

13. From 2008 to 2011, I served as Director of Packaging Technology for Constellation Brands US, a Fortune 500 company which produces and markets beer, wine and spirits. I was responsible for all aspects of technical packaging for the company's wines made in or imported into the U.S. I headed packaging development at 9 bottling sites, with operations involving a variety of packaging formats, materials and equipment.

14. From 2011 to 2015, I was the Chief Technical Officer for Ecologic Brands, Inc., a composite bottle design and manufacturing company, with deep involvement in the design, development and utilization of packaging manufacturing equipment and tooling.

15. I am currently owner of ProPac Consulting, which provides solutions for all types of packaging and product challenges including packaging design and development, innovation, technical support, materials optimization, sales and business development, supply chain development, mold and equipment design and development, process development, supply chain development, troubleshooting, cost savings, sustainability, and packaging testing. I have worked extensively with the design, development and utilization of thermoplastic materials, articles, equipment and tooling, on behalf of packaging and equipment suppliers and brand owners.

16. I have received several patents and industry awards, including the 2001 Institute of Packaging Professionals ("IoPP") AmeriStar "Best of Food Category

Ningbo Linhua Plastic Ex. 1003, p. 11

Packaging" Award for Hidden Valley Easy Squeeze Inverted Bottle w/ silicone valve and the 2008 IoPP Ameristar Award for my Method Molded Bamboo Fiber Packaging used with omop Cleaning Tools and Components, as well as 2001 WorldStar Award (HV Easy Squeeze Inverted Bottle with Silicone Valve).

17. I have presented packaging information to large audiences of professionals at seven packaging conferences. I have also taught packaging technology and recyclability to large audiences of packaging professionals at several industry-leading packaging conferences.

18. I have in-depth experience with many packaging and product materials, processes, suppliers and packaging platforms including numerous thermoform, injection molded and blow molded package designs and experience with their tooling, equipment and processes. Specifically, some of my plastic thermoform packaging developments have included several food trays for chocolate products and refrigerated pastas using MAP technology at Nestlé, thermoform articles for Merle Norman Cosmetics, thermoform condiment dressing cups, thermoform cat litter containers, insecticide bait trays, and disinfecting mopping cloths for The Clorox Company, thermoform clamshell designs for Method handsoap multi-packs, thermoform bottle liner development for Ecologic molded fiber bottles, heat sealed and overwrapped thermoform trays for deli meat at Columbus Foods, thermoform packaging for fresh produce at Plenty Unlimited, thermoform articles for Compaq Computers software

packaging, and more. My experience with injection molding includes numerous closures and other packaging components for those companies and others. I have worked with thermoforming, injection molding, and blow molding design, development, materials testing, supplier selection and qualification, production equipment and tooling for over three decades.

19. The cases in which I have testified as an expert are set forth in Ex. 1011 to this report. My testimony includes similar IPR cases related to thermoplastic articles with rolled edges, including IPR2021-00916, IPR2021-00918, and IPR2021-00919.

III. LEGAL FRAMEWORK

20. I am not a legal expert and I offer no opinions on the law. However, I have been advised by counsel about some of the legal principles relevant to an analysis of patentability of claims in a United States patent, as summarized below. I have conducted my analysis in accordance with these principles.

21. I understand that, for an invention claimed in a patent to be found patentable, or to be valid, it must be, among other things, new and not obvious in light of what came before it such as "prior art."

Ningbo Linhua Plastic Ex. 1003, p. 13

A. Standard of Proof

22. I understand that, in these proceedings, the burden is on the party asserting unpatentability to prove it by a preponderance of the evidence. I understand that "a preponderance of the evidence" is evidence sufficient to show that something is more likely than not.

B. Claim Construction

23. I understand that patent claims should usually be accorded their ordinary and customary meaning as understood by a person of ordinary skill in the art ("POSITA"), in light of the intrinsic record. The intrinsic record includes the patent's specification and claims, as well as its entire prosecution history. I also understand that a patentee is free to be his or her own lexicographer and thus may use a term in a manner contrary to or inconsistent with its ordinary meaning, provided that the patentee makes the special meaning clear in the specification or as part of the record during prosecution.

24. I further understand that in construing claims, a POSITA is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification and the prosecution history. I understand that the construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will generally be, in the end, the correct construction. Although the claims themselves

provide substantial guidance as to the meaning of particular claim terms, the claims do not stand alone.

C. Anticipation

25. I have been informed that a patent claim is invalid as anticipated only if each and every element and limitation of that claim is publicly disclosed, either explicitly or inherently, in a single prior art reference, already in practice in the industry in a single process or method, already in a single marketed product, or otherwise previously invented. I also understand that anticipation requires the presence in a single prior art disclosure of all elements of the claim arranged as in the claim. For a step or limitation to be inherent in a reference, I understand that the step or limitation must necessarily and inevitably occur or be present when one follows the teachings of the reference. I am informed that for a reference to be considered as anticipating, it must disclose the relevant technology in a manner such that a person of ordinary skill in the art would be able to carry out or utilize the technology that the reference describes without having to undertake considerable experimentation.

D. Obviousness

26. I have been informed that a patent claim is invalid as obvious only if it would have been obvious to a person of ordinary skill in the art at the time the patent was filed, in light of the prior art. A claim is invalid as obvious if the differences between the claimed invention and the prior art are such that the claimed invention as

a whole would have been obvious to a POSITA. The prior art may include one or more references that a POSITA trying to solve the problem that the inventor addressed would likely have considered, as well as the body of knowledge that such a person would possess.

27. I have been informed that the obviousness inquiry is based on three underlying factual inquiries: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims; and (3) the level of ordinary skill in the art at the time of the invention.

28. I have been informed that, although a challenger may rely on a combination of separate prior art references to support an obviousness challenge, a person of ordinary skill in the art at the time of filing must have had some motivation to combine the references in such a way as to arrive at the claimed invention. That motivation can come from the problem the invention purports to solve, from other references, from the teachings of those references showing the invention is obvious, from market incentives, or from the common sense knowledge of a person of ordinary skill in the art. However, obviousness findings grounded in common sense must contain explicit and clear reasoning providing some rational underpinning why common sense compels a finding of obviousness. A motivation to combine requires more than the mere fact that a POSITA could have made the combination.

29. I have been informed that assessing which prior art references to combine and how they may be combined to match the asserted claim may not be based on hindsight reconstruction or ex-post reasoning. That is, one must view the prior art forward from the perspective of the person of ordinary skill in the art at the time of invention, not backwards from the current time through the lens of hindsight.

30. I have been informed that a reference qualifies as prior art for determining obviousness when it is analogous to the claimed invention. I understand that prior art may be considered analogous if it is from the same field of endeavor, regardless of the problem addressed, as the claimed invention. I also understand that prior art may be considered analogous if it is "reasonably pertinent" to the particular problem with which the inventor is involved. I have been informed that a reference is "reasonably pertinent" if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering the inventor's problem.

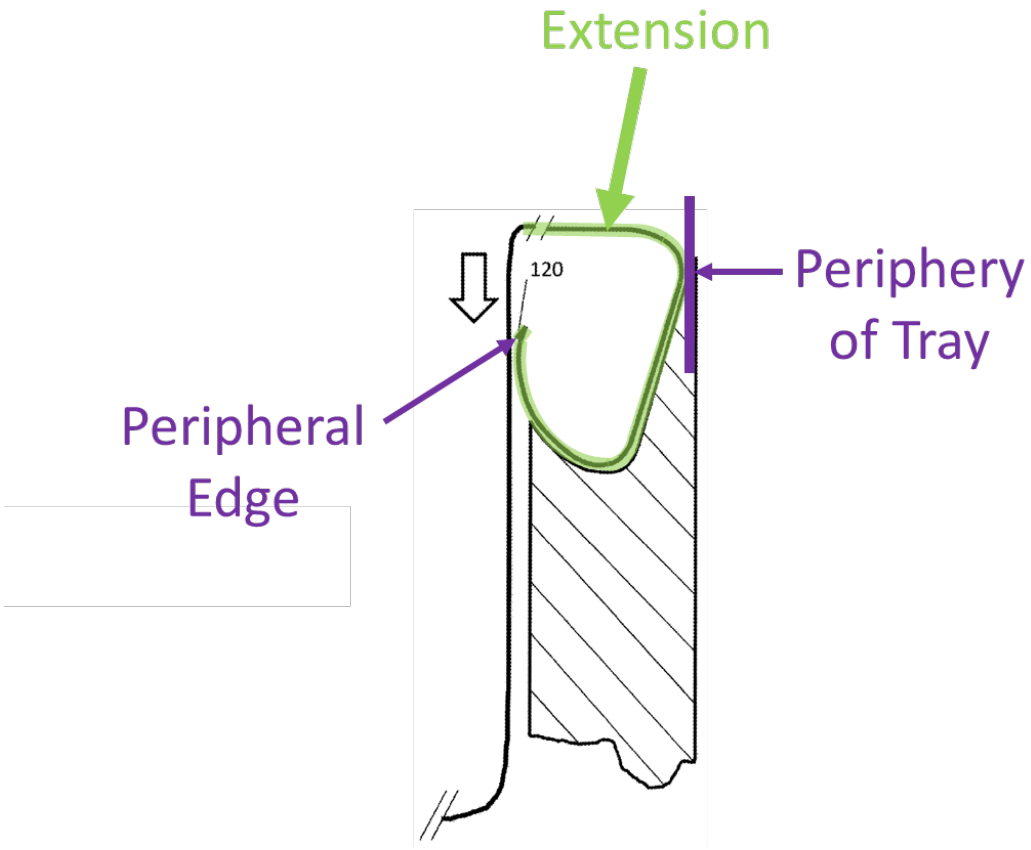
31. The alleged invention described and claimed in the '222 Patent is a method of forming a thermoplastic food container or article with a smooth periphery or rolled edge. Rolled edges and the methods for producing them were publicly known and demonstrated on a variety of thermoformed containers long before 2015, and applying that rolled edge or flange to other shapes would have occurred, and did occur, in the ordinary course of development.

IV. BACKGROUND OF THE TECHNOLOGY

32. The ‘222 Patent relates to food-packaging articles formed from thermoformable plastic, and the method for forming them. Ex. 1001, Title, Abstract, 1:18-32, 6:65-7:25, 8:17-57, Figs. 3A-3C, 6A-6E, 9D-9F.

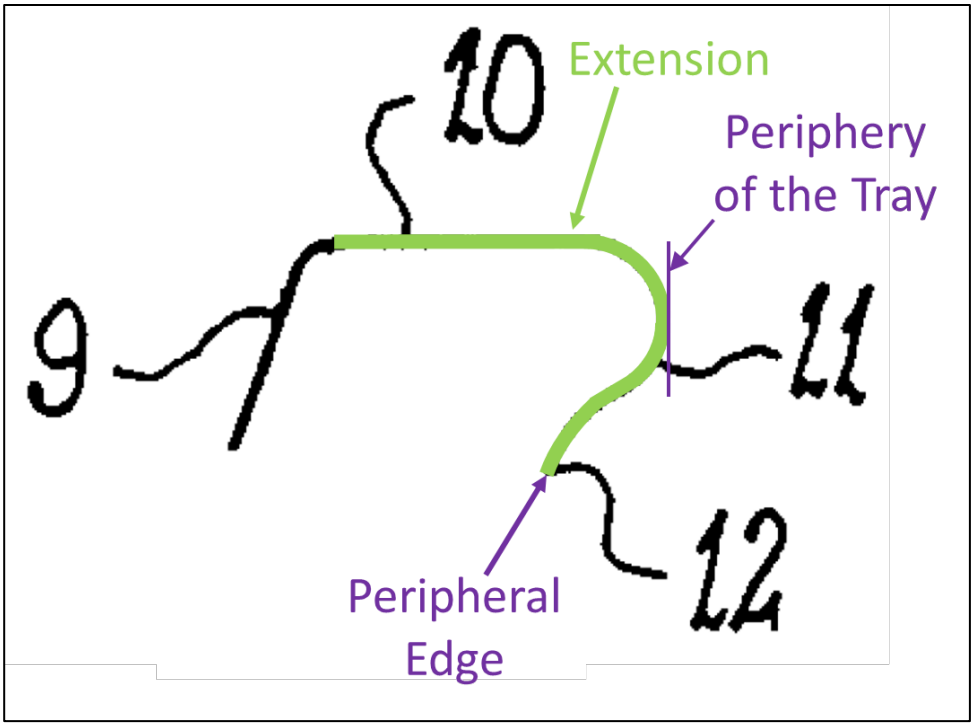
33. Food-packaging such as that described in the ’222 Patent are often wrapped in a thin, plastic flexible film or “overwrap” the food packed in the article. Ex. 1001, 1:28-47, 1:63-3:23, 32:8-63. The ‘222 Patent claims to solve a problem associated with overwrapped articles which is that they tend to have sharp edges that can tear or cut the plastic film overwrap containing the article, or the overwrap of nearby articles, or even potentially injure the flesh of someone handling the article. *Id*. Abstract, 1:23-26, 12:16-20.

34. The’222 Patent claims to solve this problem by proffering 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 and cut the overwrap film or the flesh of an individual handling the article:

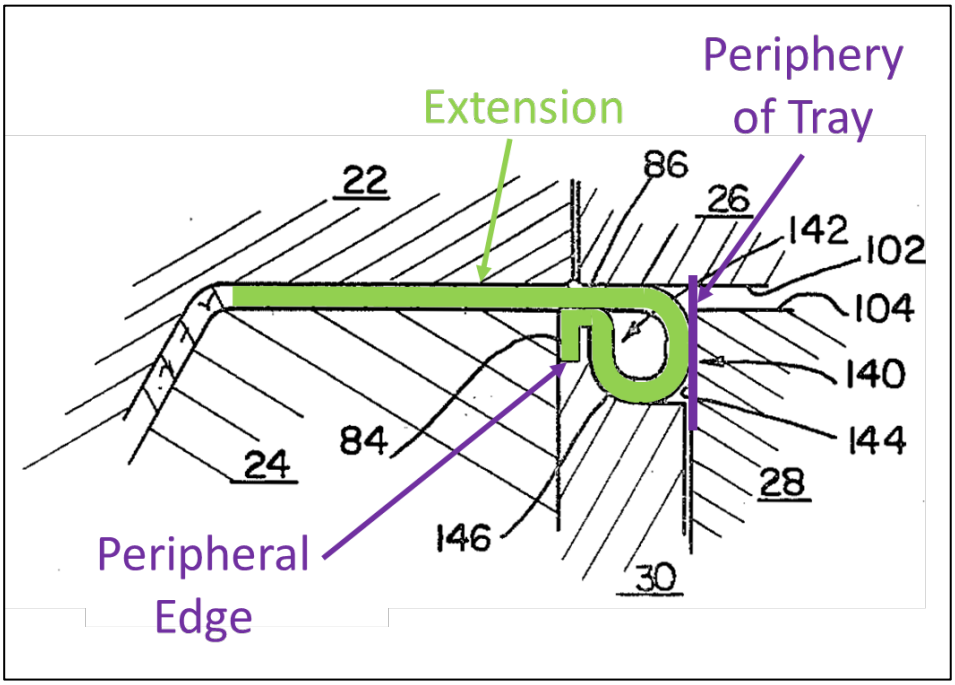


Ex. 1001, Fig. 8K (annotations added); *see also id.*, Abstract, 8:17-57, 9:16-30, 10:60-11:8, 21:42-22:35, 38:27-61, 40:424-59, Figs. 6C – 6E, 8C, 8G, 9C.

35. This claimed innovation actually existed long before the effective filing date of the '222 Patent. Some examples of prior art that solved this very same problem include, but are not limited to, the methods and articles described in International Patent Publication No. WO 96/01179 ("Portelli"), Ex. 1004; U.S. Pat. No. 4,228,121 ("Meadors"), Ex. 1005:



Ex. 1004, Fig. 13 (annotations added).



Ex. 1005, Fig. 8 (annotations added).

36. Additionally, the teachings of industry textbook by James. L. Throne titled "Technology of Thermoforming" published 1996, refer to rolled flanges around the perimeter of articles formed from thermoplastic, and methods for producing them.

37. Examples of thermoformable plastic include, but are not limited to, polyethylene terephthalate (PET), polypropylene (PP), high-impact polystyrene ("HIPS") and acrylonitrile butadiene styrene ("ABS"). These materials were known and in use for thermoforming and injection molding decades before the application leading to the '222 Patent was filed. I know this to be true because I actually used these materials for thermoformed and injection molded packaging since 1992 while at Merle Norman Cosmetics, at Nestlé in 1998 while working on packaging for chocolate products, and had seen these materials widely used in such processes for packaging and products prior to that.

V. PERSON OF ORDINARY SKILL IN THE ART

38. 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. In my experience, some of those technicians and engineers have four-year degrees, but many of them rely primarily on the practical experience that they acquire on the job. Therefore, based on my experience in the industry, it is my opinion that a person of ordinary skill in the relevant art ("POSITA") would be a person with either (a) a Bachelor of Science degree in packaging science, mechanical engineering,

Ningbo Linhua Plastic Ex. 1003, p. 21

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.

VI. THE '222 PATENT

A. Summary of the Specification

39. The '222 Patent describes articles formed from thermoformable plastic and having a rolled-over flange or extension that includes the peripheral edge of the article, and a method of forming rolled-over flanges. Ex. 1001, Title, Abstract, Ex. 1001, Title, Abstract, 1:18-32, 6:65-7:25, 8:17-57, 9:11-44, 10:60-11:8, 38:27-61, 40:23-59, Figs. 3A-3C, 6A-6E, 8C, 8G, 8K, 9C-9F. By overwrapping the article in a thin, flexible plastic film or "overwrap" ("OW"), food, or other items, are effectively sealed in the article. *Id*. 1:26-39, 2:56-67, 32:7-17, 39:14-16. A rolled-over flange or extension on the article relocates the sharp peripheral edge away from the periphery of the article, where it is far less likely to (1) tear or cut the plastic film used to overwrap that aricle or nearby articles, or (2) injure the flesh of someone handling the article. *Id*. Abstract, , 1:23-26, 7:20-25, 12:16-20, 12:49-52, 14:17-23, 16:49-65, 34:64-35:5, 37:60-63, 39:11-13. The rolled-over flange is formed by impinging a ram against the peripheral flange to deflect the spacer towards the extension, heating the bent portion and further impinging the ram against the deflectable flange to further deflect the spacer toward the extension prior to disengaging the ram from the deflectable flange,

to yield the body with a smooth periphery. *Id.* Abstract, 4:30-59, 14:65-15:40, 16:3-49, 16:66-18:9, 18:35-21:3, 31:4-32:5, 35:29-36:8, 36:42-37:37, 38:42-61, 40:39-59, Figs 1B, 1C, 2A-2D, 4, 5A-5C, 6E, 7A-7C, 8A-8K. The '222 Patent further describes a shaped thermoform article suitable for several methods of sealing with film, including overwrap (OW), vacuum seal packaging (VSP) and modified atmosphere packaging (MAP). *Id.* 1:40-45, 1:61-3:40, 12:23-31, 33:9-16, 34:46-35:5.

B. Claims

40. The '222 Patent has 21 claims, including Claims 1 and 21 which are independent. Claim 1 is an illustrative example:

1. A ***method of making*** a shaped article having a body with a smooth periphery, the method comprising

forming a thermoplastic into a shape comprising the body and a deflectable flange at a peripheral portion of the body, the deflectable flange comprising an extension that extends peripherally away from the body and connects thereto

a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer that is connected with

a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peropheral (sic) flange being connected, at an angle other than 180 degrees, at an elbow;

impinging a ram against the peripheral flange to deflect the spacer towards 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, the bent portion being selected from the group consisting of the extension, the bend region, and the spacer;

heating the bent portion to at least the glass transition temperature of the thermoplastic; and

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

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***.

Id. Claim 1 (emphasis added).

Ningbo Linhua Plastic Ex. 1003, p. 24

41. The ’222 Patent acknowledges that (1) rounded rectangular trays, and (2) rolled-edge, thermoformed articles (e.g., drinking cups with rolled edges) were both known in the prior art, *id.* 2:56-61, 4:7-11. The ‘222 Patent refers to the method of producing thermoformed articles with flange or extension bent or rolled so as to result in the peripheral edge of the article being displaced from the periphery,resulting in the article having a smooth periphery. The ‘222 Patent claims — that similar, rolled edges had never been implemented on a non-circular thermoformed article using methods described therein. *Id*. 4:14-19, 33:13-16, 34:46-48, 35:2-5, 37:51-59, 38:1-15.

42. Following is a claim chart showing all Claims of the ‘222 Patent:

Claim Number /Element	Claim Limitation	Independent/ Depends From
1 Preamble	“A method of making a shaped article having a body with a smooth periphery, the method comprising”	Independent
1a	“forming a thermoplastic into a shape comprising the body and a deflectable flange at a peripheral portion of the body”	
1b	“the deflectable flange comprising an extension that extends peripherally away from the body and connects thereto”	
1c	a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer that is connected with…	
1d	“[a spacer that is connected with] a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peropheral (sic) flange being connected, at an angle other than 180 degrees, at an elbow;	

1e	impinging a ram against the peripheral flange to deflect the spacer towards 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,	
1f	the bent portion being selected from the group consisting of the extension, the bend region, and the spacer,	
1g	heating the bent portion to at least the glass transition temperature of the thermoplastic; and,	
1h	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…	
1i	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	1
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.	1
4	The method of claim 1, wherein the bend region interconnects the spacer with the extension at an angle of about 87-93 degrees.	1
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.	1

Ningbo Linhua Plastic Ex. 1003, p. 26

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.	1
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.	6
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.	7
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.	7
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.	9
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.	1
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.	1

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.	1
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.	1
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.	1
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.	1
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	1

	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.	1
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.	1
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.	1
21 Preamble	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	Independent
21a	forming a deflectable flange about the peripheral edge of the article,	
21b	the deflectable flange comprising an extension that extends peripherally away from the body and connects thereto	
21c	a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer that is connected with	
21d	[a spacer that is connected with] 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;	
21e	impinging a ram against the peripheral flange to deflect the spacer towards 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,"	
21f	the bent portion being selected from the group consisting of the extension, the bend region, and the spacer,	
21g	heating the bent portion to at least the glass transition temperature of the thermoplastic;	
21h	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	
21i	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.	

43. Following are several Figures from the '222 Patent, including 1A and 1B, which the '222 Patent explains refer to article 100 with body 10, extension 50, deflectable flange 160, spacer 140, bend region 150, elbow 130, peripheral flange 120, and peripheral edge 110.

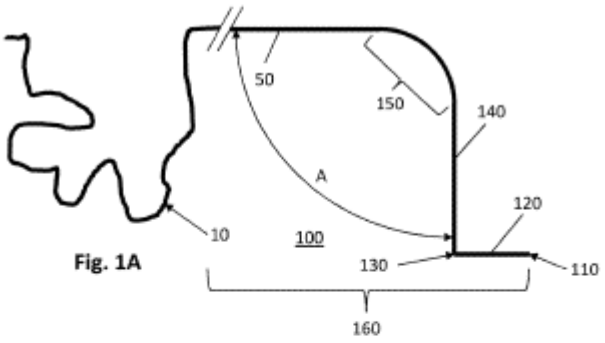


Fig. 1A

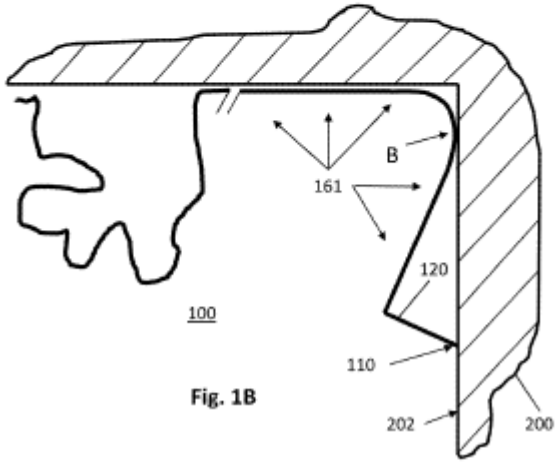


Fig. 1B

Ex. 1001, Figs. 1A, 1B

44. The peripheral edge in the ‘222 patent is illustrated in Figs. 1C and 8G, marked as feature 110, and is also illustrated in Fig. 8K (annotated below), though it is not marked in that illustration:

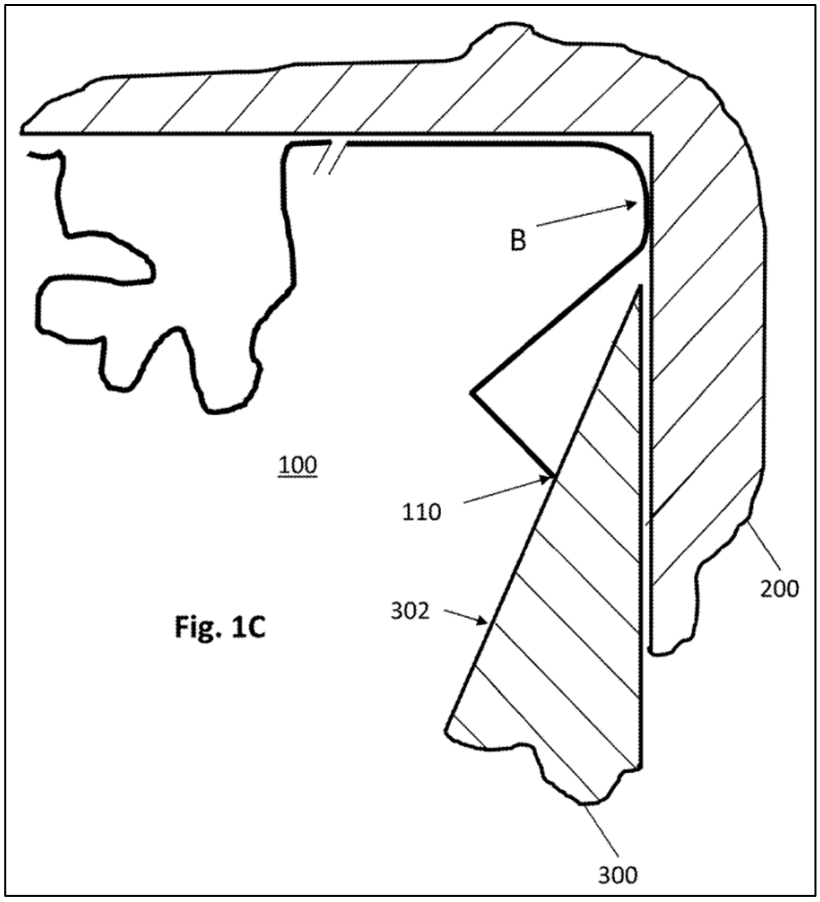
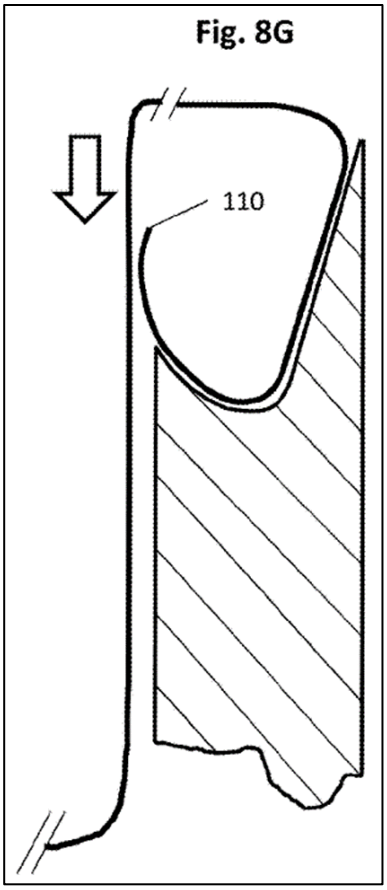
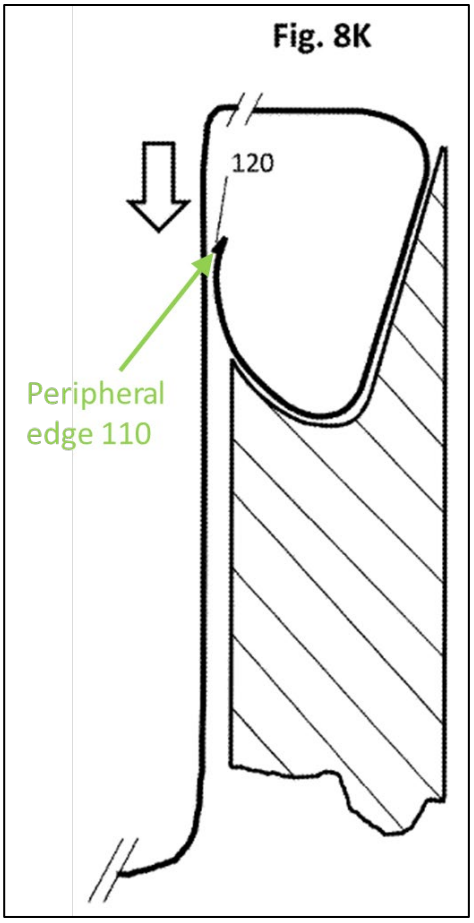


Fig. 1C


Fig. 8G
110



Ex. 1001, Figs 1C, 8G, 8K (annotated)

C. Prosecution History

45. The application 15/445,220 which became the '222 Patent was filed February 28, 2017, and was a continuation-in-part of co-pending international application PCT/US16/49692, filed August 31, 2016, which claims priority to US provisional patent application No. 62/212,367, filed August 31, 2015. The '222 Patent was allowed without substantive prosecution.

46. Although Portelli was cited by the applicant in an IDS following multiple notices of allowance, the application was allowed without substantive prosecution

following the Portelli disclosure. The '222 patent does not cite, disclose or make known to the examiner the relevant prior art of Meadors. However, Portelli and Meadors are relevant prior art disclosing methods, apparatus, and materials and thermoplastic articles including inwardly displaced peripheral edges which allow for various means of wrapping and sealing.

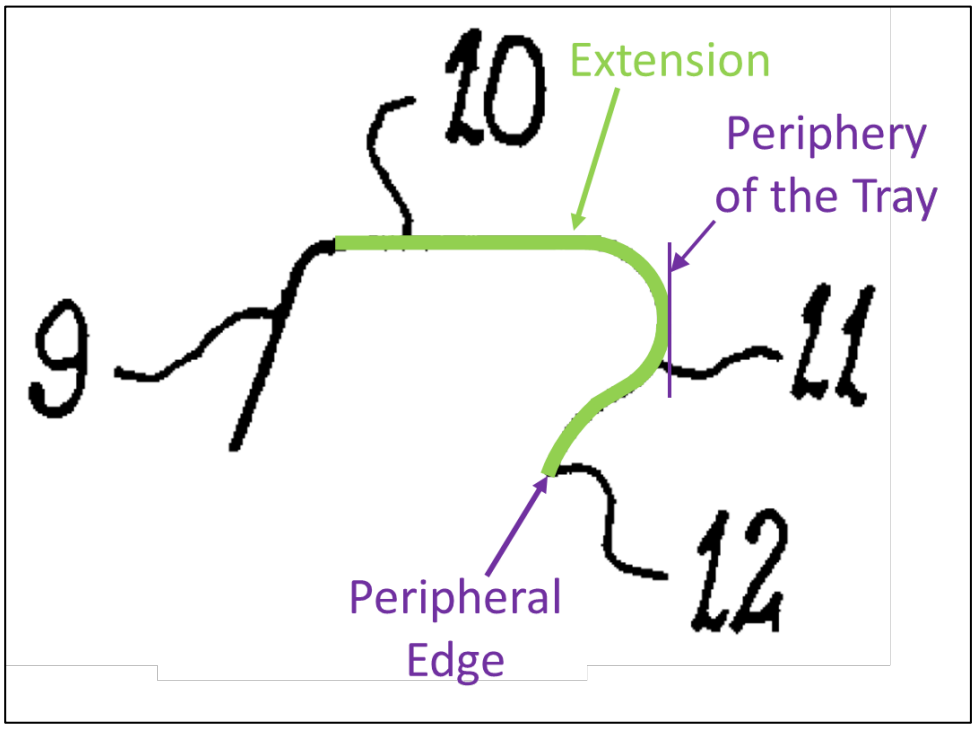
VII. OVERVIEW OF PRIOR ART

A. Portelli

47. Portelli's international publication date was January 18, 1996, having been applied for on July 6, 1995, and has a priority date of July 6, 1994. Portelli teaches a method of producing thermoplastic articles for packaging food such as meat, fish, poultry, and produce, which can be overwrapped in plastic film. Ex. 1004, Abstract, 1:2-11 ("This invention relates broadly to packaging. More specifically 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 …. [T]he invention [is described] with particular reference to plastic trays used for the packaging of foodstuffs such as red meat, fish, poultry, [etc.]"), 1:17-19 (referring to "***materials, synthetic or natural, which may be shaped when soft and then hardened***"). 1:12-16, 9:17-24, 14:10-14, 15:12-14, 16:15-17, Figs. 14, 15 (emphasis added). Portelli likewise teaches 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." 15:4-8.

48. Portelli further explains "It would therefore be advantageous if a method and an apparatus could be found for providing these trays with a peripheral edge region which reduced the tendency of the wrap to tear." 2:16-18. Portelli teaches a method and apparatus which yield an article where the peripheral edge is purposely bent or rolled so as to result in the peripheral edge of the article being displaced from the periphery, resulting in the article having a smooth periphery:



Id. Fig. 13 (annotations added); *see also id*. 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").

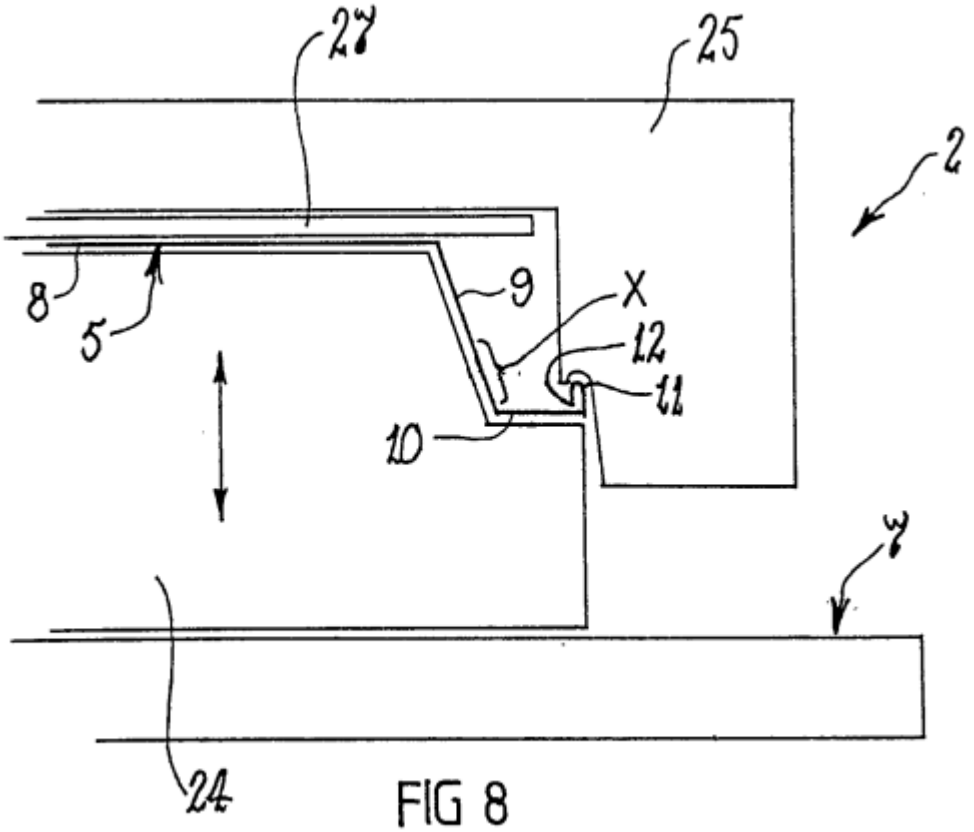


FIG 8

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

Ningbo Linhua Plastic Ex. 1003, p. 37

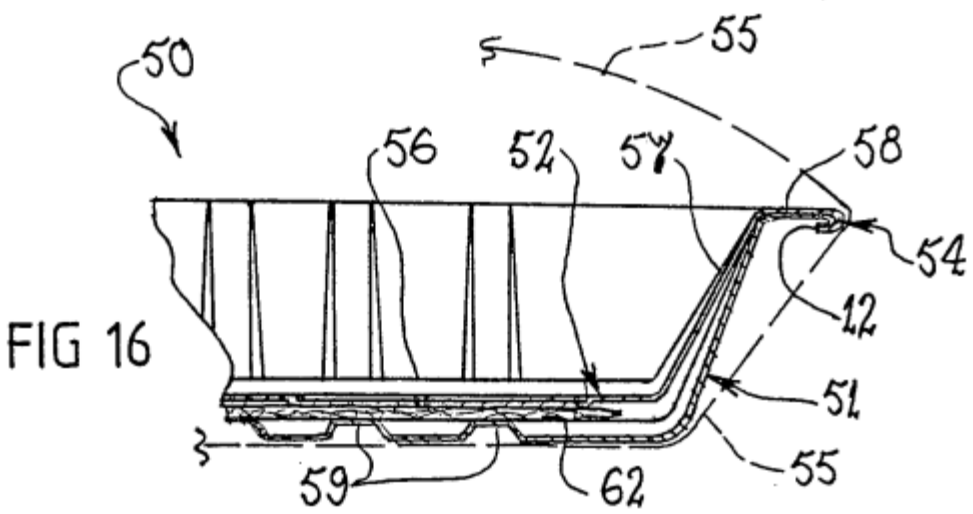


FIG 16

Id. Fig. 16, showing rolled edge displaced from periphery such that it will not contact film overwrap.

49. Portelli discloses, inter alia, "According to *a first aspect of this invention* there is provided a method of producing a plastic tray having a peripheral edge region terminating in a ***terminal edge which is deformed such that the terminal edge is displaced out of a wrap path around a tray***, the method including: providing a plastic tray having a peripheral edge terminating in a terminal edge; ***heating the peripheral edge region of the tray such that said peripheral edge region becomes malleable*** and the remainder of the tray remains non-malleable; and ***deforming the peripheral edge region of the tray by 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, the deforming being affected by relative movement between the tray and the deforming means. Typically ***the method includes cooling the peripheral***

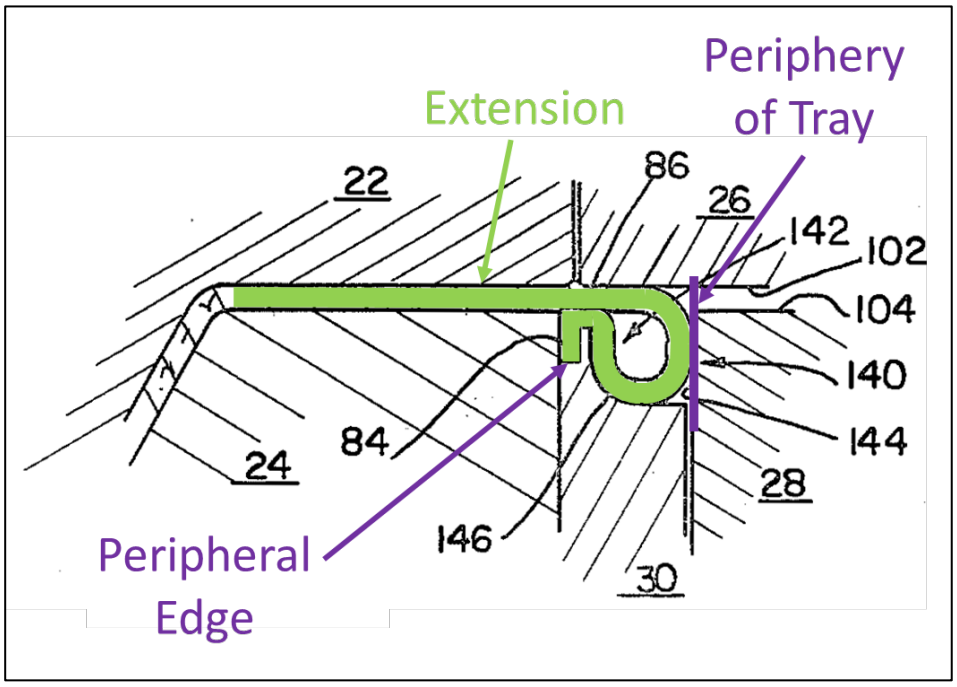
edge region of the tray such that it sets and hardens with the terminal edge displaced out of the wrap path." 2:22-3:8. Emphasis added.

50. Portelli's tray displaces the peripheral edge out of the tray's wrap path, where it is less likely to cut or tear the overwrap film. *Id*. Abstract, 1:29-2:18 (purpose of invention is to solve a problem of conventional trays which "have a sharp terminal edge forming the periphery thereof with an unfortunate tendency to tear or cut through plastic film within which the trays are wrapped"); 3:1-3, 5:1-2, 12, 5:25-6:3, 15:20-23, 18:3-5, 20:11-16, 24-27, 21:17-23. I have direct experience with the issues that Portelli solved, including sharp thermoform peripheries which tend to cut and damage outer packaging such as overwrap or other sealed film, and which present safety issues for consumers. I was responsible for helping several brand owners reduce damages or "unsaleables" (damaged product that cannot be sold to retailers or consumers) as well as consumer complaints regarding injuries resulting from sharp peripheries on thermoplastic packaging. These issues were solved in various manners, sometimes by rolling over and displacing the sheet's sharp peripheral edge, other times by using more expensive, heavier gauge film, or use of a film overwrap to other types of outer packaging like folding cartons or heat-sealed lidding.

B. <u>Meadors</u>

51. The prior art of Meadors was published on October 14, 1980. teaches an article formed from a thermoplastic, such as acrylonitrile butadiene styrene (commonly

known as ABS). Ex. 1005, 3:40-46, 4:23-25; 6:24-25. Meadors's tray intentionally uses a bent or rolled-over flange or extension resulting in a smooth periphery by moving the peripheral edge of the tray away from the periphery, resulting in a smooth tray periphery:



Ex. 1005, Fig. 8 (annotations added); *see also id*. Figs. 6, 7, 9, 10.

52. Meadors discloses "This invention relates to methods of, and apparatus for, forming a multiple-thickness, bead in a sheet or blank of a flexible material, such as thermoplastic material or paper stock, as the sheet or blank is being formed into an article such as a container or lid for a container." 1:5-9. Meadors further explains, "This invention relates to methods of, and apparatus for, forming a multiple-thickness, bead in a sheet or blank of a flexible material, such as thermoplastic

material or paper stock, as the sheet or blank is being formed into an article such as a container or lid for a container." 1:46-61.

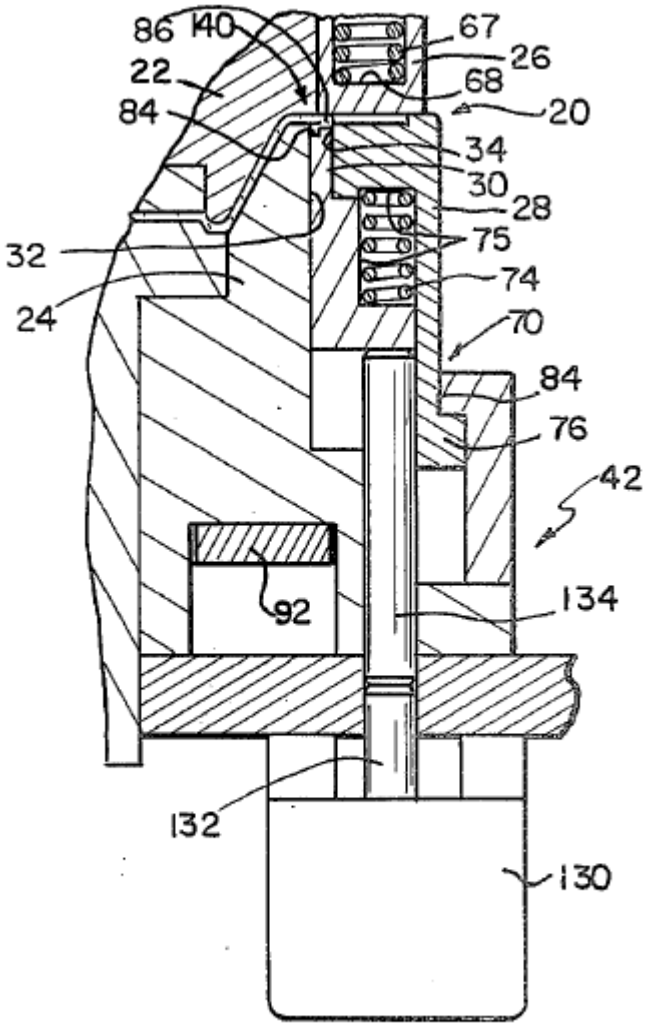


FIG. 5

Ex. 1005, Fig. 8 (annotations added); *see also id*. Figs. 1-4.

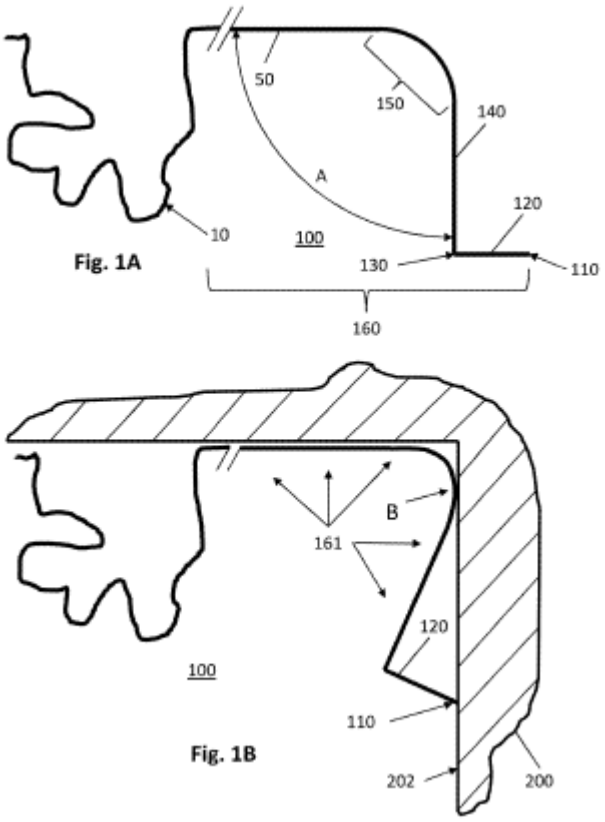
VIII. SPECIFIC GROUNDS FOR INVALIDITY

A. Ground 1: Claims 1-21 are Rendered Obvious Under § 103 by Portelli

1. Claim 1

a. Comparison to Patent Owner's Application of Claim Elements in '222 Patent and Related Litigation

53. As noted previously, the '222 Patent refers to article 100 with body 10, extension 50, deflectable flange 160, spacer 140, bend region 150, elbow 130, peripheral flange 120, and peripheral edge 110, as shown here in Figs. 1A and 1B.



Ex. 1001, Figs. 1A, 1B

54. The ‘222 patent illustrated in Fig. 1C a ram 300 and peripheral edge 110. Figs 8G and 8K also depict those features, though only the peripheral edge 110 is marked in Fig. 8G:

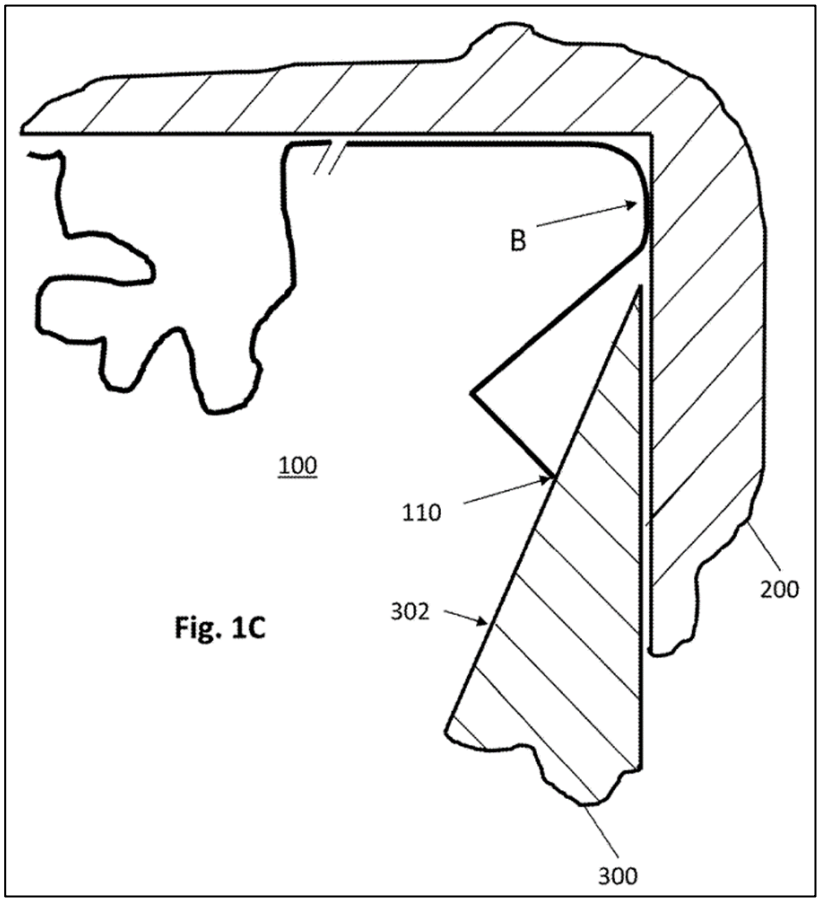
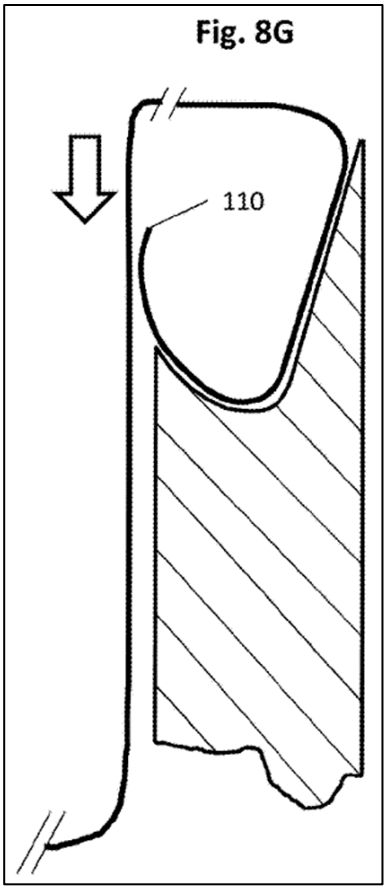
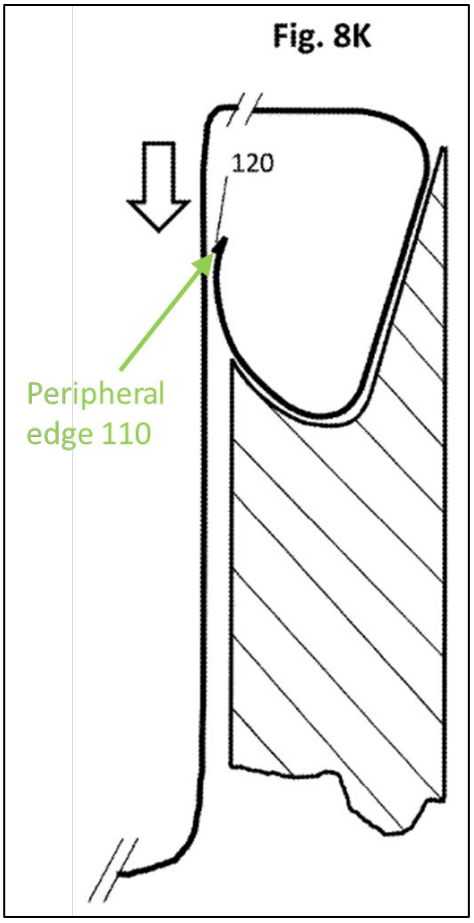


Fig. 1C

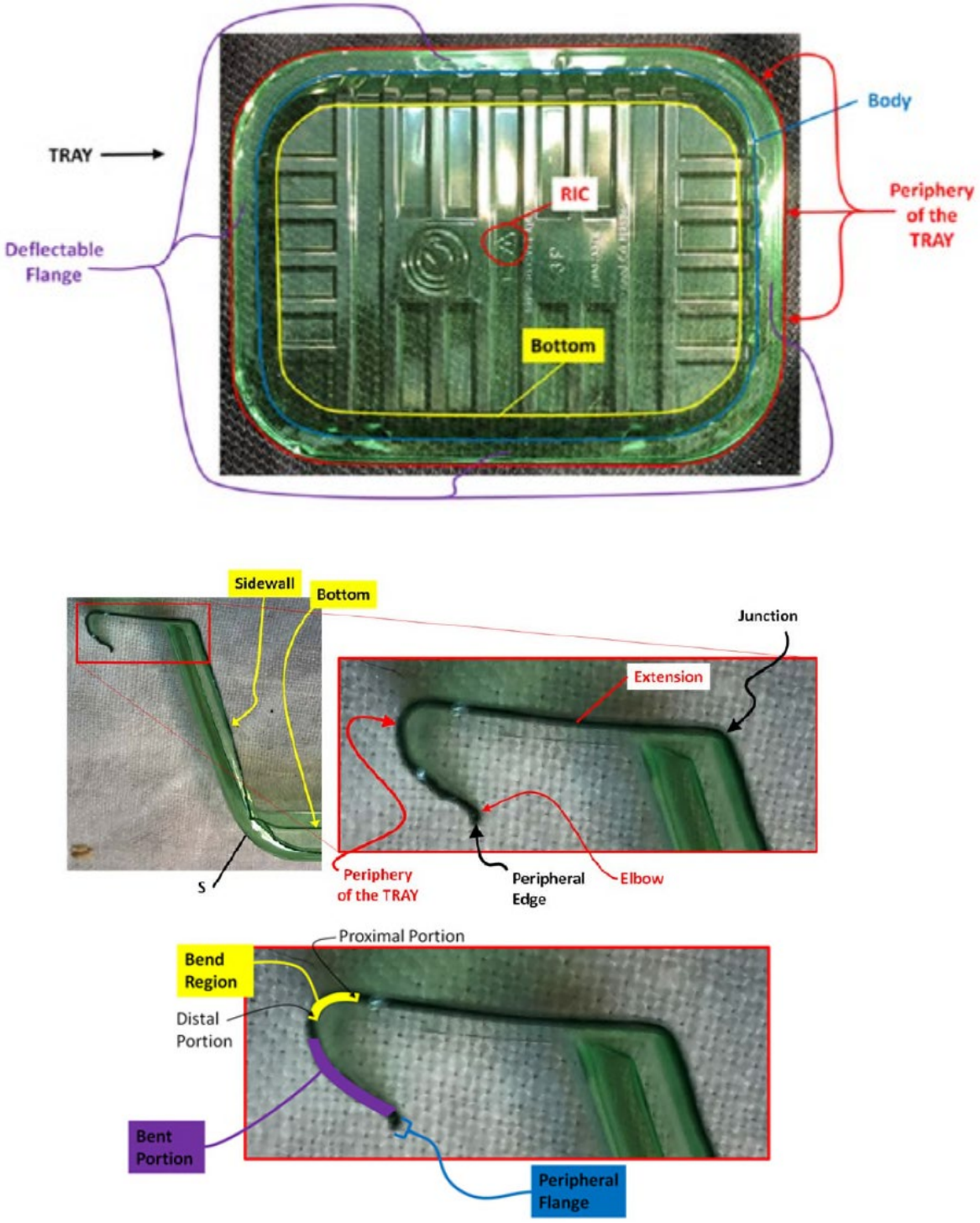

Fig. 8G
110



Ex. 1001, Figs 1C, 8G, 8K (annotated).

55. Furthermore, the 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 article ("Model E090733TE Accused Product") in their First Amended Complaint ("First Amended Complaint") dated 9/13/22 in litigation related to the '222 Patent:

Ningbo Linhua Plastic Ex. 1003, p. 45


TRAY
Deflectable Flange
RIC
Bottom
Body
Periphery of the TRAY
Sidewall
Bottom
Junction
Extension
S
Periphery of the TRAY
Peripheral Edge
Elbow
Proximal Portion
Bend Region
Distal Portion
Bent Portion
Peripheral Flange

Ex. 1007, p. 8

56. However, Portelli teaches the same features for each of those claim elements, shown in Figs. 13 and 8, simply in reverse direction, with essentially identical forms:

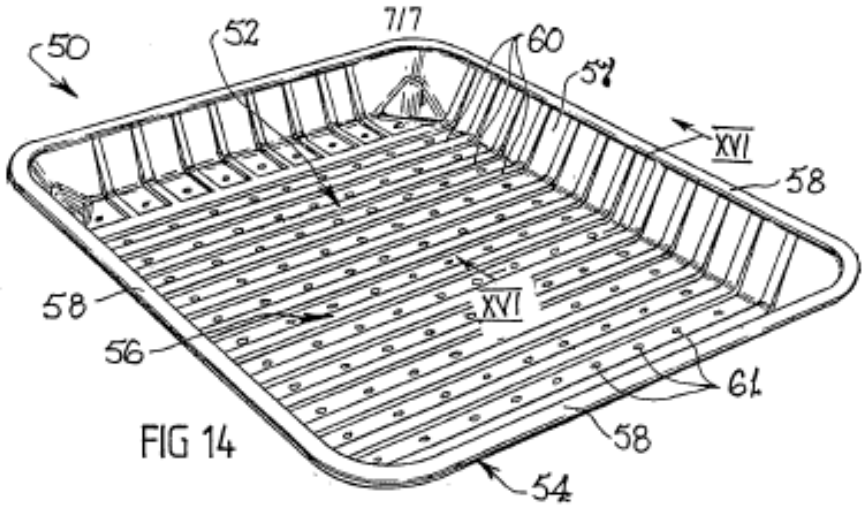
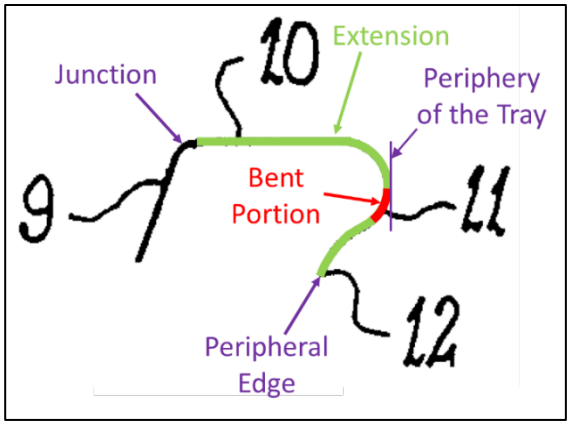
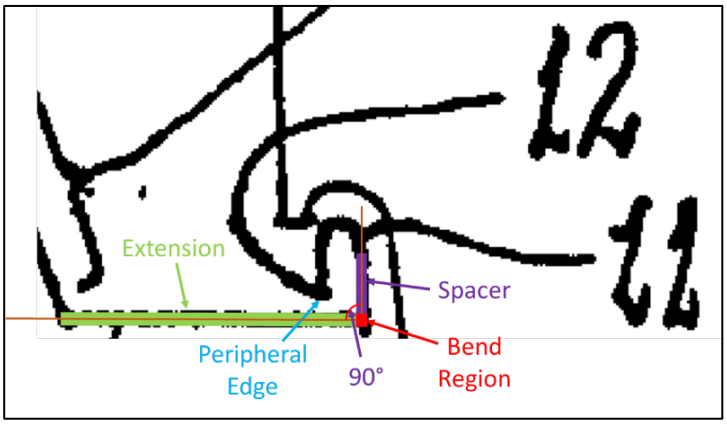


FIG 14

Ningbo Linhua Plastic Ex. 1003, p. 47





Portelli Fig. 14 Portelli Fig. 13 (annotations added) Portelli Fig. 8 (excerpted and annotations added).

57. Every element of the '222 Patent's Claim 1 is rendered obvious by the combination of the embodiments illustrated in Portelli's Figs. 8 and 13 and the remainder of Portelli's specifications and claims, as explained below.

b. **Preamble: "A method of making a shaped article having a body with a smooth periphery, the method comprising"**

58. The preamble of the '222 Patent is taught by the prior art of Portelli. Portelli discloses a method of making a shaped 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. A method of applying heat to render the tray's edge region malleable, deforming it with a die to bend and roll over the flange or extension region, and allowing the flange to cool and harden into the shape with a smooth periphery *Id.* Abstract ("The peripheral edge region (11) of the tray (5) is heated to render it malleable The region (11) is deformed by bringing [a] die into engagement with the malleable region (11) and rolling that region (11). The region (11) is then cooled such that it sets and hardens in the deformed condition."), 1:6-20 (referring to materials "which may be shaped when soft and then hardened"); 2:28-3:3 (referring to "heating the peripheral edge region of the tray such that said peripheral edge region becomes malleable and the remainder of the tray remains non-malleable; and deforming the peripheral edge region of the tray by bringing an appropriately configured deforming means into engagement with said peripheral edge region of the tray"), 5:25-26 ("This invention also extends to a plastic tray including a peripheral edge region terminating in a terminal edge."); 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") (emphasis added). A POSITA would understand that this method and apparatus refer 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 relates broadly to packaging. 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**.") (emphasis added). A POSITA would recognize that the materials used in Portelli's tray would have sufficient rigidity to define the conformation of the tray, since they include plastics which are "shaped when soft and then hardened," *e.g.*, *id*. 1:17-20.

59. As previously mentioned, Portelli discloses a container formed from a thermoformable sheet, and having a "sharp terminal edge 12." Portelli, 9:17-18. This is synonymous with what the '222 patent calls a 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, marked as feature 110, and is also illustrated in Fig. 8K (annotated below), though it is not marked in that illustration:

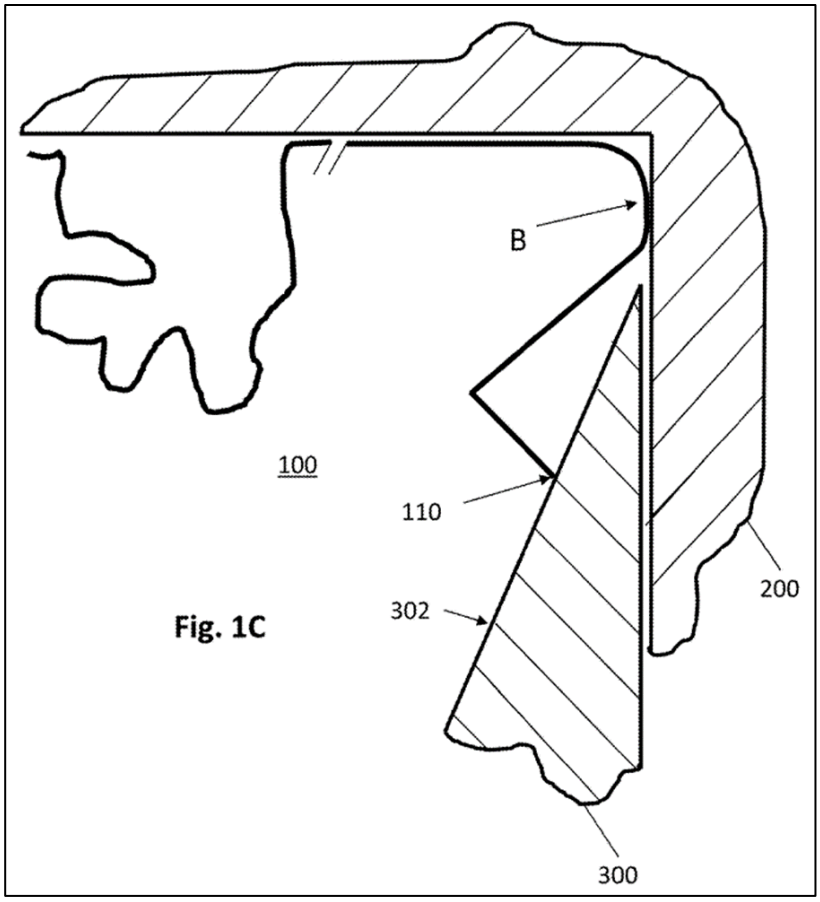
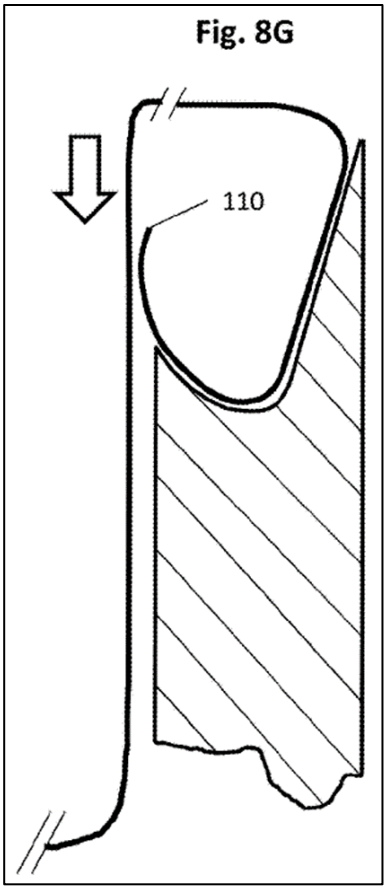
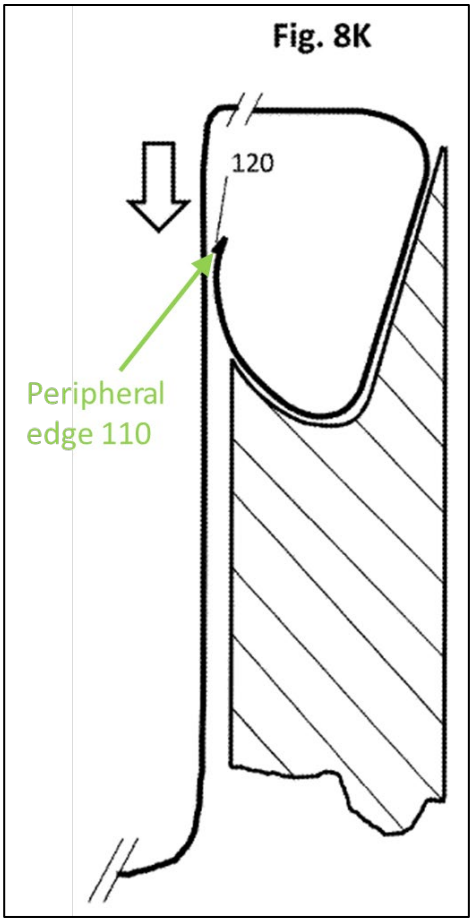


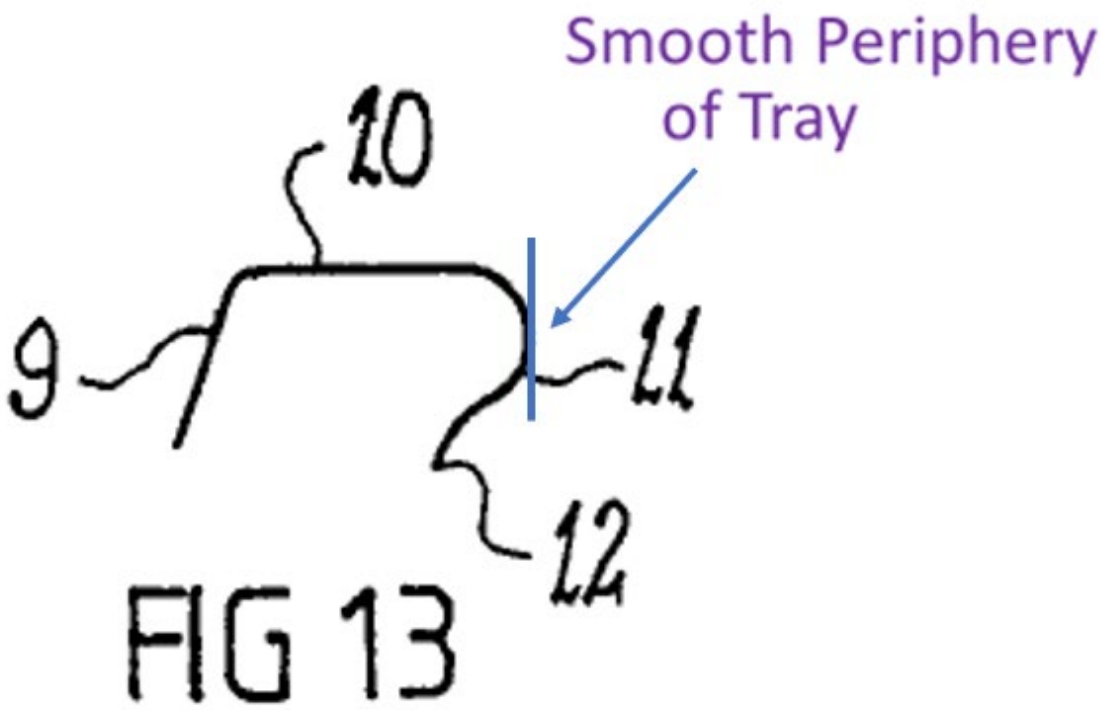
Fig. 1C


Fig. 8G
110



Ex. 1001, Figs 1C, 8G, 8K

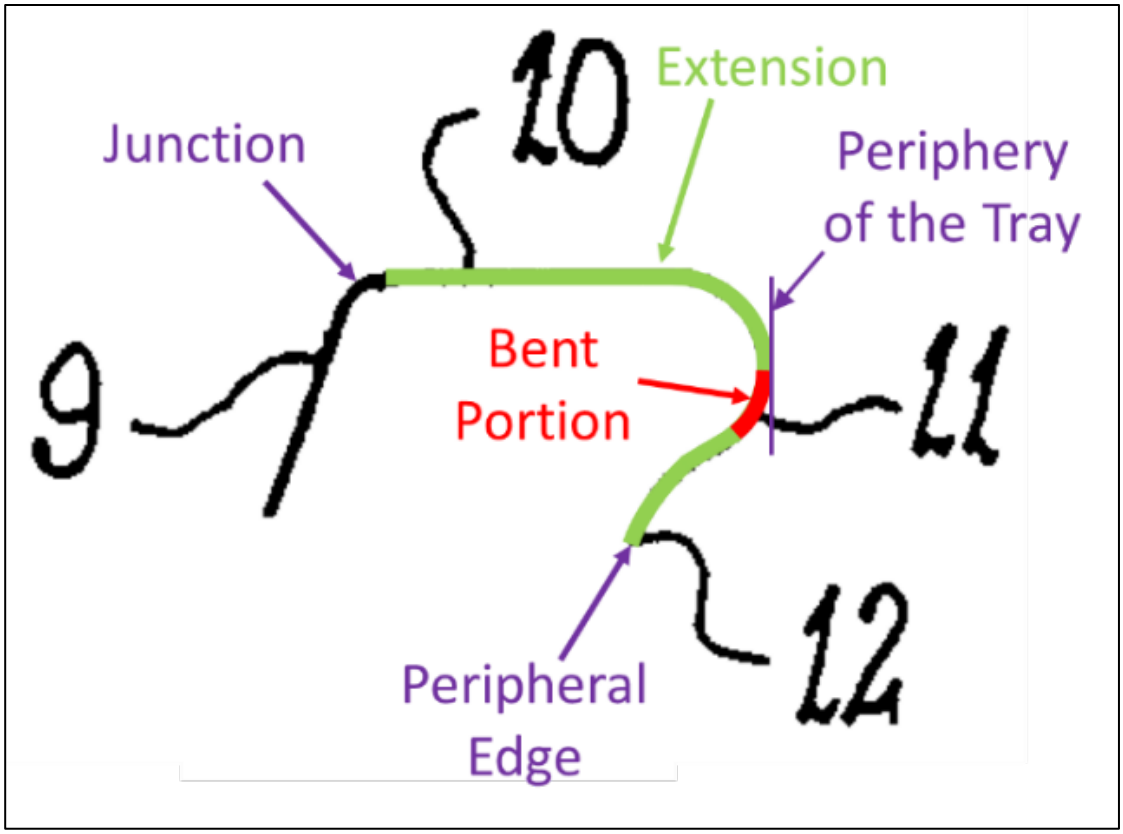
60. In the same manner as the '222 Patent, Portelli's tray includes a a smooth periphery at the outermost perimeter of the tray. This smooth periphery is shown in examples below of Portelli Fig. 13, marked at the far right of the "peripheral edge region 11":



Portelli, Fig. 13 (annotations added).

61. 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. In addition to Portelli's illustrations showing a smooth periphery, Portelli further describes in writing how the peripheral edge is displaced away from the periphery. *See, e.g., id*. 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 (referring to improvement over prior trays by "provid[ing] a tray with a ***terminal edge which does not form the peripheral edge of the tray*** [, i.e.,] a tray where the ***terminal edge faces away from the path transversed by plastic film which is wrapped around the***

tray (hereinafter referred to as the wrap path."), 3:17-19 ("[D]eforming the peripheral edge region includes rolling the peripheral edge region. Preferably the edge region around the full periphery of the tray is rolled substantially simultaneously."). A POSITA at the time of the '222 filing would equate Portelli's "terminal edge (12)" terminology to the '222 Patent's "peripheral edge," since the terminal edge indicates where the thermoplastic article's edge "terminates" near the article's periphery- either at the furthest outward point of the extension before rolling, or inward of the smooth periphery after using Portelli's edge-displacing method and apparatus. Furthermore, a POSITA would equate Portelli's "peripheral edge region (11)" terminology to the '222 Patent's "periphery of the article," noting it is in the smooth "region" of the periphery resulting from Portelli's edge-rolling teachings:

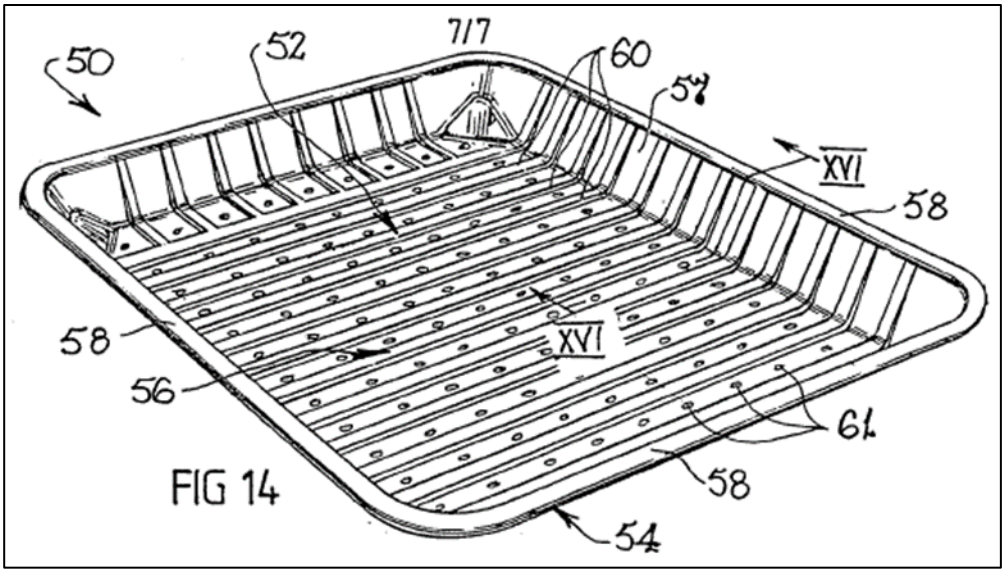


Portelli Fig. 13 (annotations added)

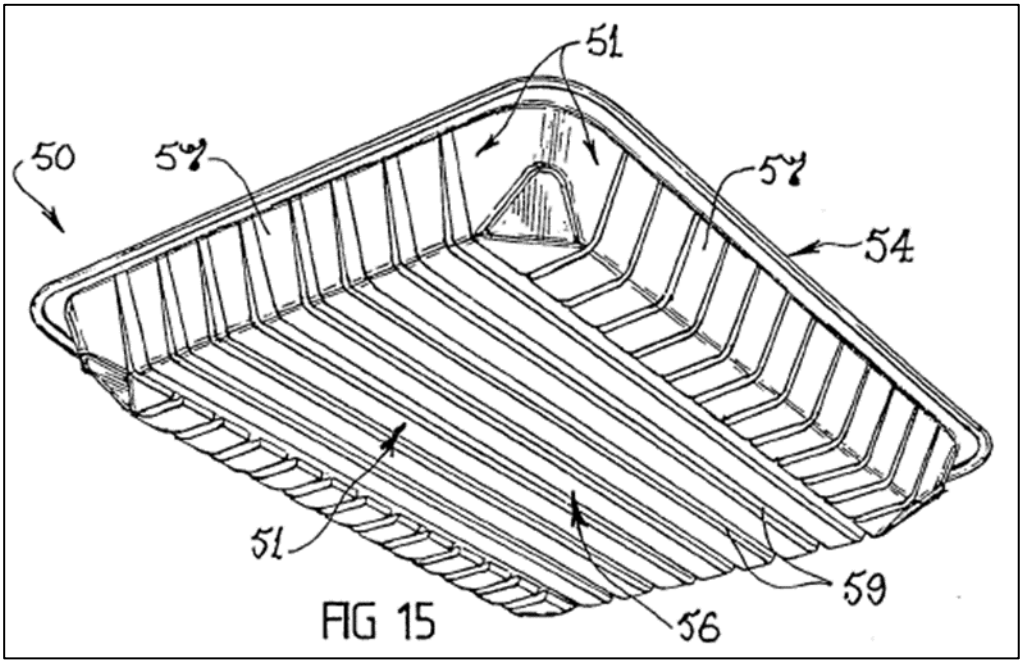
c. **Element 1a: "forming a thermoplastic into a shape comprising the body and a deflectable flange at a peripheral portion of the body"**

62. See my prior references to Claim elements "body" and "deflectable flange" as claimed by the '222 Patent and described in Patent Owner's First Amended Complaint from related litigation.

63. Portelli discloses and portrays a "base member 51" and a "cover member 52," both of 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; *see also id.* 15:12-16, Fig. 11 (item 5).

64. 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". 9:17-24 Portelli explains that his method and apparatus are used to deform article's flange, i.e. a "deflectable flange." He further discloses that "heating the peripheral edge region of the tray such that said ***peripheral edge region becomes malleable***," again a reference to a "deflectable flange." *Id*. 2:22-30 (emphasis added). He further shows the flanged of his thermoplastic shape being deflected in his Figs. 3 and 4, where the sharp terminal edge 12 in Fig 3 is deflected and displaced in Fig 4:

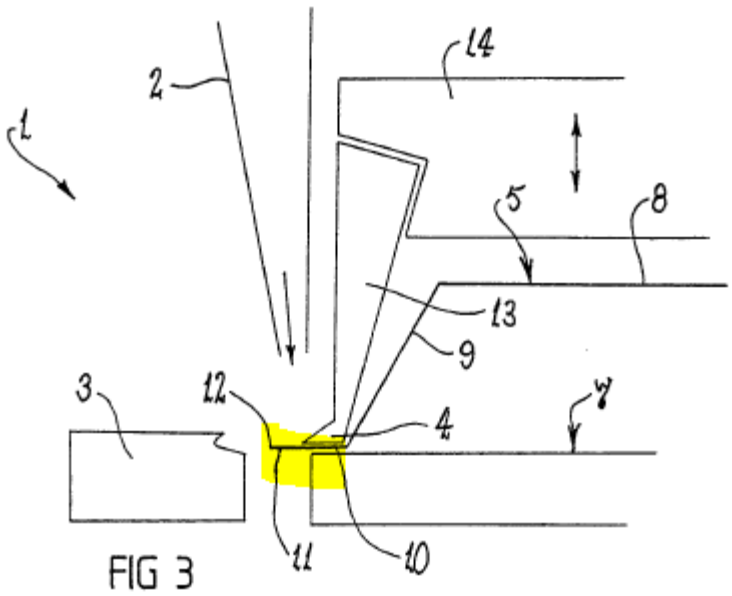


FIG 3

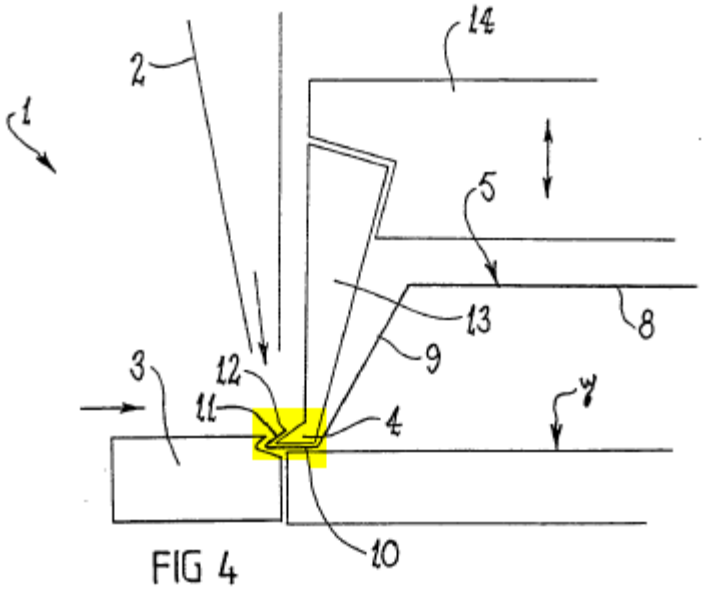
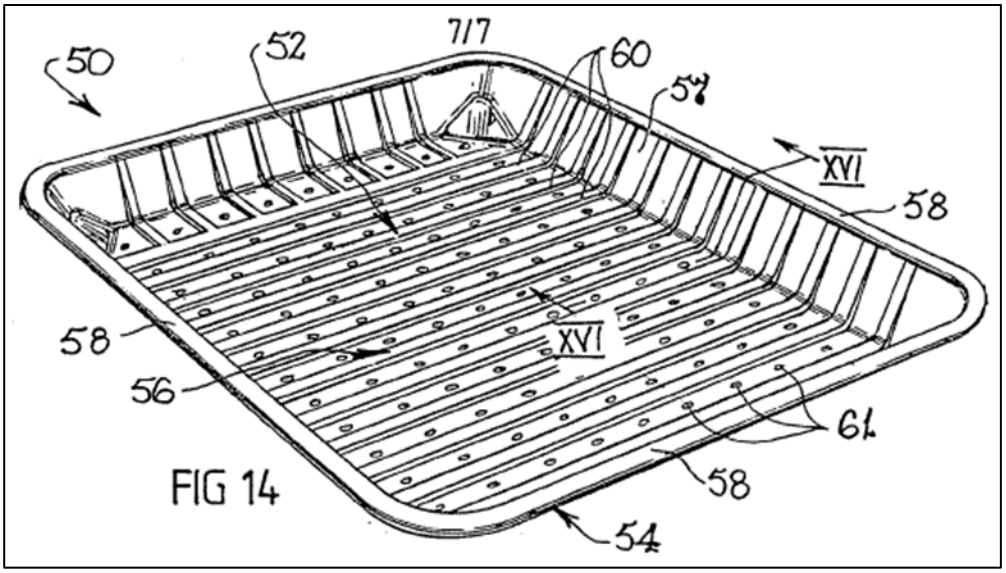


FIG 4

Id. Figs 3 and 4, indicating sharp terminal edge 12 being deflected (annotated; *see also* Figs. 1-2, 5-8).

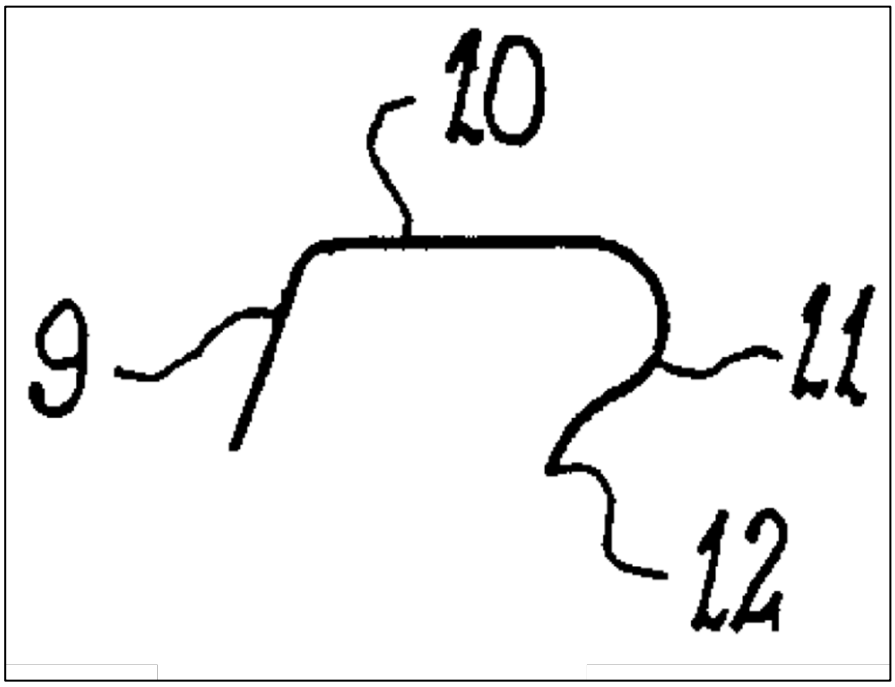
65. Regarding shape, the thermoformable article in Portelli is repeatedly described as a tray, and is even described specifically as a "rectangular tray." *See, e.g., id*. 1:1-5 ("[T]his invention relates to trays for packaging …."), 1:7-8 ("trays used for the packaging of foodstuffs such as red meat, fish, poultry, garden produce and the like"), 5:25 ("plastic tray"), 10:17-18 (referring to "rectangular tray 5"), 18:6 ("providing a plastic tray"). While Portelli's Fig. 14 and Fig. 15 clearly identify a shape with a body and deflectable flange in the form of a rectangular tray, Portelli also explains that "In this specification, the term "tray" shall not be limited to flat or shallow containers. Further the term shall not be limited to containers having four straight edged sides. For example, it is specifically envisaged that the trays defined in this specification might contain chickens and that **the tray might be configured to conform with the outline of the shape of the chicken**." Id. 1:12-16 (emphasis added).

66. 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.

67. The "deflectable flange" is illustrated as item 10 in Portelli Fig. 13:



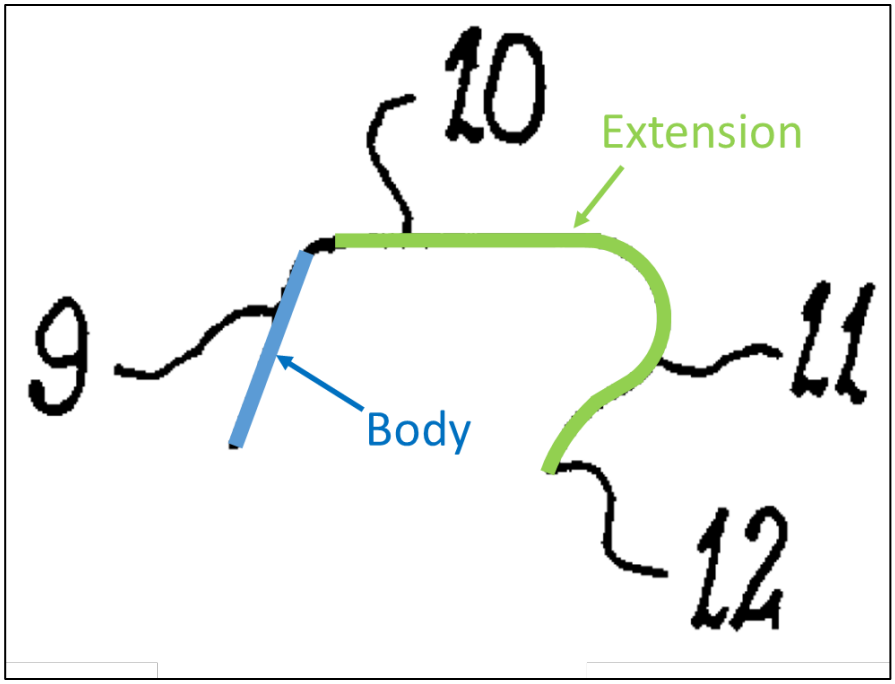
Portelli, Fig. 13.

68. Regarding the claim's reference to "thermoplastic," Portelli likewise teaches that "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…"). 1:12-16, 9:17-24, 14:10-14, 15:12-14, 16:15-17, Figs. 14, 15 (emphasis added). Portelli repeatedly refers to the application of heat in thermoforming processes, apparatus, and operations, further describing parameters for the shaping of thermoplastic materials. Portelli even 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." *Id*. 15:4-8 (emphasis added).

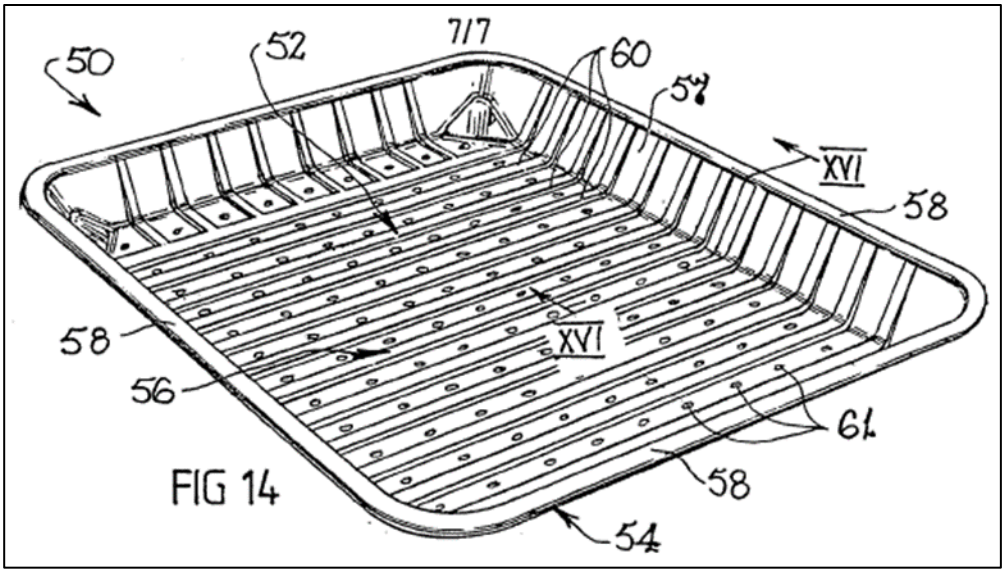
d. **Element 1b: "the deflectable flange comprising an extension that extends peripherally away from the body and connects thereto"**

69. Portelli teaches a tray with a deflectable flange comprising an extension that extends peripherally away from the body and connects thereto. Portelli demonstrates a rim 10/58 is connected to "a peripheral edge region 11 and a terminal edge 12." *Id*. 14:11-13. 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:



Portelli, Fig. 13 (annotations added), showing Portelli's extension connecting to the article's body.

70. 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 that his tray includes a "circumferential peripheral rim 58 [which] projects outwardly away from the upper end of the side wall 57":

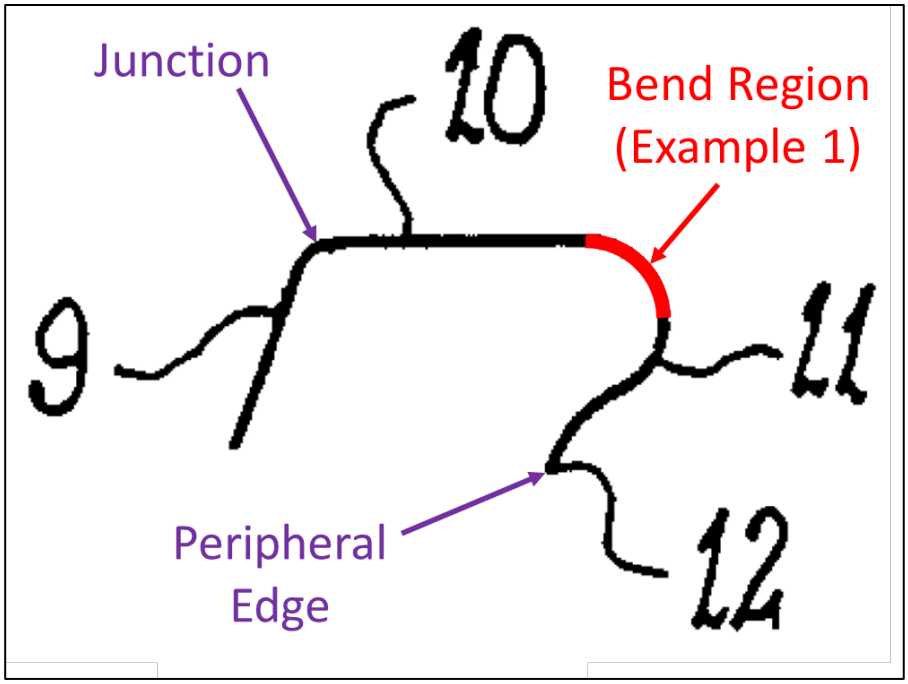


Portelli, Fig. 14, 15:28-30.

e. **Element 1c: "a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer that is connected with…"**

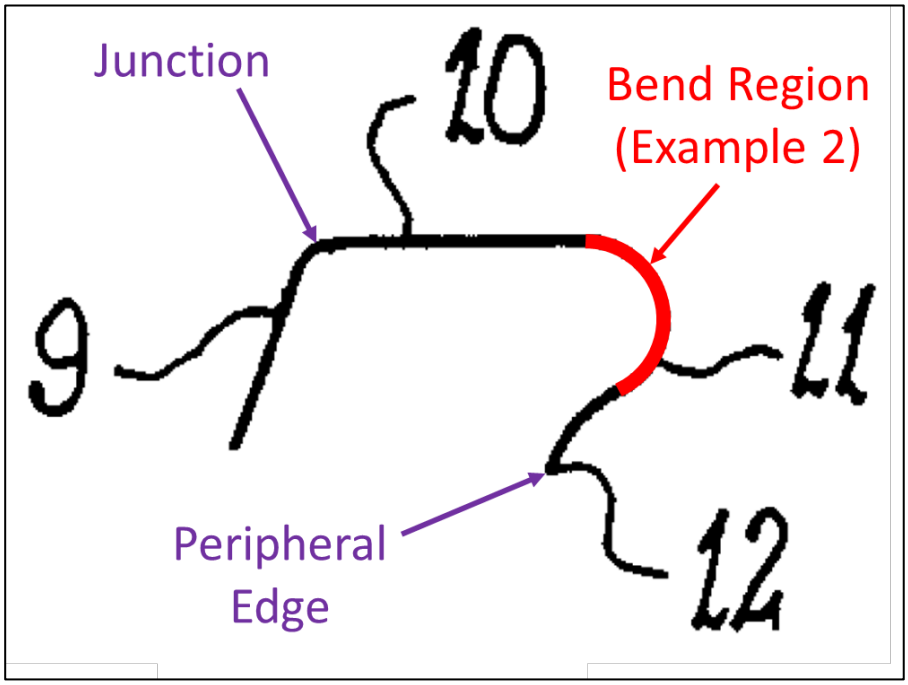
71. Portelli teaches a deflectable flange with a bend region having a smooth contour and interconnecting the extension.

72. Portelli shows the bend region between the peripheral edge and the junction between the body and the extension, and beginning at the straight section connecting the body of the tray. Portelli's "bend region" can be the upper portion of the curve at the right side of Fig. 13, as shown in Example 1 below:



Portelli, Fig. 13 (annotations added).

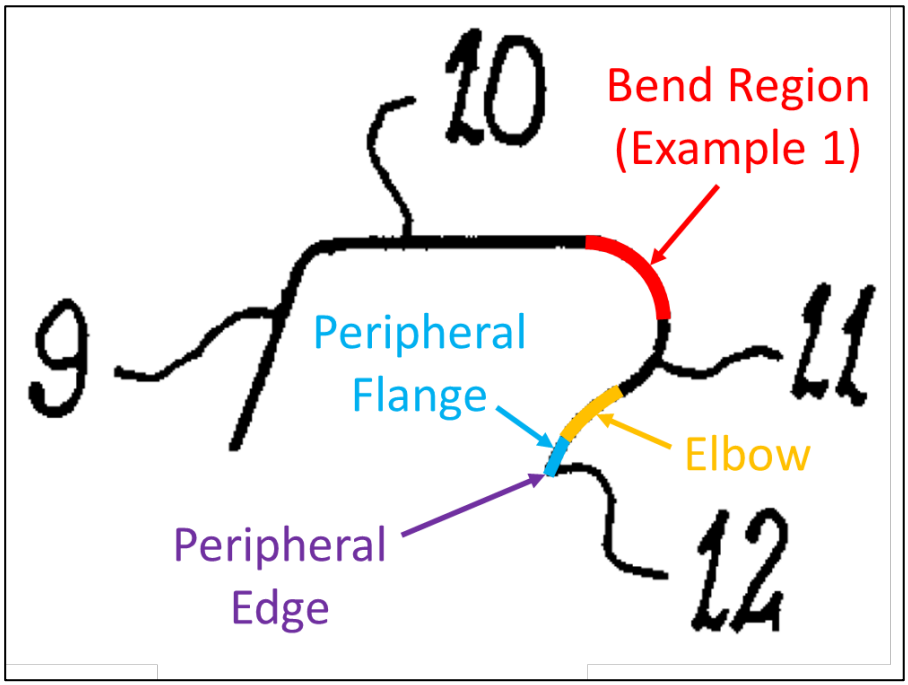
73. The "bend region" can also be a combination of the upper and lower portions of the curve at the right side of Fig. 13, as shown in Example 2 below:

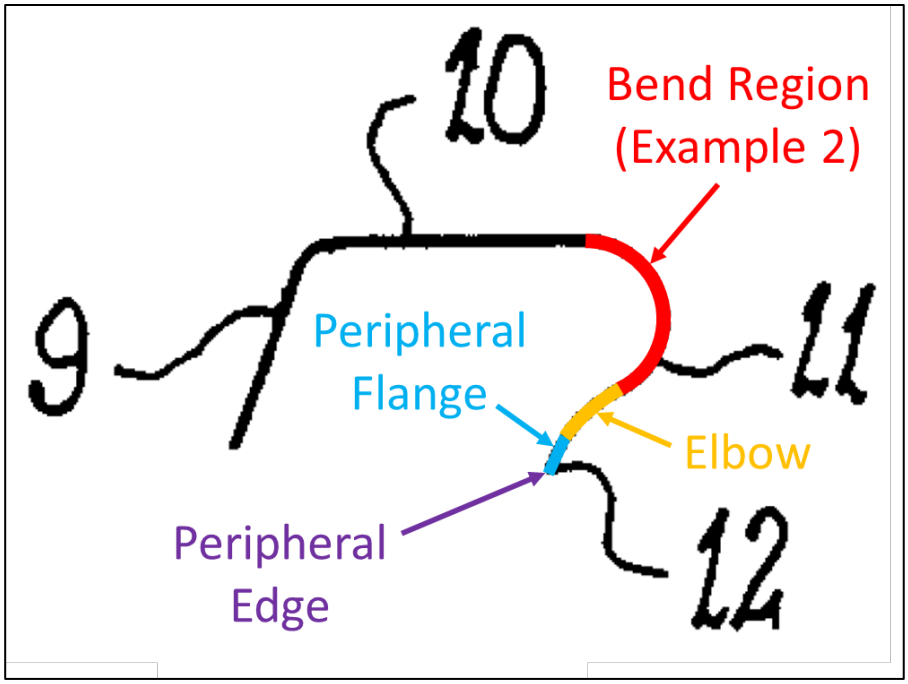


Portelli, Fig. 13 (annotations added).

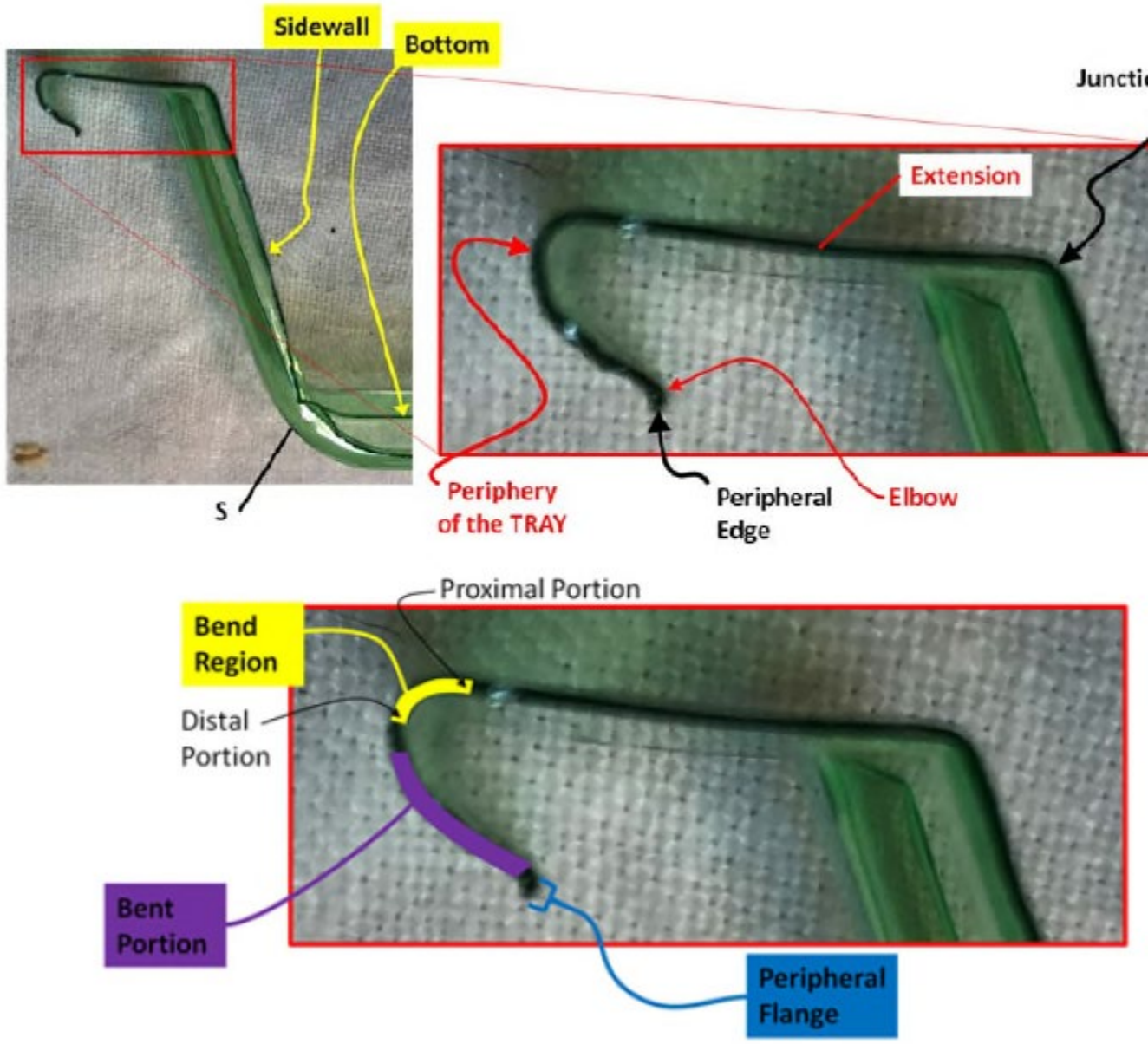
74. In both examples above, Portelli's bend region has a smooth contour.

75. 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, as highlighted in Fig. 13 below:

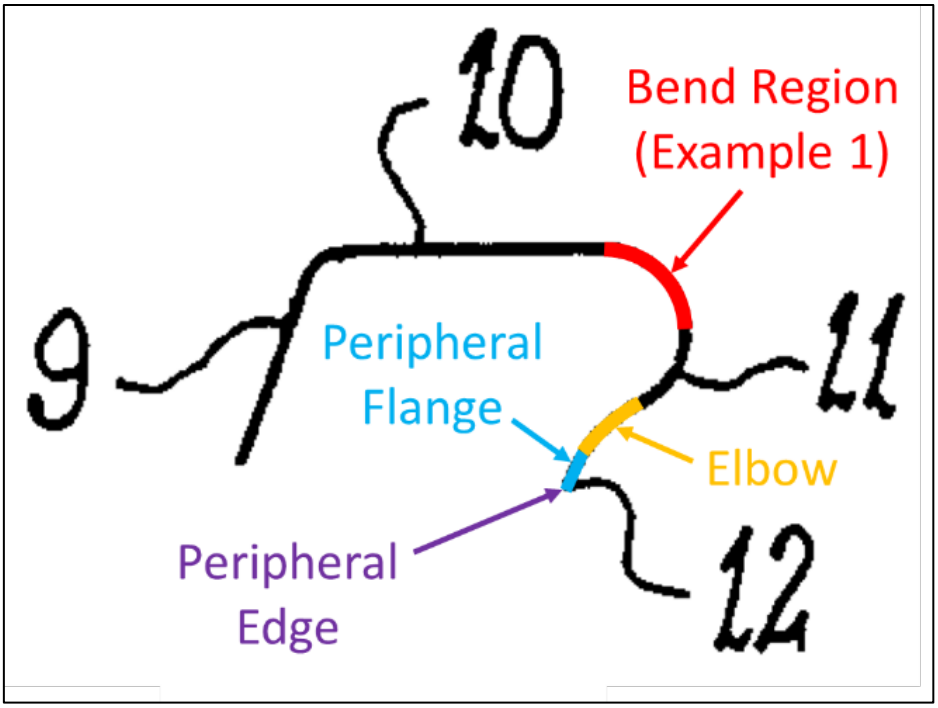




76. It is noted that the First Amended Complaint in the related case referred to a slight downward curvature in Petitioner's product, which is practically identical to Portelli's tray's "bend region" and "elbow" feature:

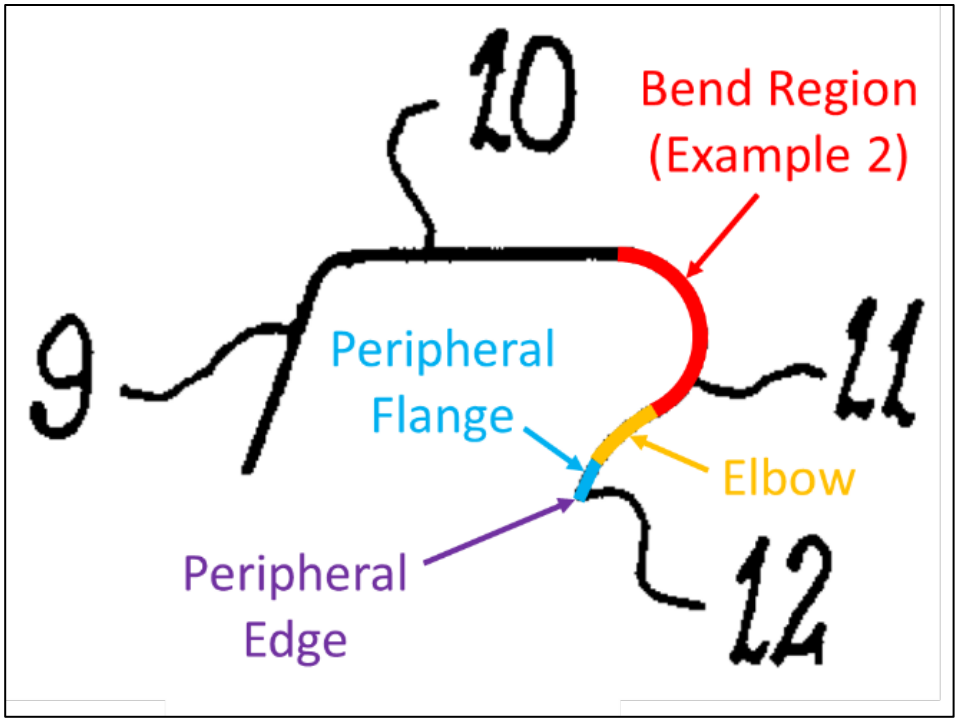

Sidewall
Bottom
Junctio
Extension
Periphery
of the TRAY
Peripheral
Edge
Elbow
S
Proximal Portion
Bend
Region
Distal
Portion
Bent
Portion
Peripheral
Flange

Ex. 1007, p. 8



Portelli, Fig. 13 (annotations added).

77. Additionally, the bend region and elbow feature in Patent Owner's First Amended Complaint in the related case can be compared to Portelli Example 2, where the "bend region" is a combination of the upper and lower sections of the bend region on the right side of Fig. 13, as shown below:



Portelli, Fig. 13 (annotations added).

78. Therefore, Portelli's tray teaches a **bend region having a smooth contour** and interconnecting the extension (10) with an **elbow**.

79. The '222 Patent describes a **spacer** as item 140 in several Figures and portions of the specification, including the following:

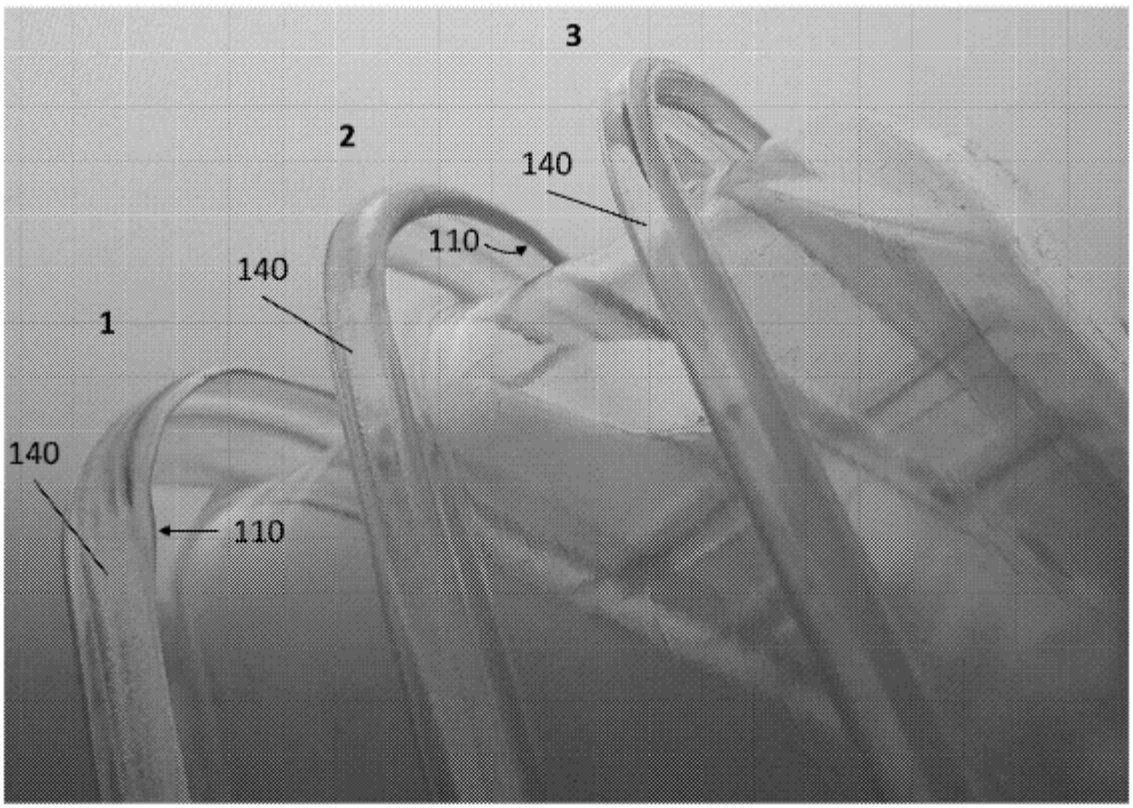


Fig. 6E

Ex. 1001 Fig. 6E, where the spacer is identified as item 140 in all 3 articles.

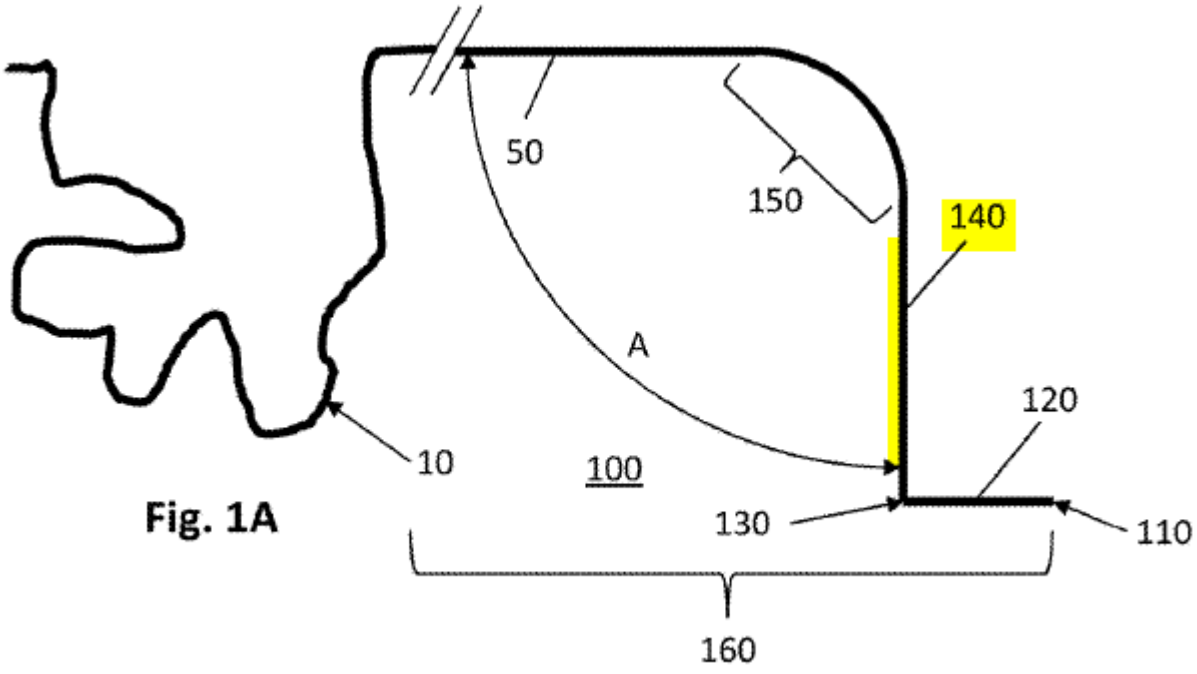
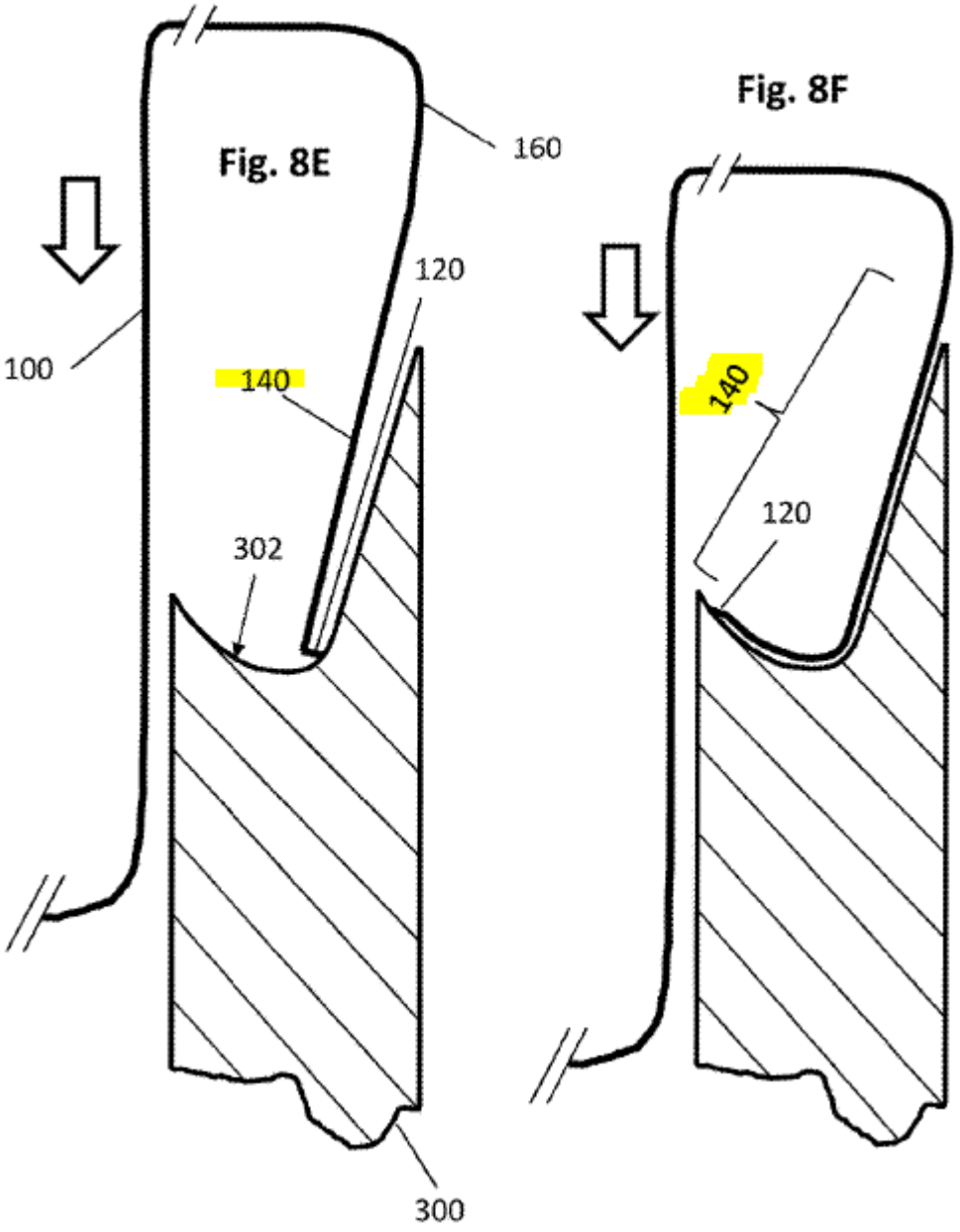


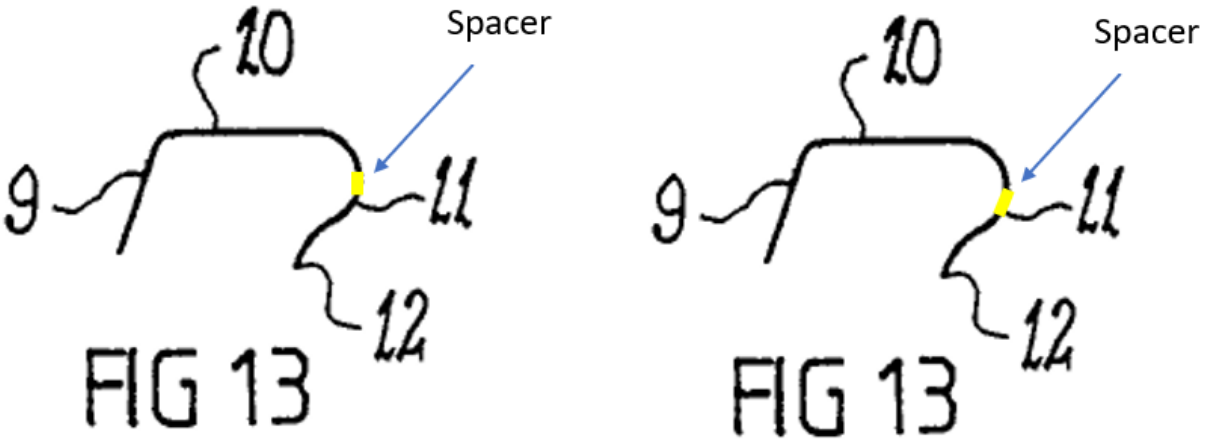
Fig. 1A

Ex. 1001 Fig. 1A, where the spacer identified as item 140 is annotated.

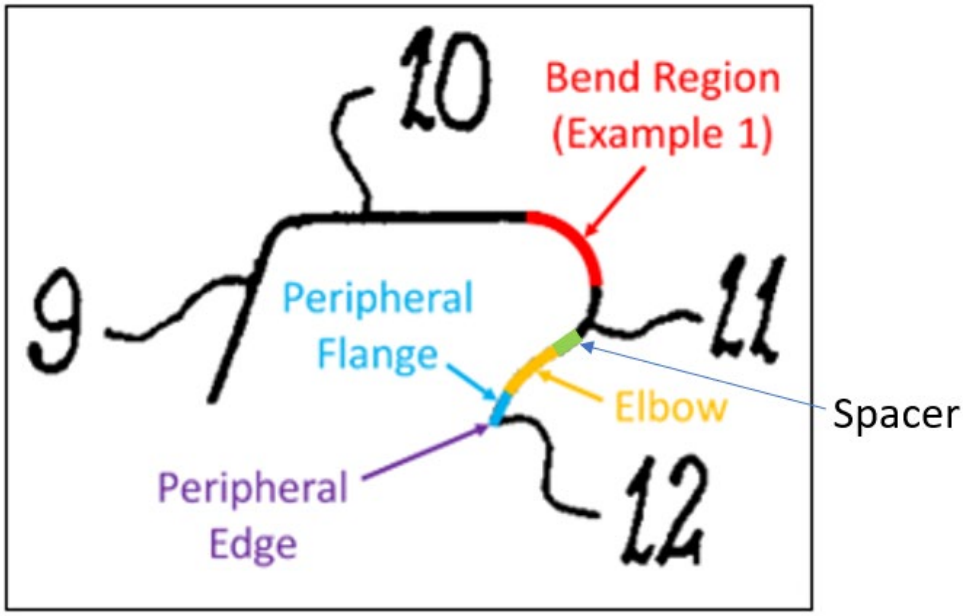


Ex. 1001 Figs. 8E and 8F, where the spacer is identified as item 140 is annotated.

80. Portelli likewise teaches a ***spacer*** that is connected with a peripheral flange which bears a peripheral edge of the thermoplastic. Examples of Portelli's spacer are shown here:

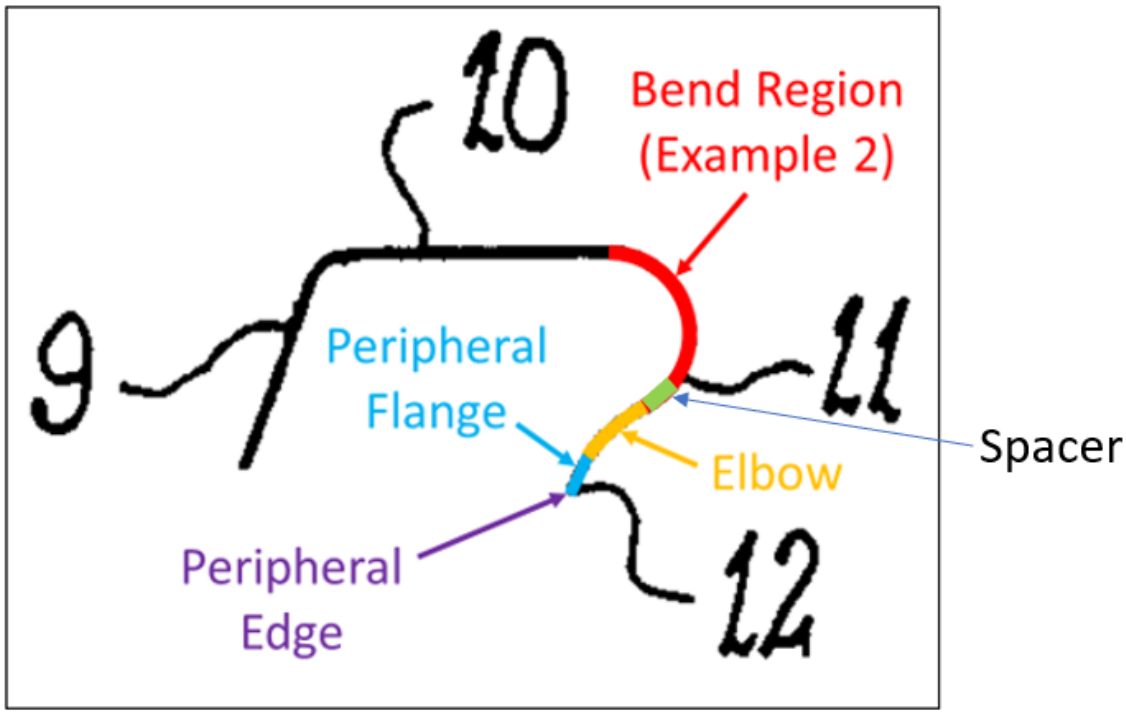


81. Another example of Portelli's Fig. 13 spacer is shown in the following two examples:



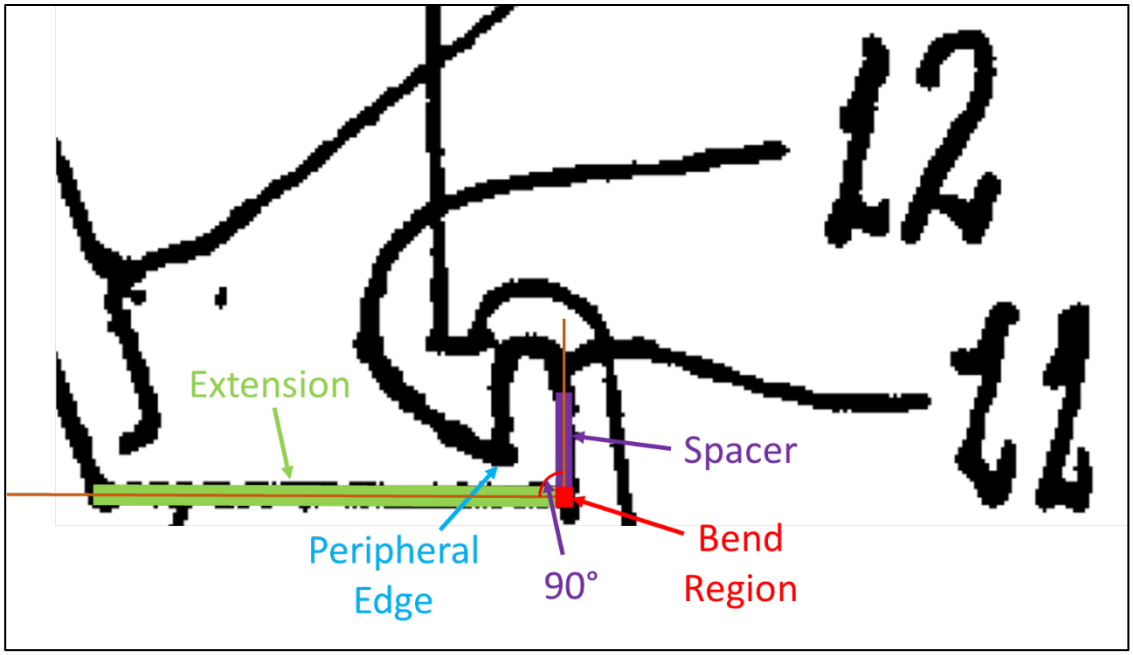
Ningbo Linhua Plastic Ex. 1003, p. 73

Portelli, Fig. 13 (excerpted and annotations added).



Portelli, Fig. 13 (excerpted and annotations added).

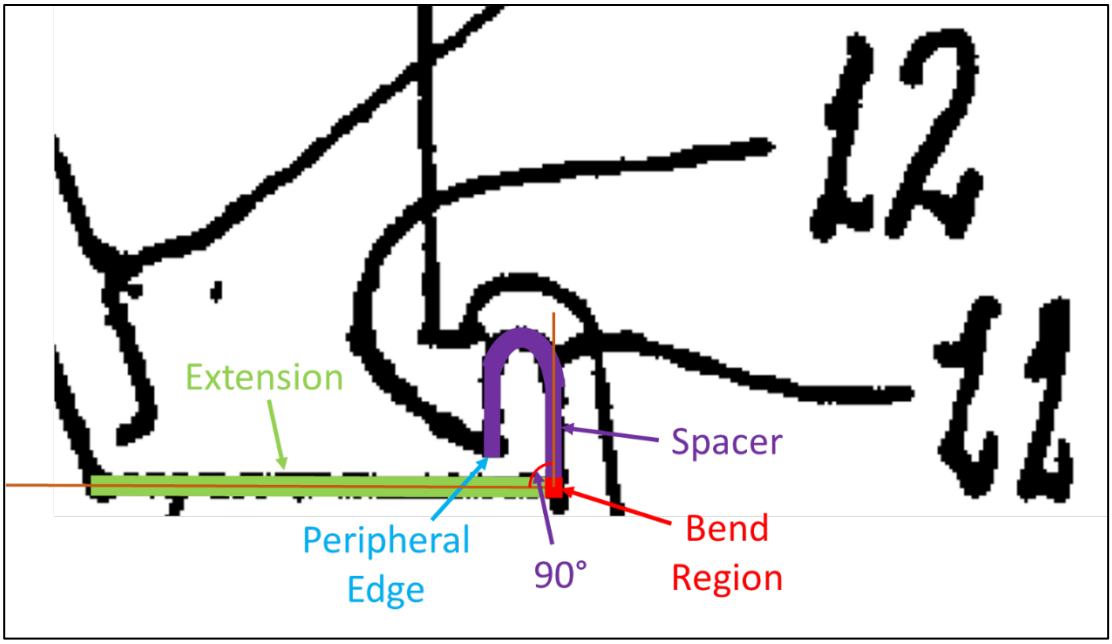
82. Even *if* the tray illustrated in Fig. 13 of Portelli did not have a bend region having a smooth contour and interconnecting the extension, **at an approximately right angle**, with a spacer that is connected with, **those limitations appear in Fig. 8 of Portelli**. Specifically, the vertical segment in the middle of the excerpt of Fig. 8 below comprises a spacer, and Portelli's Fig. 8 bend region interconnects the Extension and spacer at 90 degrees, as shown below:



Portelli, Fig. 8 (excerpted and annotations added).

83. The peripheral edge, labeled in the above drawing excerpt, is borne at least in part by the spacer, since every portion of the tray between the spacer and the peripheral edge is borne by the spacer.

84. As another example, the spacer can 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. Again, the bend region interconnects the Extension and spacer at 90 degrees, as shown below:



Portelli, Fig. 8 (excerpted and annotations added).`

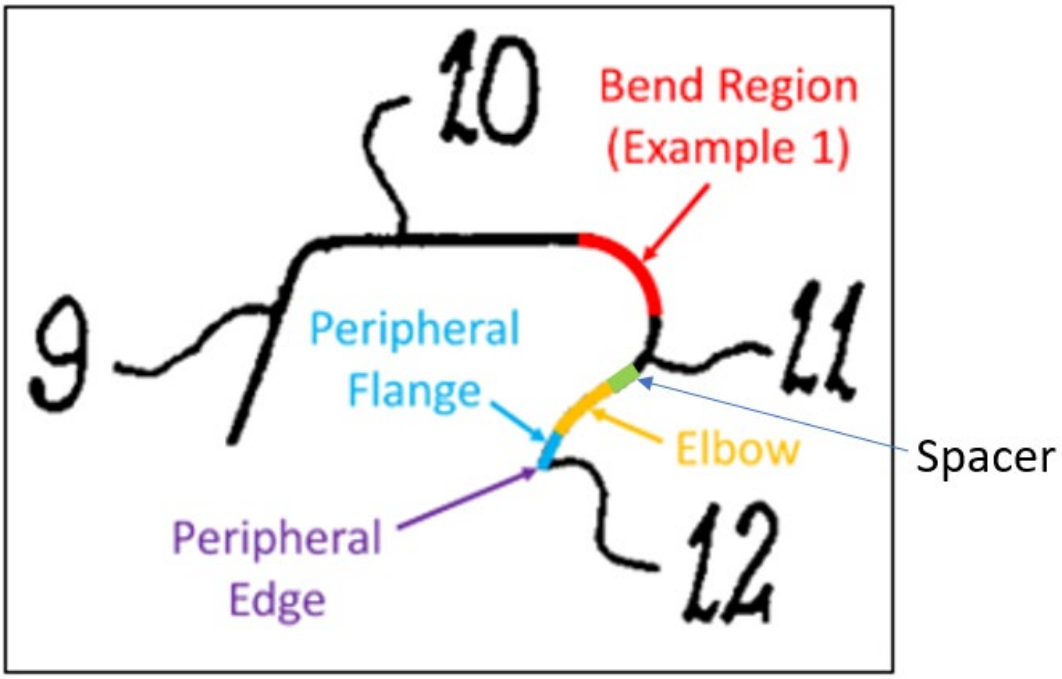
85. Starting from the above-excerpted portions of Fig. 8, if one draws lines through and parallel to (a) the horizontal portion of the extension, and (b) the spacer, which comprises or begins with the vertical segment in the middle, the angle between those two lines is 90 degrees.

86. 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. Indeed, for the purpose of this discussion, the extensions illustrated in Portelli Figs 8 and 13 are interchangeable and can be combined, even though they are not shown as being identical. This is owing to the fact both drawings are referenced by Portelli in disclosing the prior art of rolled flanges with displaced peripheral flanges resulting in smooth tray peripheries. Specifically,

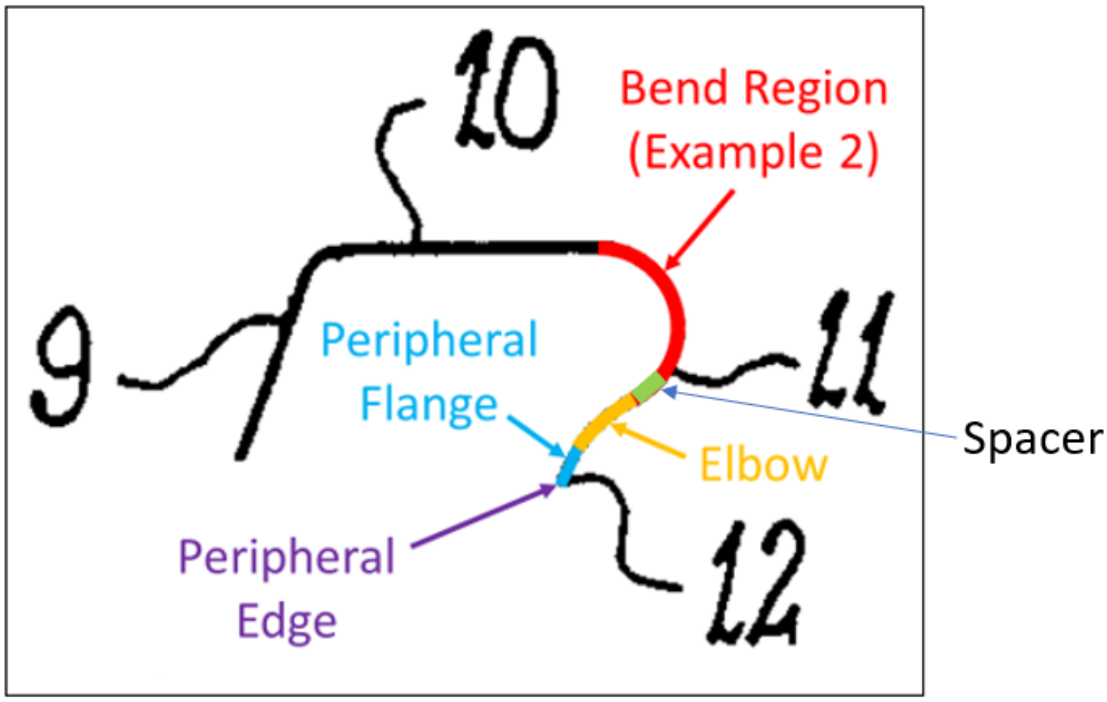
Portelli teaches both "the apparatus of Figs. 7 and 8" *Id*. 14:10-28 and provides a description of processing the tray extensions of the invention using that apparatus, while also explaining and the peripheral flange of Figs. 12 and 13. A POSITA would interpret this portion of Portelli's prior art to mean that the tray of Figs. 12 and 13 can be introduced and thermoformed by the apparatus of Figs. 7 and 8. Accordingly, when working with food trays in produce and other food applications involving film overwrap, I have developed and tested trays with rolled flanges having various degrees of rolling or bending in their flanges. In those examples, I found the bent portions to function similarly regarding preventing film cutting or damage, provided that the flanges were at least sufficiently displaced from the tray periphery.

f. **Element 1d: "[a spacer that is connected with] a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peropheral (sic) flange being connected, at an angle other than 180 degrees, at an elbow;"**

87. As noted earlier, Portelli Fig 13 teaches a spacer, and said spacer is connected with a peripheral flange which bears a peripheral edge of the thermoplastic. Portelli's Fig. 13 spacer is shown in the following two examples:



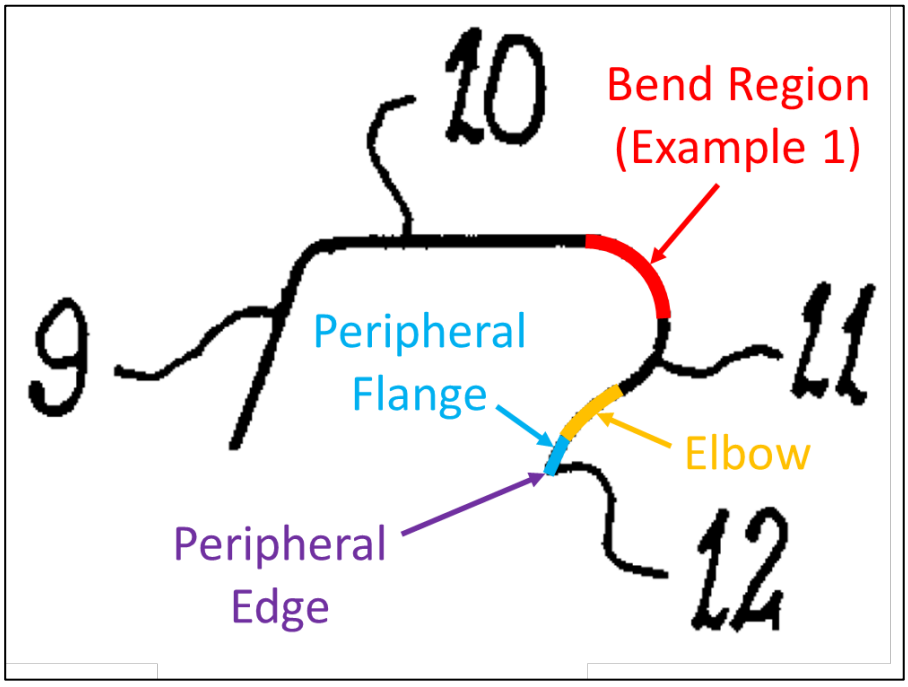
Portelli, Fig. 13 (excerpted and annotations added).

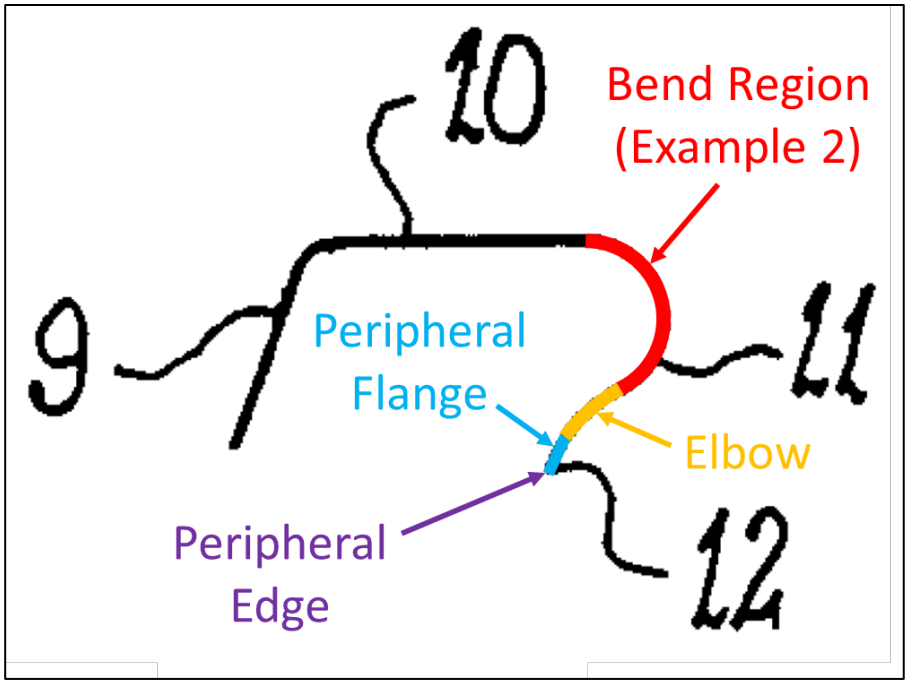


Portelli, Fig. 13 (excerpted and annotations added).

88. Also as discussed earlier, every element of Claim 1, including the recited spacer, is rendered obvious by the combination of the embodiments illustrated in Figs. 8 and 13 of Portelli, and teachings elsewhere in Portelli's specification and claims. Portelli also teaches the recited "[a spacer that is connected with] a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and periphoral (sic) flange being connected, at an angle other than 180 degrees, at an elbow."

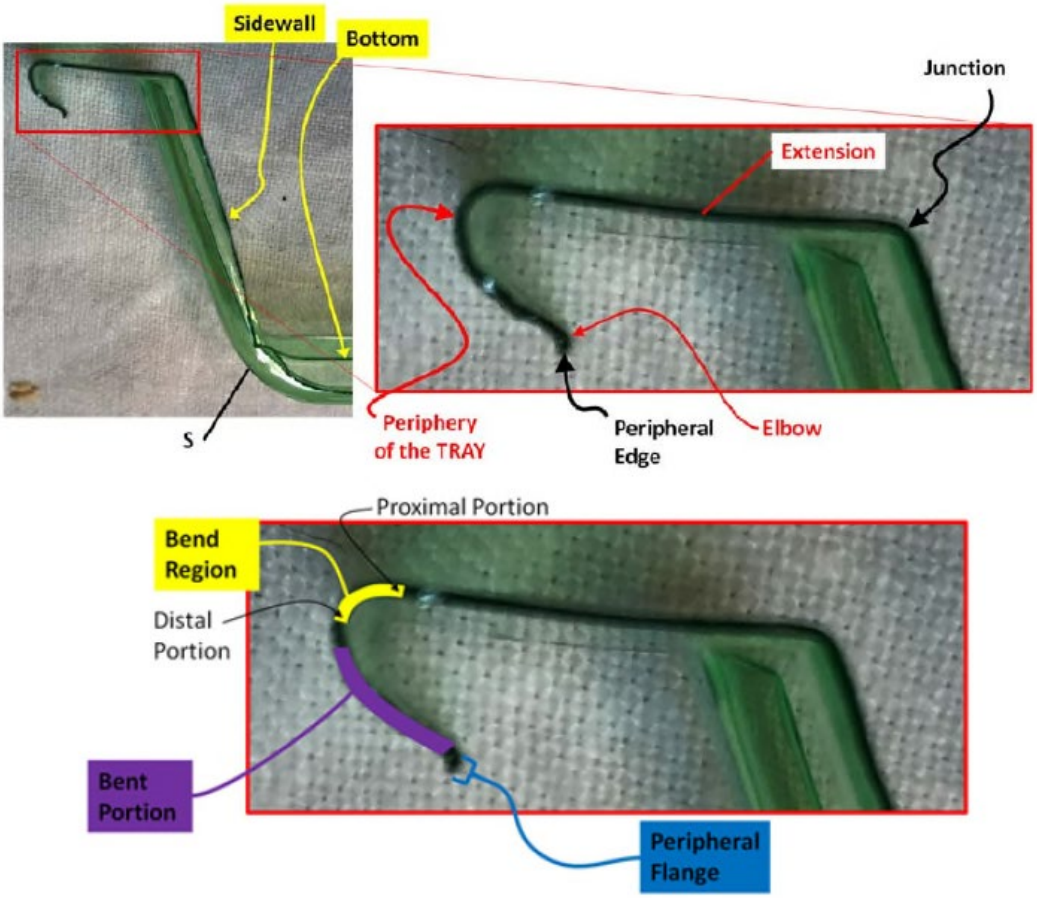
89. For example, Portelli's Fig. 13 discloses an **elbow** connecting the bend region to the **peripheral flange**. It shows the elbow as the section below the bend region, and curved in the opposite direction, as highlighted in Fig. 13 below:



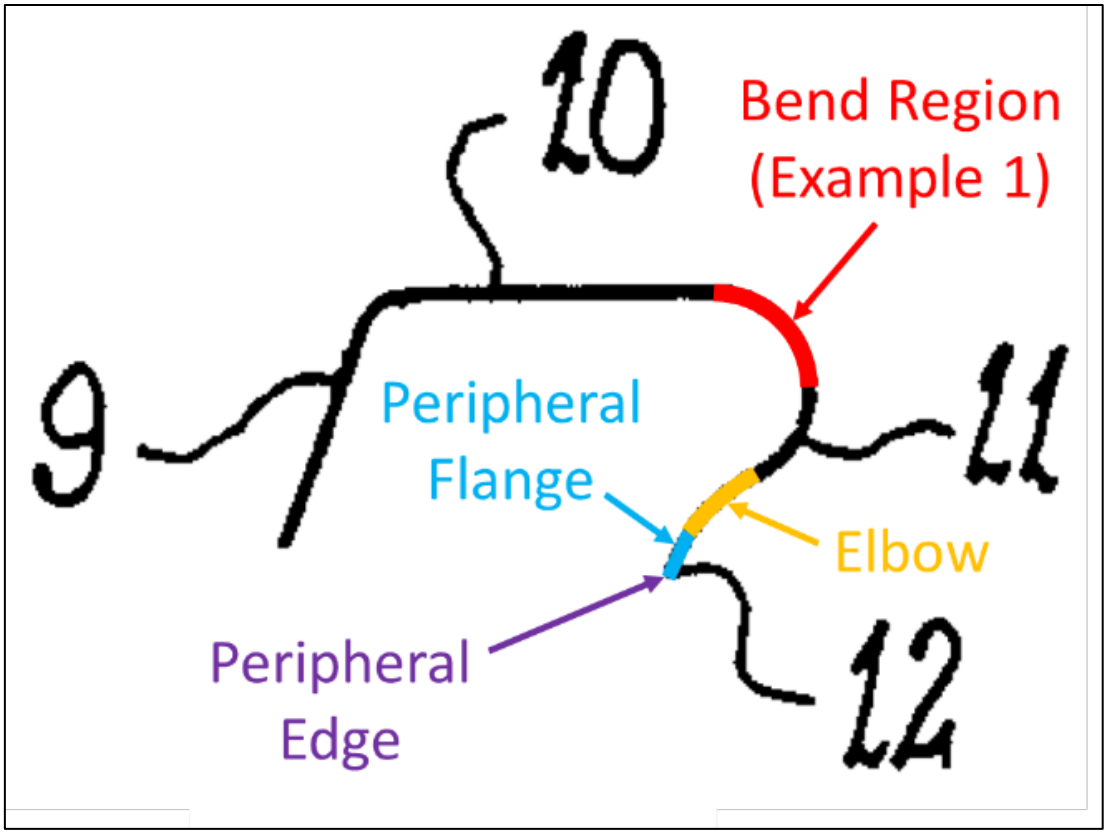


Portelli, Fig. 13 (annotations added) on Example 1 and Example 2.

90. It is noted that Patent Owner's First Amended Complaint in a related case referred to a slight downward curvature in Petitioner's product, which is practically identical to Portelli's tray's "elbow" feature:

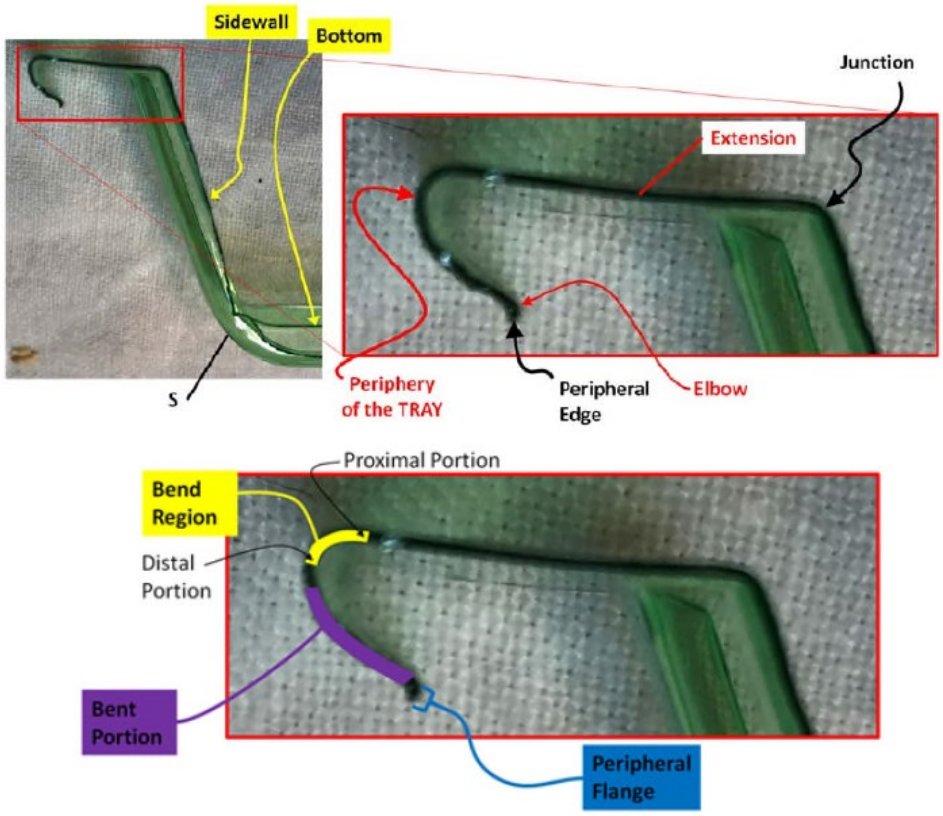

Sidewall
Bottom
Junction
Extension
S
Periphery
of the TRAY
Peripheral
Edge
Elbow
Proximal Portion
Bend
Region
Distal
Portion
Bent
Portion
Peripheral
Flange

Ex. 1007, p. 8

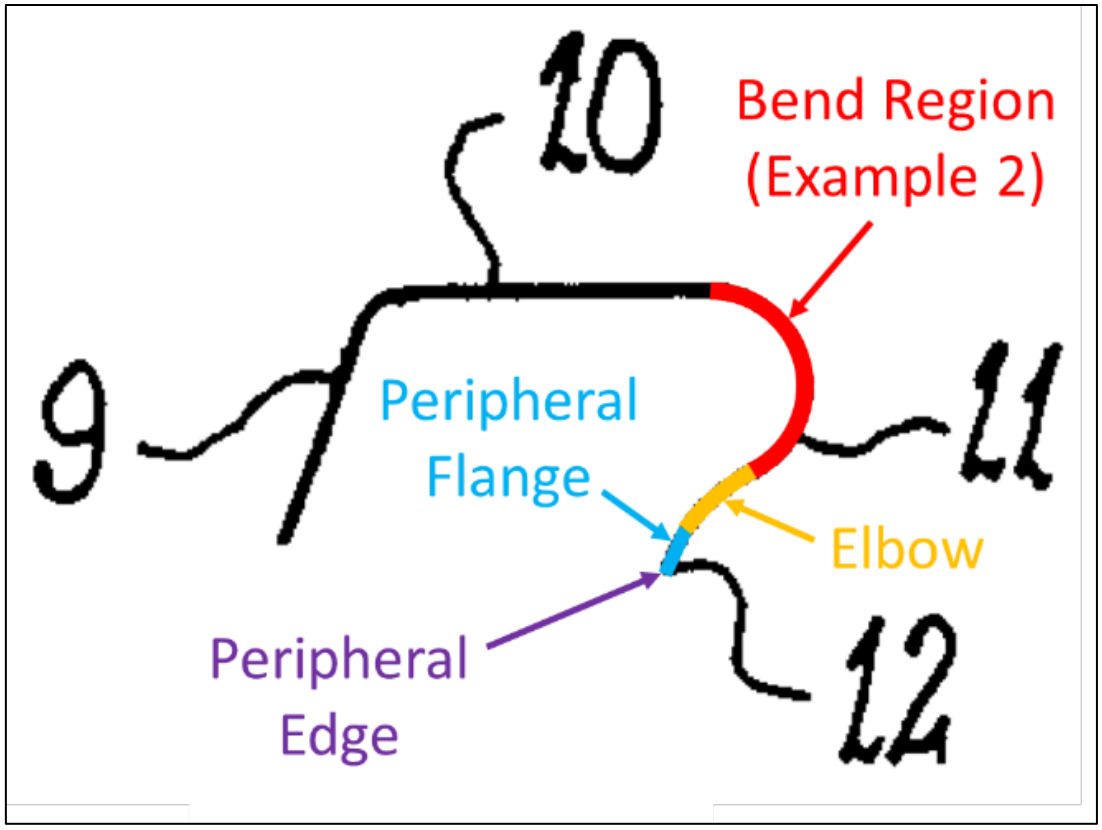


Portelli, Fig. 13 (annotations added).

91. Additionally, Patent Owner's First Amended Complaint regarding Claim 9 can be compared to Portelli Example 2, where the "bend region" is a combination of the upper and lower sections of the bend region on the right side of Fig. 13, as shown below:

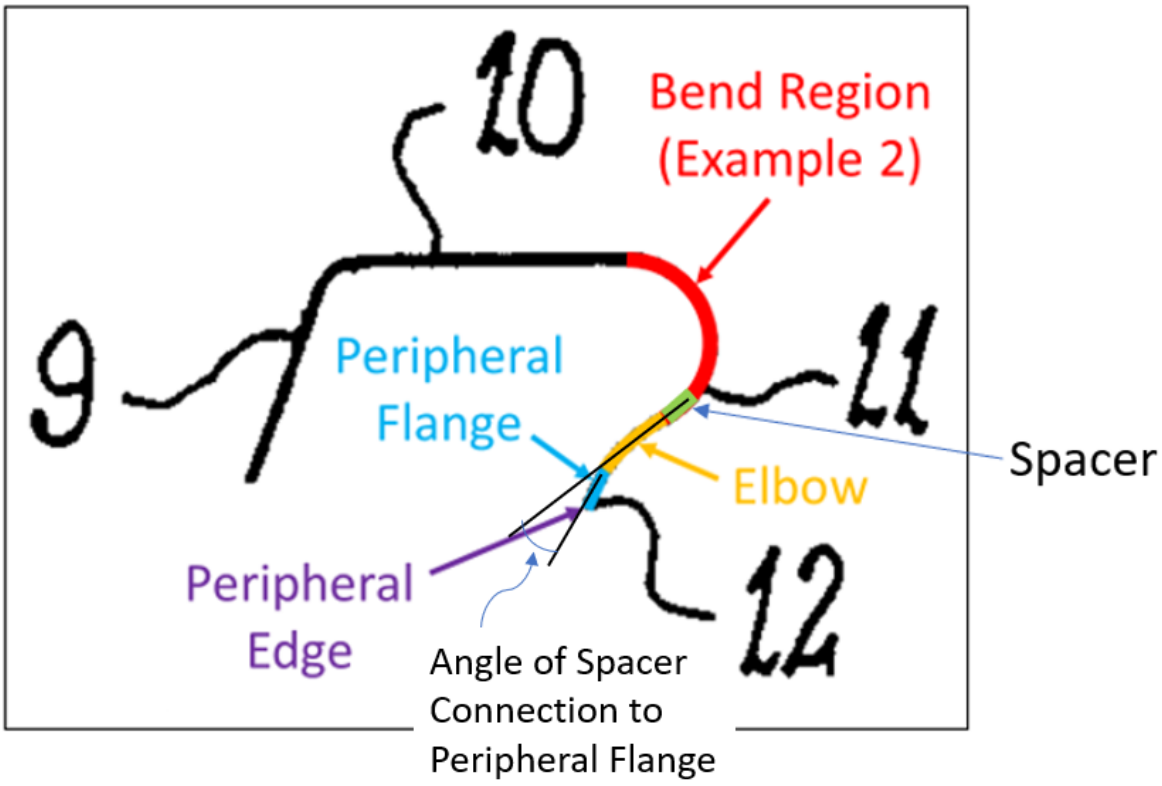

Sidewall
Bottom
Junction
Extension
S
Periphery
of the TRAY
Peripheral
Edge
Elbow
Proximal Portion
Bend
Region
Distal
Portion
Bent
Portion
Peripheral
Flange

Ex. 1007, p. 8



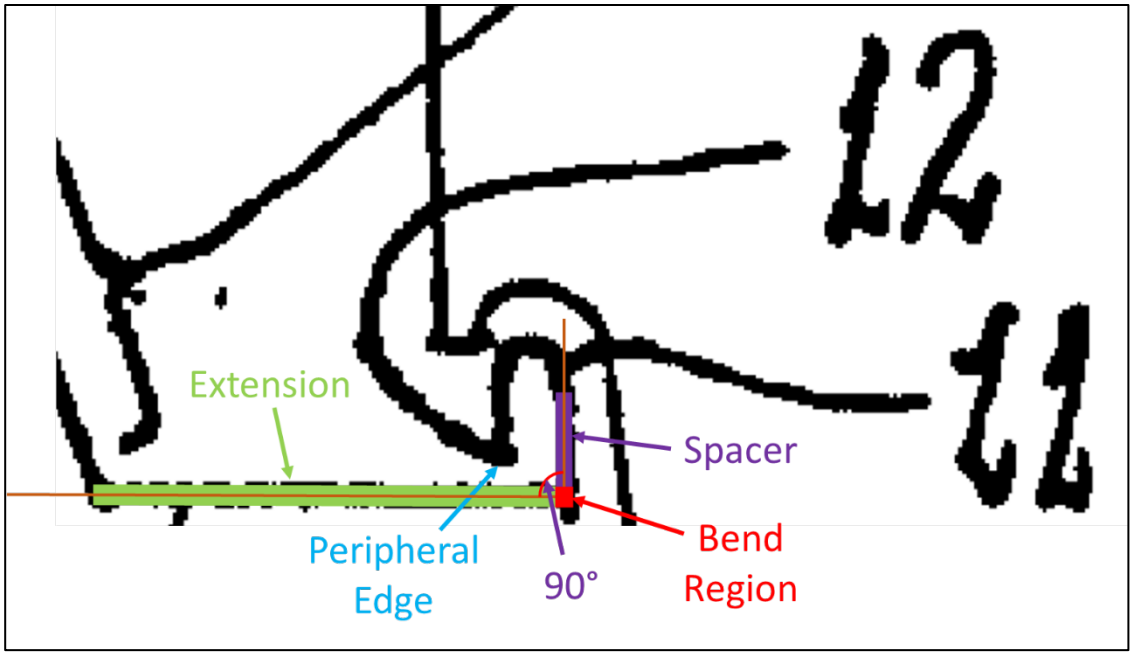
Portelli, Fig. 13 (annotations added).

92. Portelli's Fig. 13 teaches a peripheral flange connected to the bend region by an elbow, based on Patent Owner's own application of the "elbow" specification in a related litigation. Given the slight 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 Fig. 13 is in fact far less than 180 degrees, measuring only approximately 30 degrees, as shown below:



Portelli, Fig. 13 (annotated).

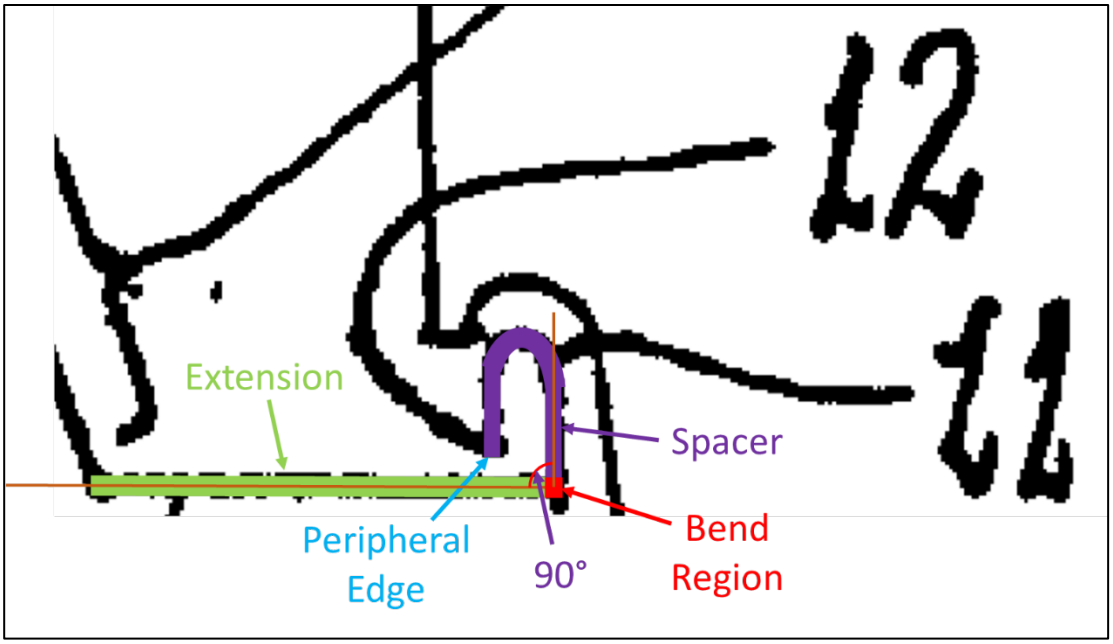
93. As noted earlier, even *if* the tray illustrated in Fig. 13 of Portelli did not have a spacer bearing a peripheral edge of the thermoformable sheet, the spacer being connected with a peripheral flange which bears a peripheral edge, appears in Fig. 8 of Portelli. Specifically, the vertical segment in the middle of the excerpt of Fig. 8 below comprises a spacer:



Portelli, Fig. 8 (excerpted and annotations added).

94. The peripheral edge, labeled in the above drawing excerpt, is borne at least in part by the spacer, since every portion of the tray between the spacer and the peripheral edge is borne by the spacer.

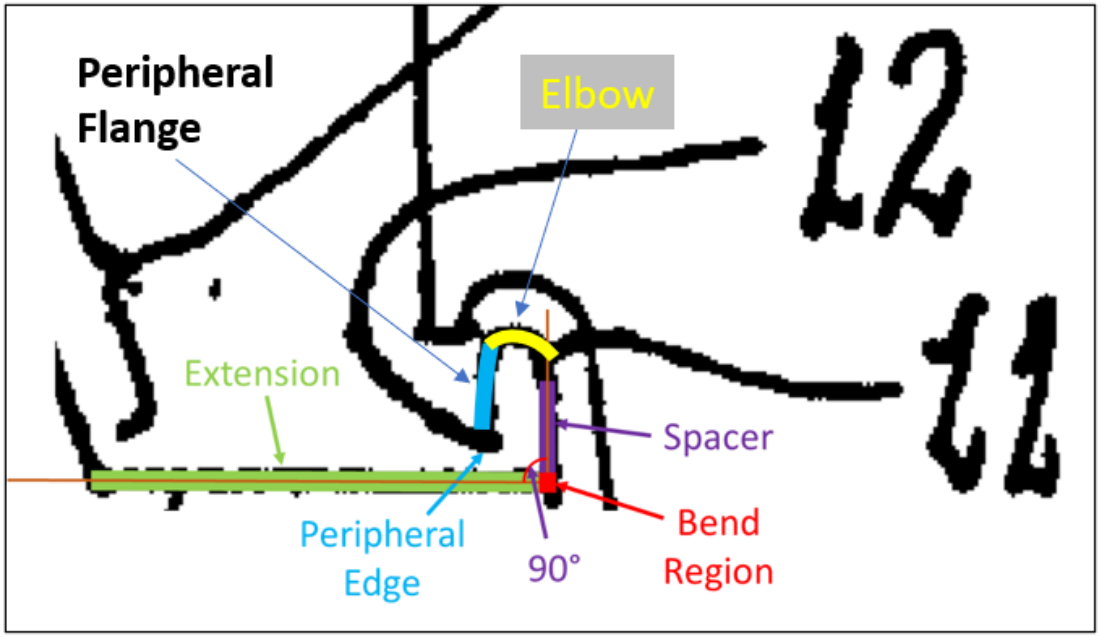
95. As another example, the spacer can include the vertical segment in the middle of the excerpt of Fig. 8, plus the remainder of the curve up to and including the peripheral edge:



Portelli, Fig. 8 (excerpted and annotations added).

96. Thus, Portelli's spacer bears the peripheral edge.

97. Furthermore, Portelli 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, as shown below:



Portelli, Fig. 8 (excerpted and annotations added).

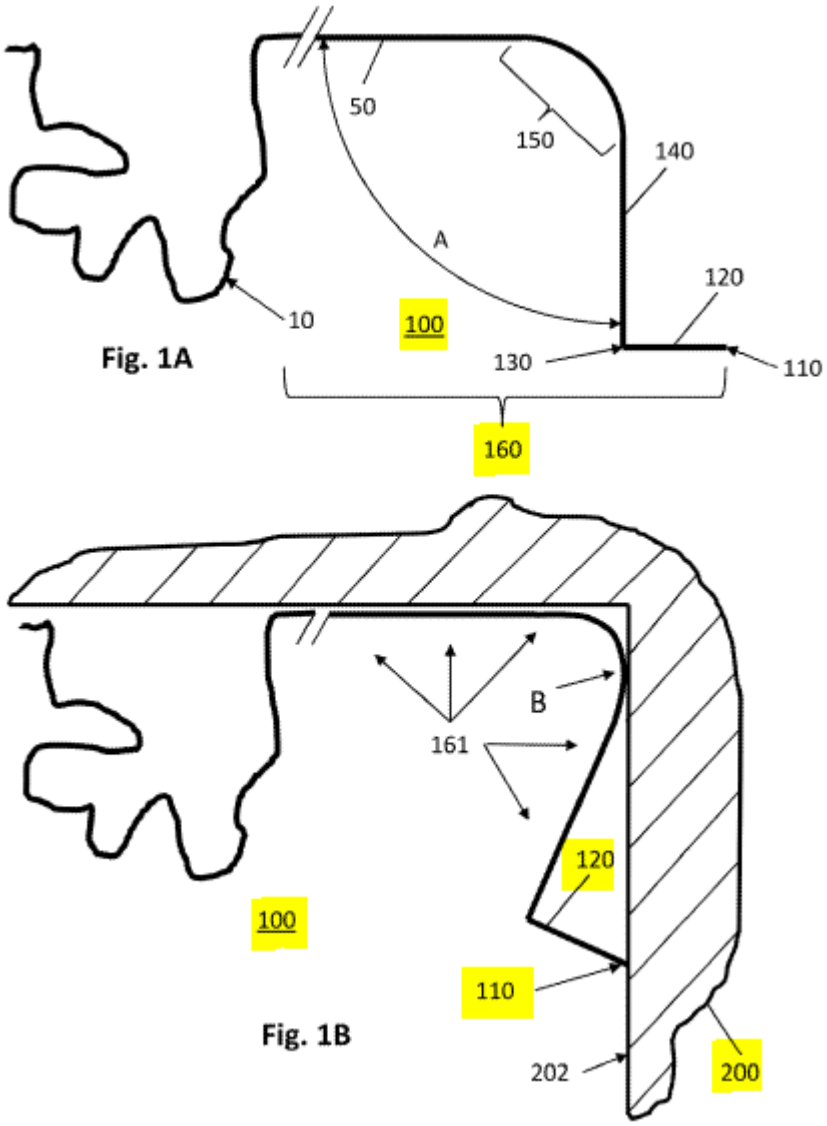
98. In sum, Portelli's Fig. 13 individually teaches a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peropheral (sic) flange being connected, at an angle other than 180 degrees, by an elbow. If it is determined that Portelli's Fig. 13 does not include a spacer, a POSITA would be well equipped to recognize and implement the spacer shown in Portelli's Fig. 8 into Portelli's Fig. 13, and conversely, would find it well within their capability to recognize and implement the peripheral flange and elbow of Poretelli's Fig. 13 into Portelli'sFig. 8. In all cases, the resulting article would yield a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peropheral (sic) flange being connected, at an angle other than 180 degrees, by an elbow. Motivations for such combinations are detailed later, but include the shared problem of displacing the sharp peripheral edge away from

the wrap path, and to yield a smooth periphery with added strength due to the curled flange.

g. **Element 1e: "**impinging a ram against the peripheral flange to deflect the spacer towards 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,**"**

99. The '222 Patent depicts in Fig. 1A a shaped thermoplastic article 100 with deflectable flange 160. In Fig. 1B, article 100 is inserted within an "upper body" (aka cavity), where "impingement of the peripheral edge 110 of the peripheral flange 120"… "causes the deflectable flange 160 to defect (sic)." '222 Patent 6:13-36. See below:

Ningbo Linhua Plastic Ex. 1003, p. 89



Ex. 1001 Figs. 1A and 1B, annotated.

100. According to Patent '222, 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 in induced within the bend region 150." *Id* 6:37-48. Fig. 1C is shown below:

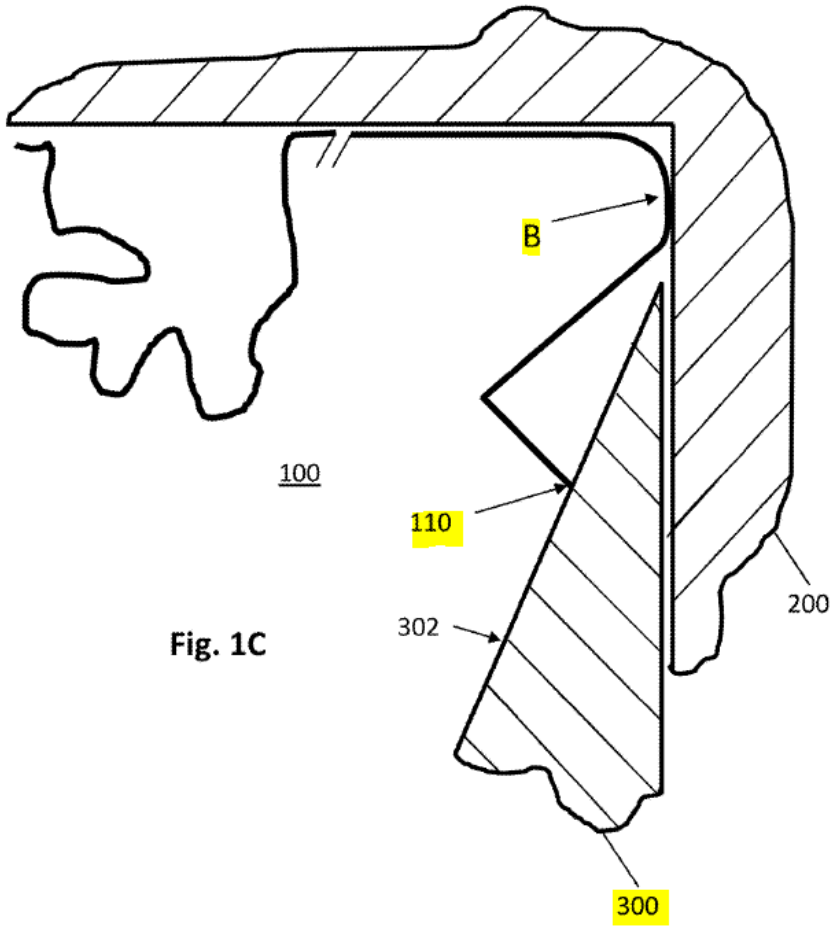


Fig. 1C

Ex. 1001 Fig. 1C, annotated.

101. Portelli's method and apparatus teach impinging a ram against the peripheral flange to deflect the spacer towards the extension. Specifically, Portelli Figs 1 and 2 show *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

Ningbo Linhua Plastic Ex. 1003, p. 91

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:

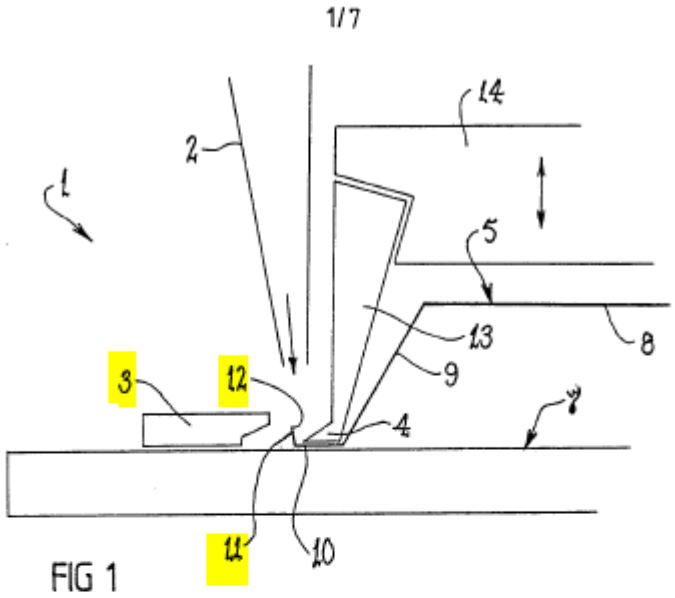


FIG 1

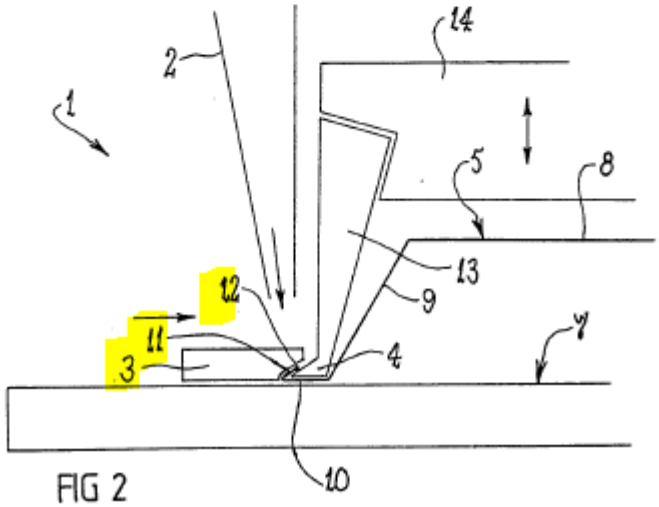
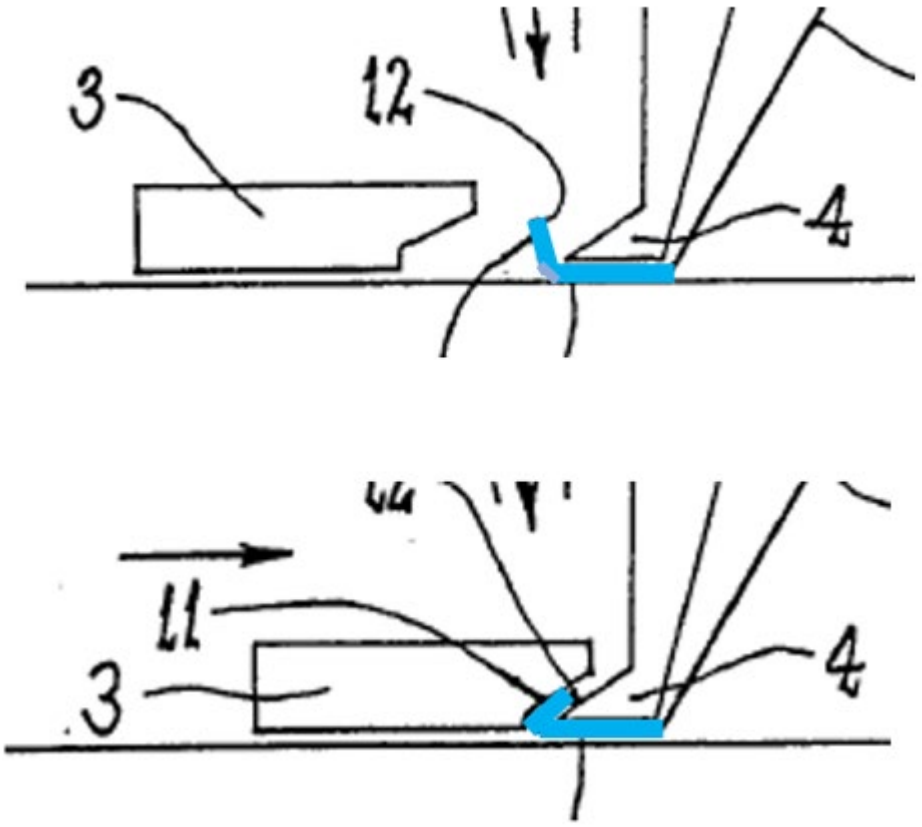


FIG 2

Portelli, Figs. 1 and 2 (annotations added).

102. Excerpts of Portelli Figs. 1 and 2 are shown here, annotated to 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 and 2 (excerpted and annotations added).

103. Portelli shows additional configurations of the ram used in his method and apparatus, as seen here in Figs. 3 and 4:

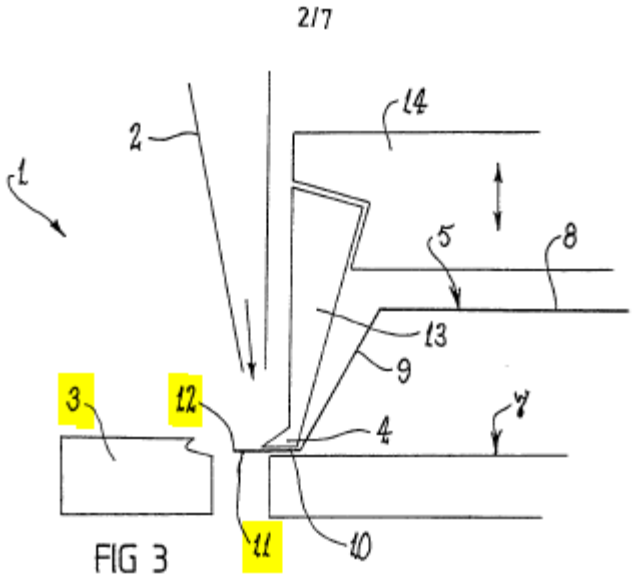


FIG 3

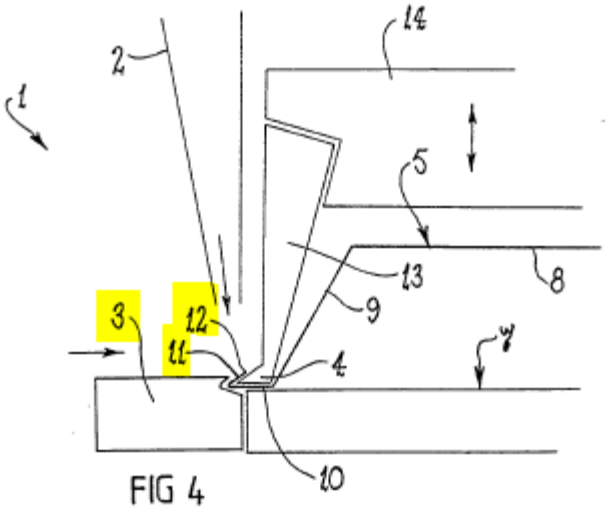


FIG 4

Portelli, Figs. 3 and 4 (annotations added).

104. Still further configurations for Portelli's *impinging a ram (25) 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:

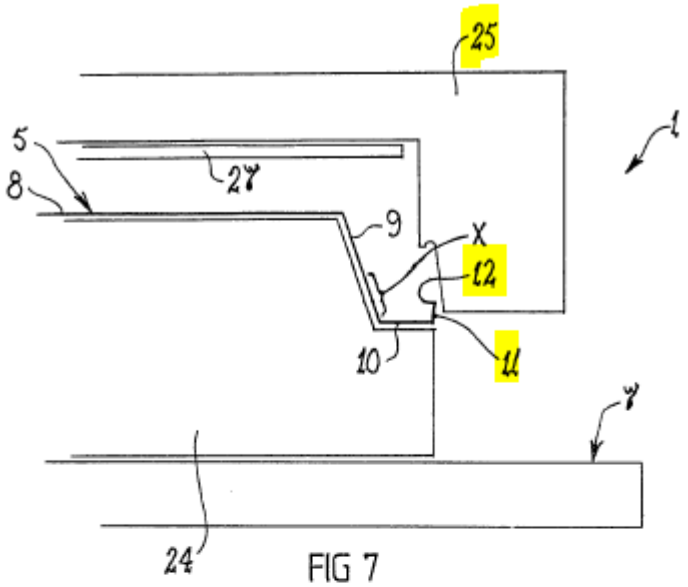


FIG 7

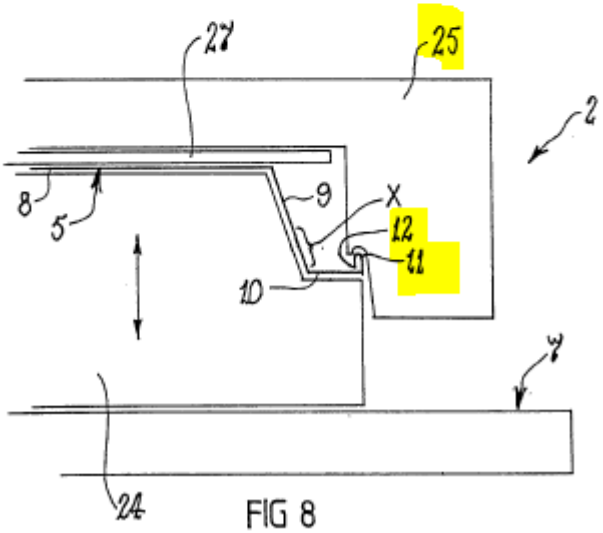
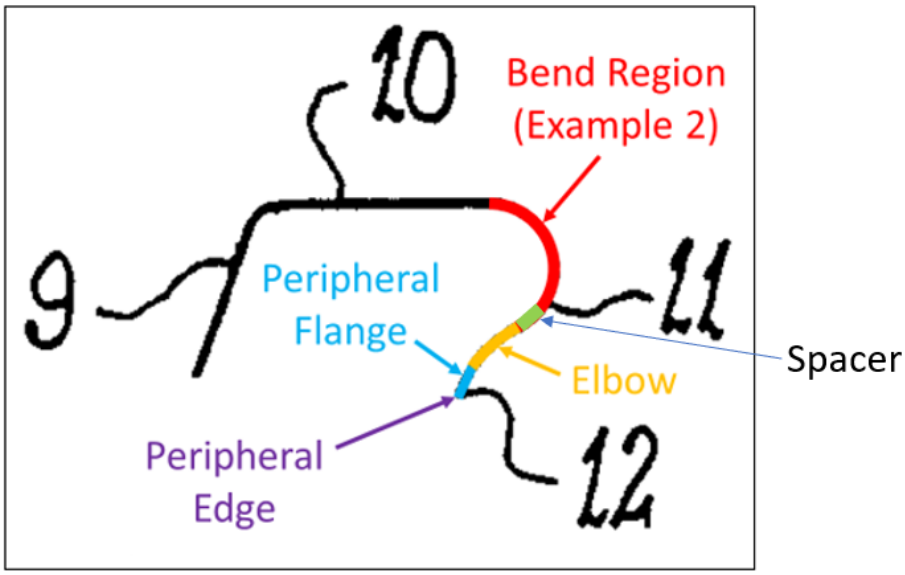


FIG 8

Portelli, Figs. 7 and 8 (annotations added).

105. For reference, the following annotated Portelli Fig. 13 shows the peripheral flange and an example of the spacer:



106. Portelli, Fig. 13 (annotations added).

107. Accordingly, Portelli shows in his Fig. 12 the "pre-impingement position" of the peripheral flange, and in Fig. 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:

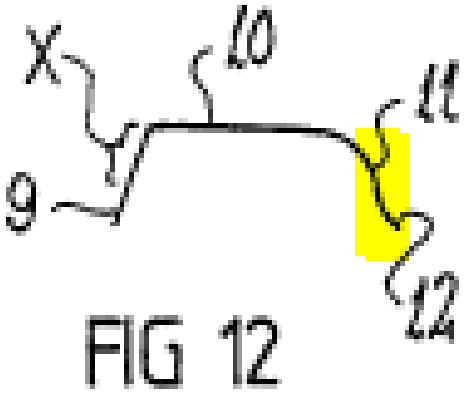


FIG 12

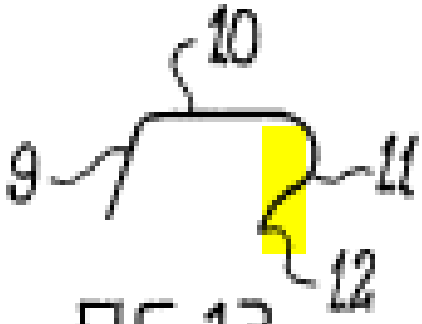
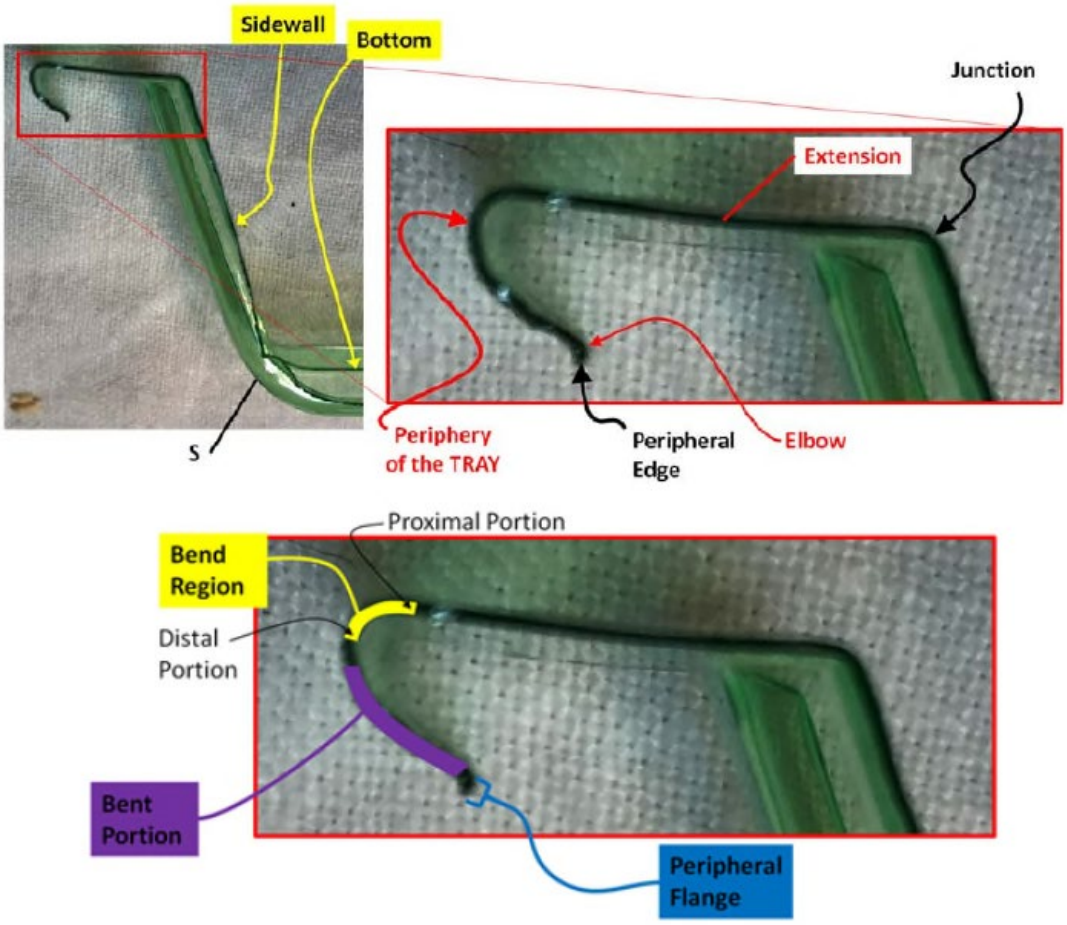


FIG 13

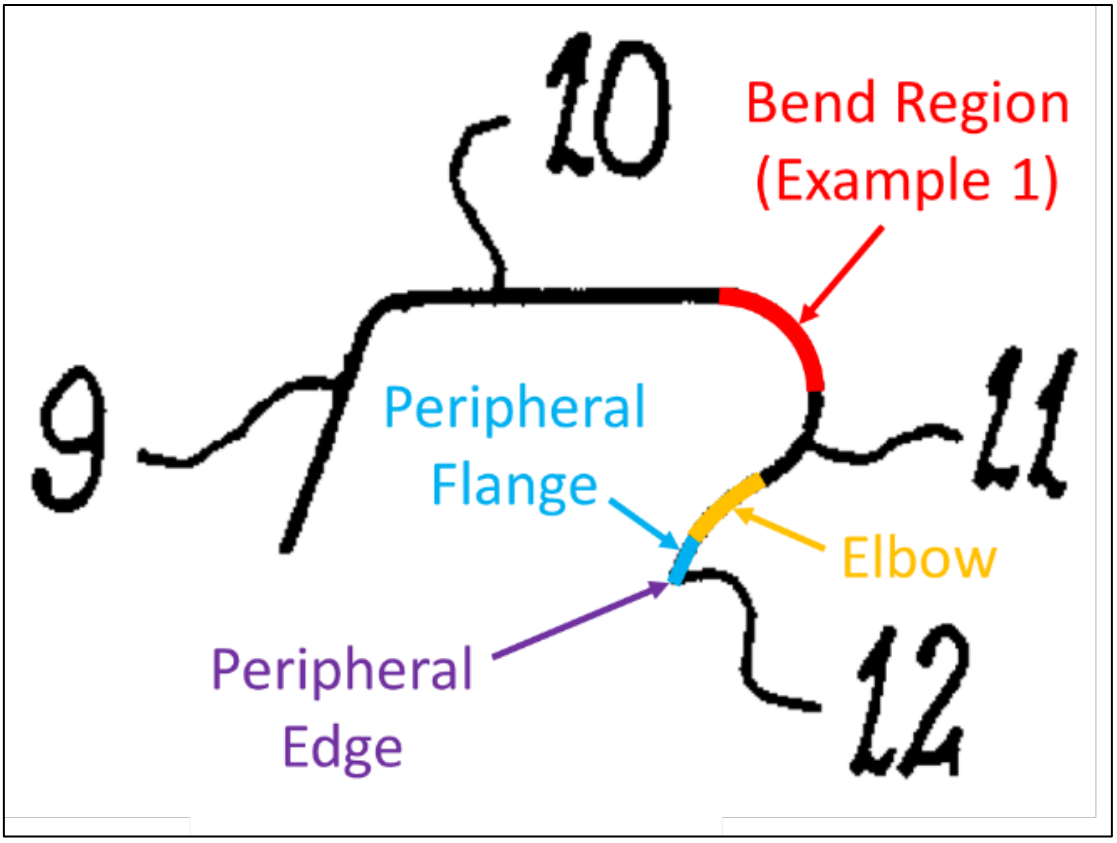
Portelli, Figs. 12 and 13 (annotations added).

h. **Element 1f: "the bent portion being selected from the group consisting of the extension, the bend region, and the spacer,"**

108. As previously noted, Patent Owner's First Amended Complaint in a related case referred to a "bent portion," "extension," "bend region" and "spacer," which are practically identical to Portelli's same features:

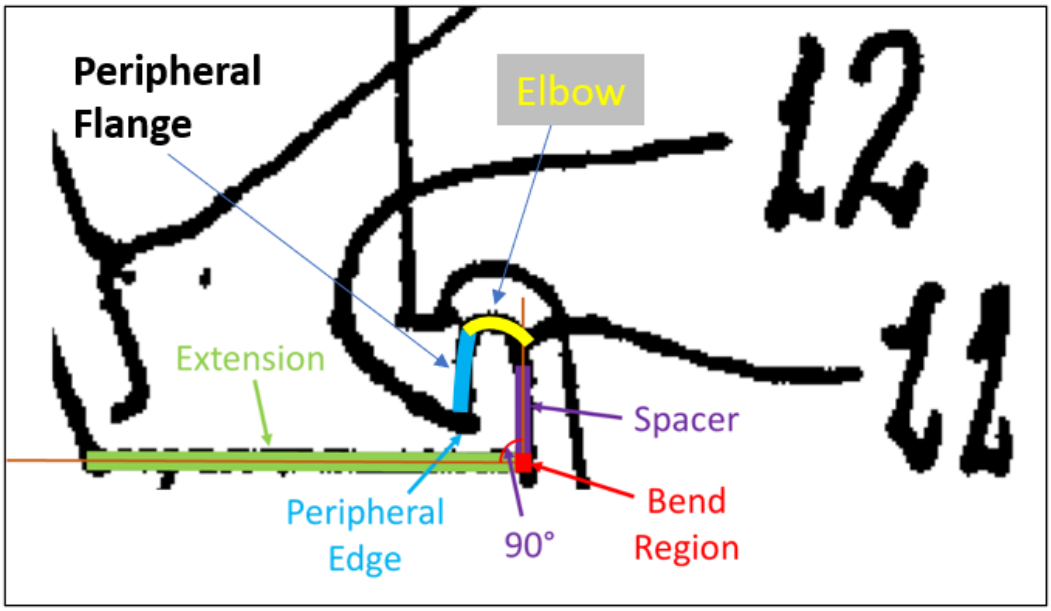


Ex. 1007, p. 8

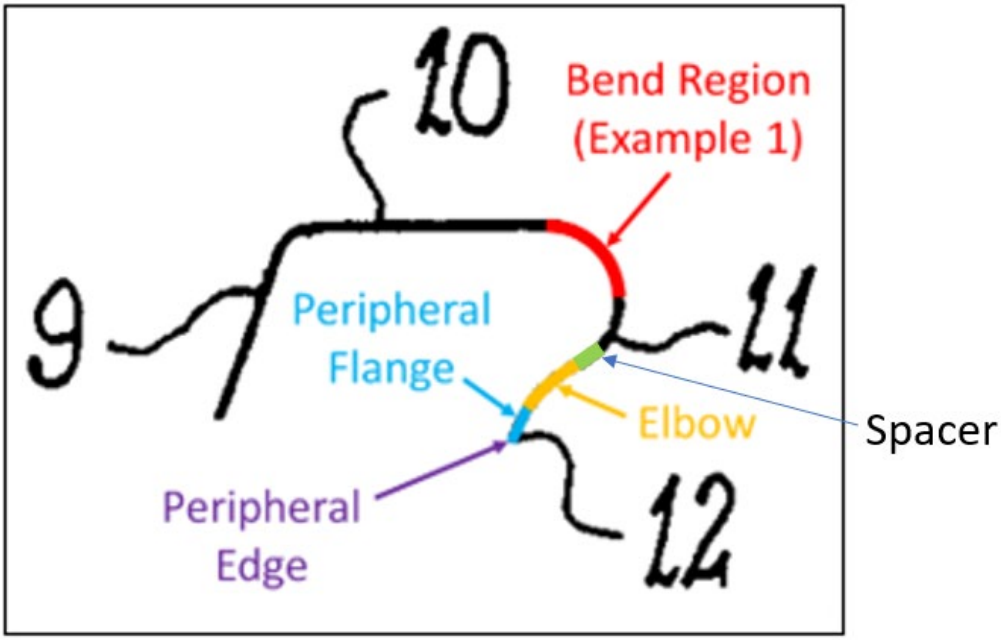


Portelli, Fig. 13 (annotations added).

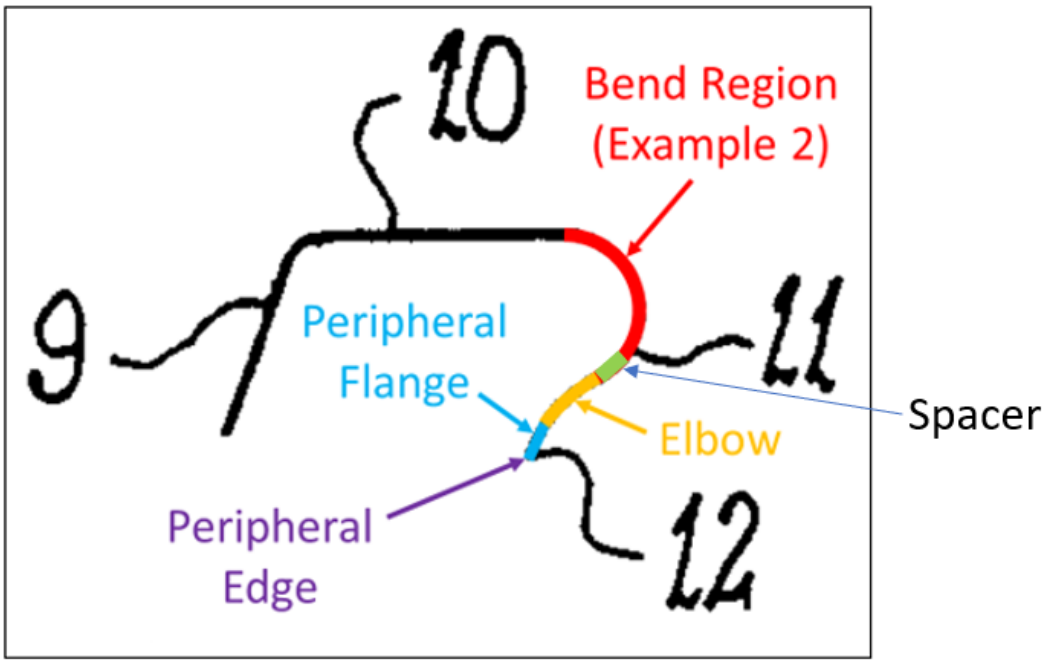
109. As explained previously, Portelli discloses a spacer in both his Fig. 8 and Fig. 13, shown again here:



Portelli, Fig. 13 (excerpted and annotations added).

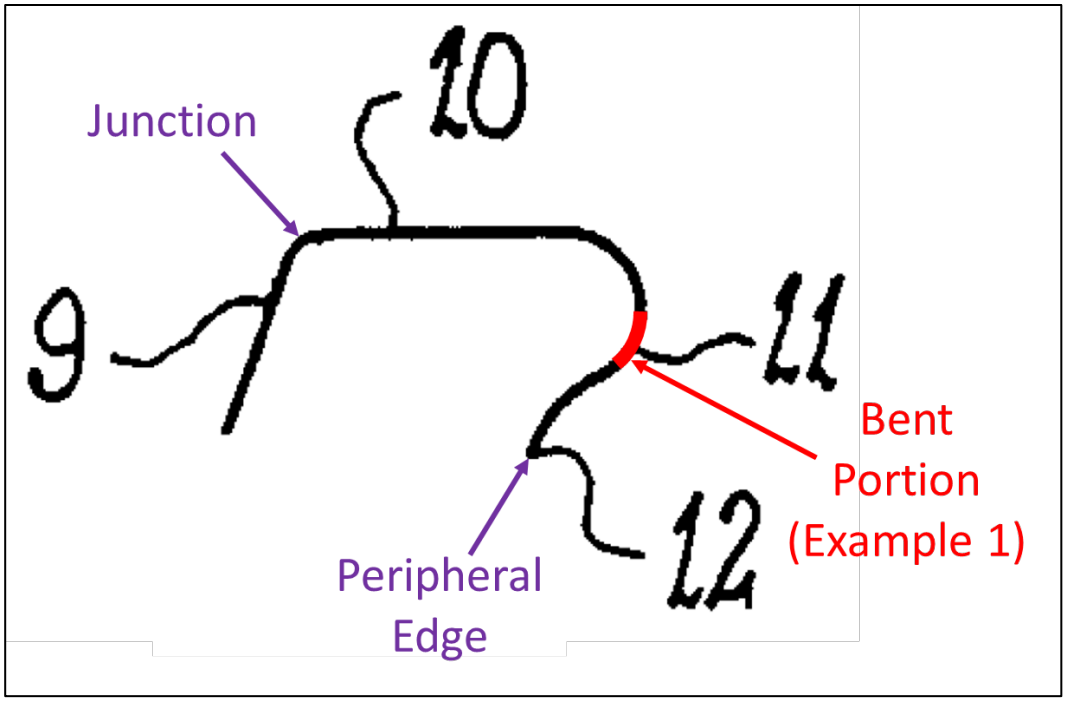


Portelli, Fig. 13 (excerpted and annotations added).



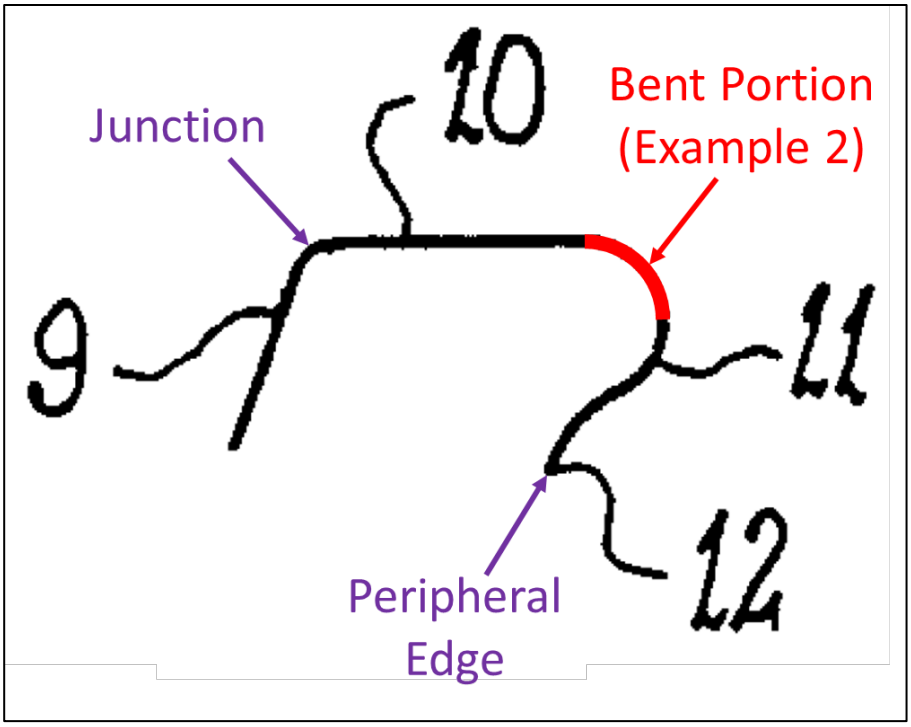
Portelli, Fig. 13 (excerpted and annotations added).

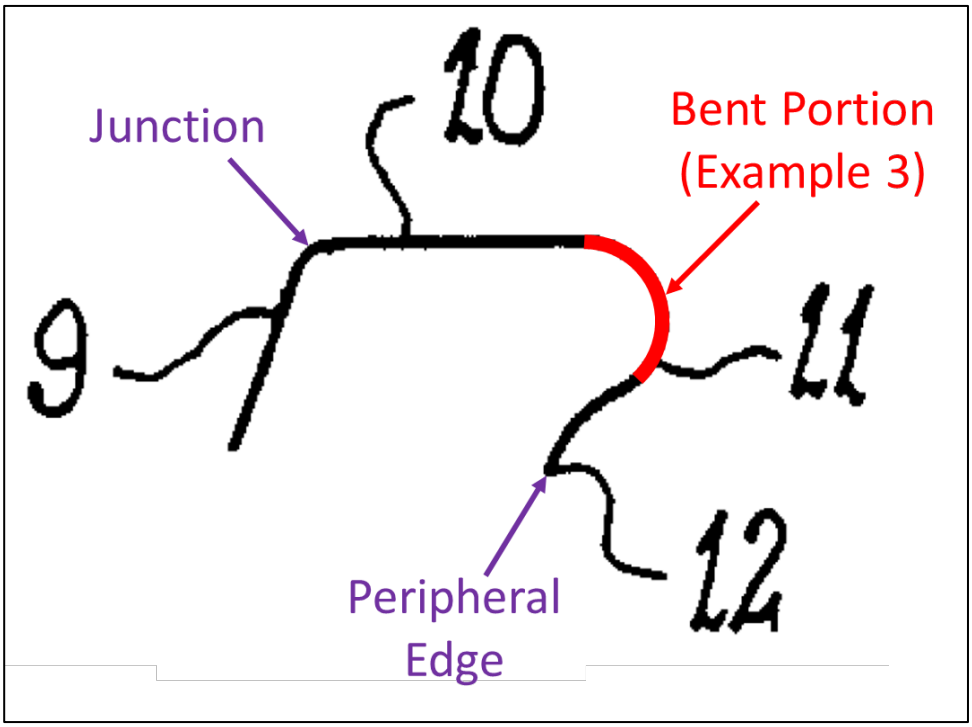
110. Portelli's Fig 13 disclose a peripheral edge 12 of the thermoformable sheet and a **bent portion** interposed between the peripheral edge and the junction between the body and the extension. Portelli illustrates the "bent portion" in several ways, including the lower portion of the curve highlighted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



Portelli, Fig. 13 (annotations added).

111. Patent '222's "bent portion" is also disclosed by Portelli in the upper portion of the curve highlighted on the right side of Fig. 13 (Example 2), or by combining the upper and lower portions of that curve (Example 3):

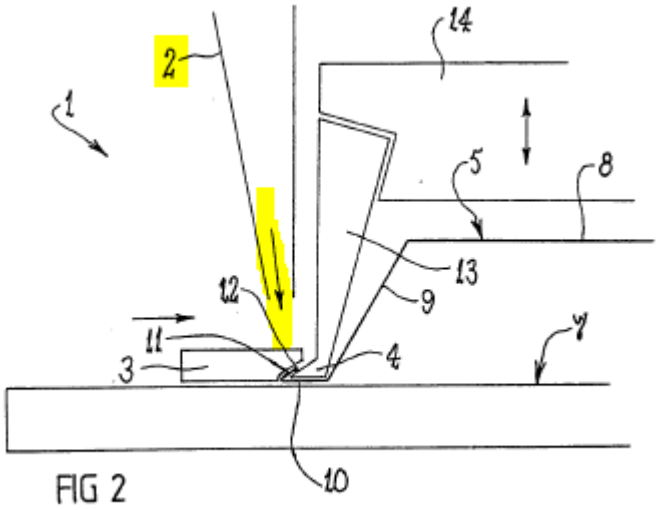




Portelli, Fig. 13 (annotations added).

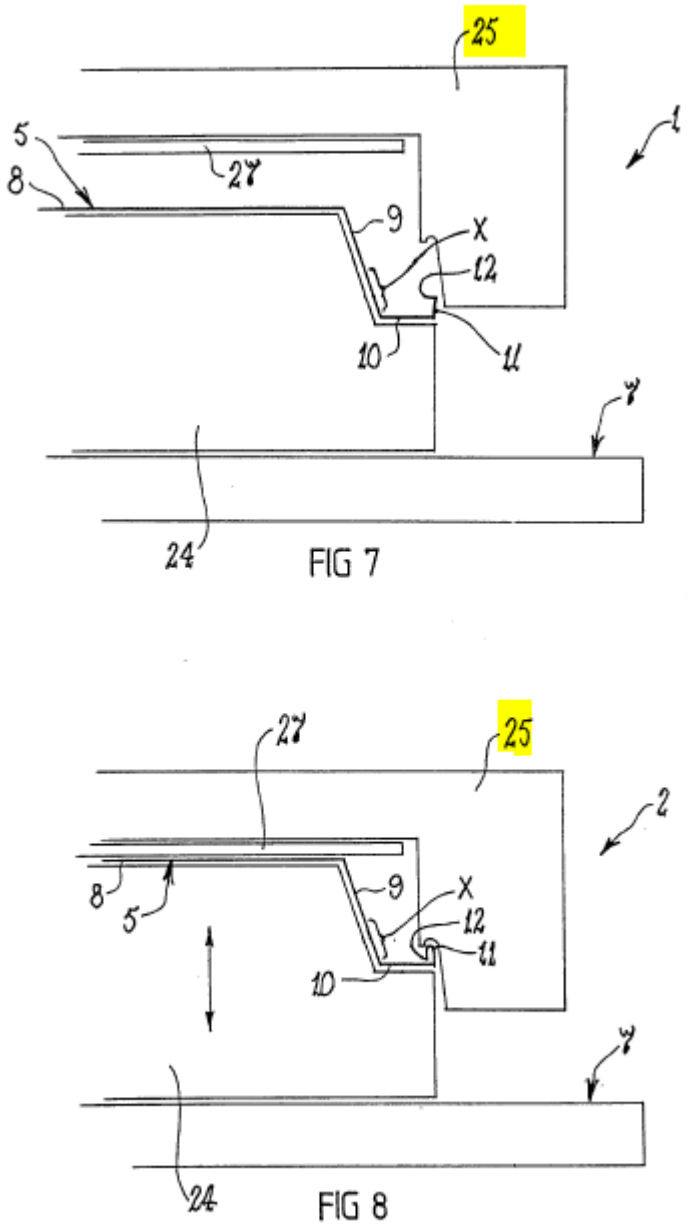
i. **Element 1g: "*heating the bent portion* to at least the glass transition temperature of the thermoplastic; and,"**

112. Portelli shows heating of the bent portion of the thermoplastic article in several ways, including the methods depicted in the following Figures and descriptions. Portelli describes the apparatus in Fig 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.



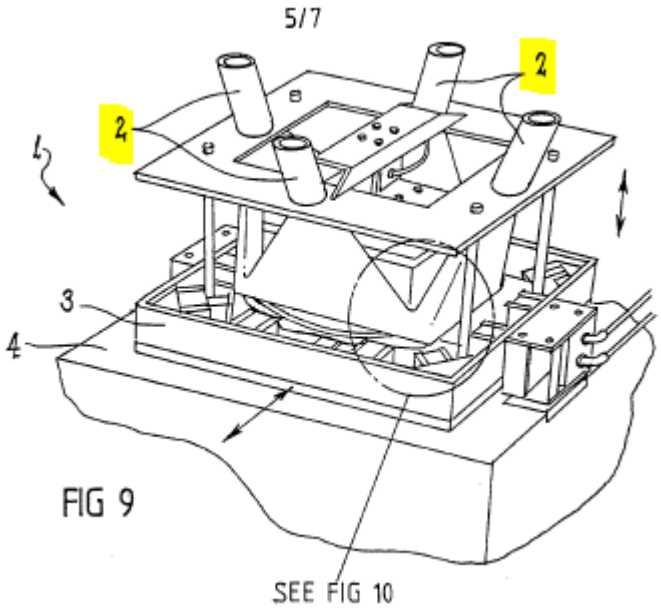
Portelli, Fig. 2 (annotated).

113. Portelli explains with respect to his Figs. 7 and 8, "the 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..." *Id* 12:24-29.



Portelli, Figs. 7 and 8 (annotated).

114. Still further, Portelli describes additional heating methods and apparatus in Fig. 9, explaining "There are four hot air ducts 2 directing air along the four edges 12 of the rectangular tray 5. Each of the ducts 2 fans outwardly from a round pipe cross-section at its upper length of the tray edge 12." Fig 9 is shown here:



Portelli, Fig. 10 (annotated).

115. Portelli explains that "heating means for heating the peripheral edge region of the tray to a temperature at which it is malleable;" Id 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." Id. 6:17-19.

116. Portelli further discloses regarding his Fig. 1, "When the plastic material of the tray reaches the temperature at which it becomes malleable, 150 to 250 degrees C, the former 3 is brought into operative engagement with the peripheral edge region 11 deforming it. Id. 9:22-24. Portelli likewise teaches 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." 15:4-8. A POSITA would readily understand that Portelli's references to thermoplastics becoming "malleable" and "softening" and becoming "molten" are synonymous with the "glass transition temperature" referenced in the '222 Patent limitations.

j. **Element 1h: "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…"**

117. According to Patent '222, 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 in 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:

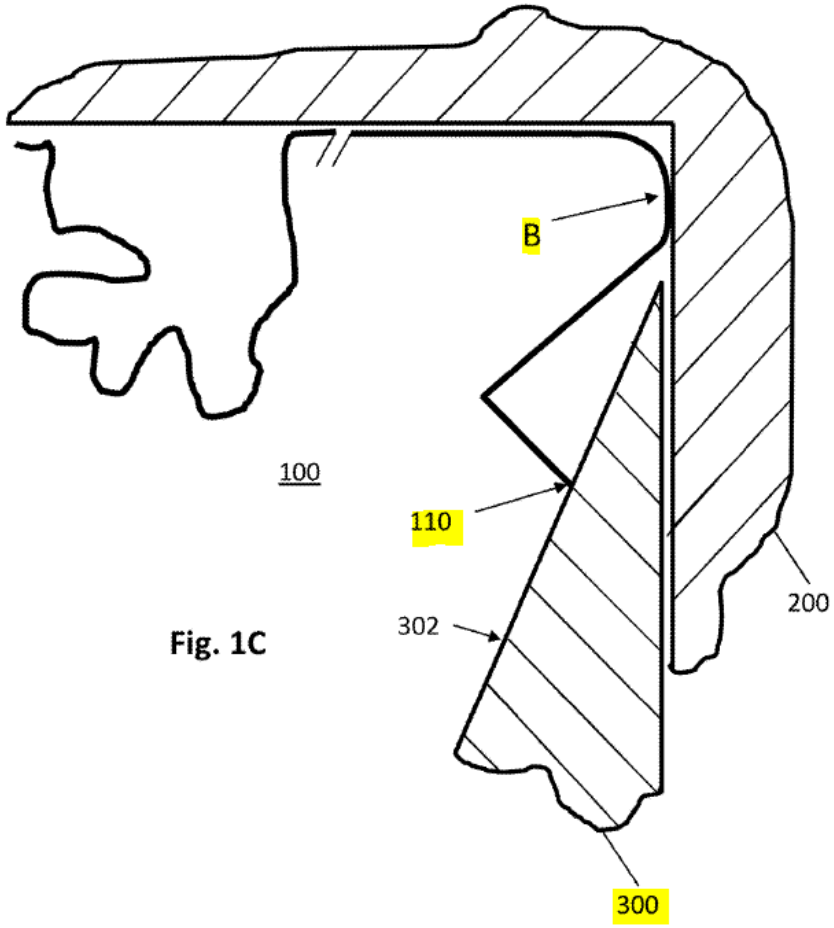
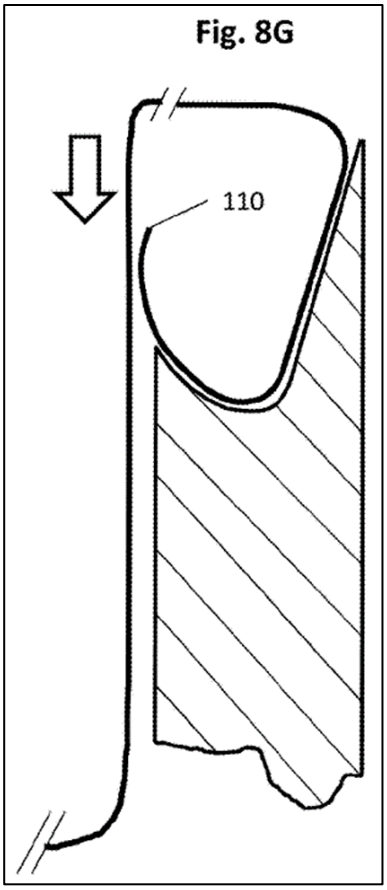


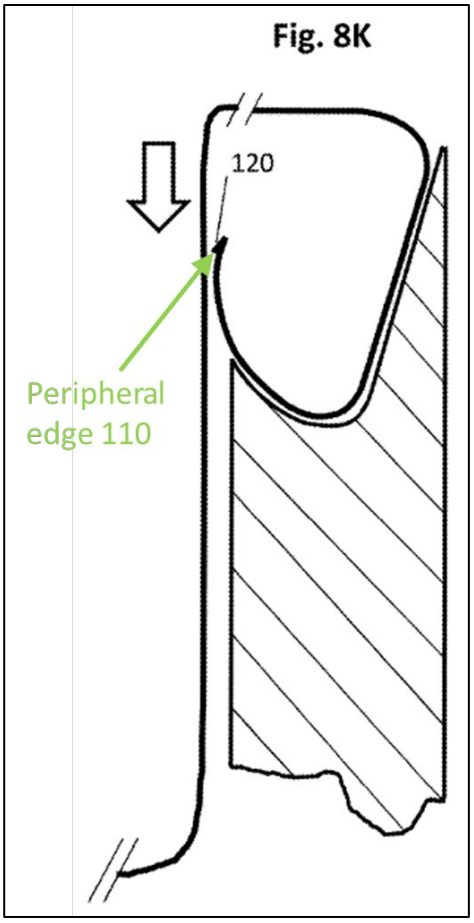
Fig. 1C

Ex. 1001 Fig. 1C, annotated.

118. The ‘222 patent illustrates in Figs. 8G and 8K ram 300 impinging the deflectable flange to deflect the spacer toward the extension:



Ningbo Linhua Plastic Ex. 1003, p. 109



Ex. 1001, Figs 1C, 8G, 8K (annotated).

119. Portelli discloses regarding his Fig. 1, "When the plastic material of the tray reaches the temperature at which it becomes malleable, 150 to 250 degrees C, the former 3 is brought into operative engagement with the peripheral edge region 11 deforming it. Id. 9:22-24. Portelli likewise teaches 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." 15:4-8. A POSITA

would readily understand that Portelli's references to thermoplastics becoming "malleable" and "softening" and becoming "molten" are synonymous with the "glass transition temperature" referenced in the '222 Patent limitations.

120. Glass transition (often abbreviated as "Tg") can be described as the temperature that a thermoplastic transitions from a relatively rigid and glossy material to a soft, pliable one. Said another way, it is the temperature at which a plastic becomes "malleable." The specific glass transition temperature of various thermoplastic materials varies, but is commonly specified and published by most material suppliers.

121. As explained above, Portelli teaches several methods and apparatus configurations for impinging the ram against the peripheral flange and heating the bent portion to at least the glass transition temperature. The '222 Patent provides the limitation of "further impinging the ram against the deflectable flange to further deflect the spacer toward the extension…"

122. It is evident from the results described in Portelli's specifications, Figures and claims that the sharp peripheral edge is sufficiently displaced by Portelli's method, apparatus and flange geometry that "further impinging" is indeed taught and achieved. For example, Portelli illustrates various degrees and increments of impinging the ram against the peripheral flange, as a POSITA would understand that Portelli's ram is slidably movable, and thus can be selectively impinging the

peripheral flange. Indeed, Portelli describes the ram configuration and movement in his Fig. 1, stating, "The former [ram] 3 is a solid block slidable along the support surface 7 towards and away from the anvil 4. The former may be driven by any suitable mechanical drive means. Such drive means are well known to persons skilled in the art and as such will not be described in any further detail here." Id. 9:4-7.

123. Furthermore, a POSITA would be very familiar with incremental 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 well understood to have a virtually infinite incremental advancement capability, and are extremely precise in their movement, such that "further impinging a ram against the peripheral flange" would be a routine matter and well within the capability of both a POSITA and their equipment. This is especially true when combined with the curved ram facings disclosed by the prior art.

124. Accordingly, Figs. 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 some distance to travel and re-engage with the article.

Ningbo Linhua Plastic Ex. 1003, p. 112

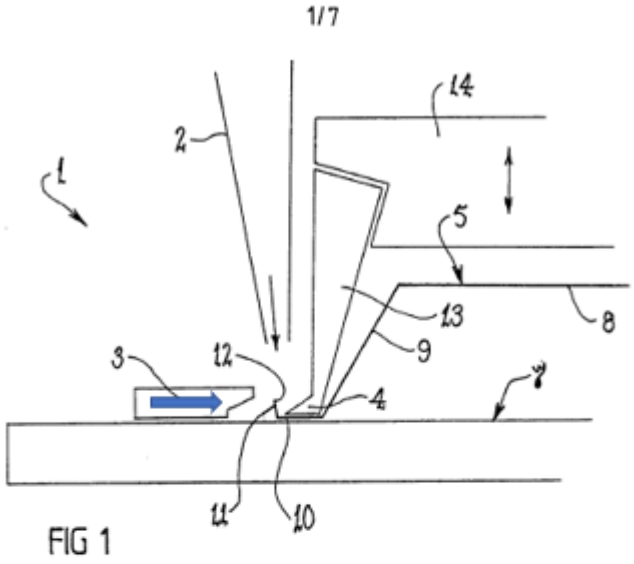


FIG 1

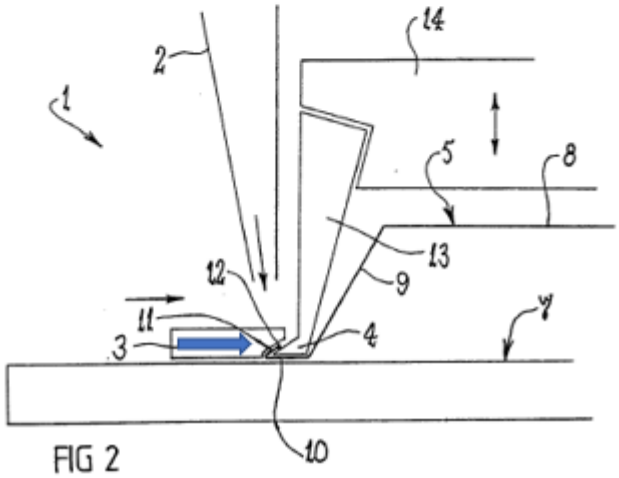
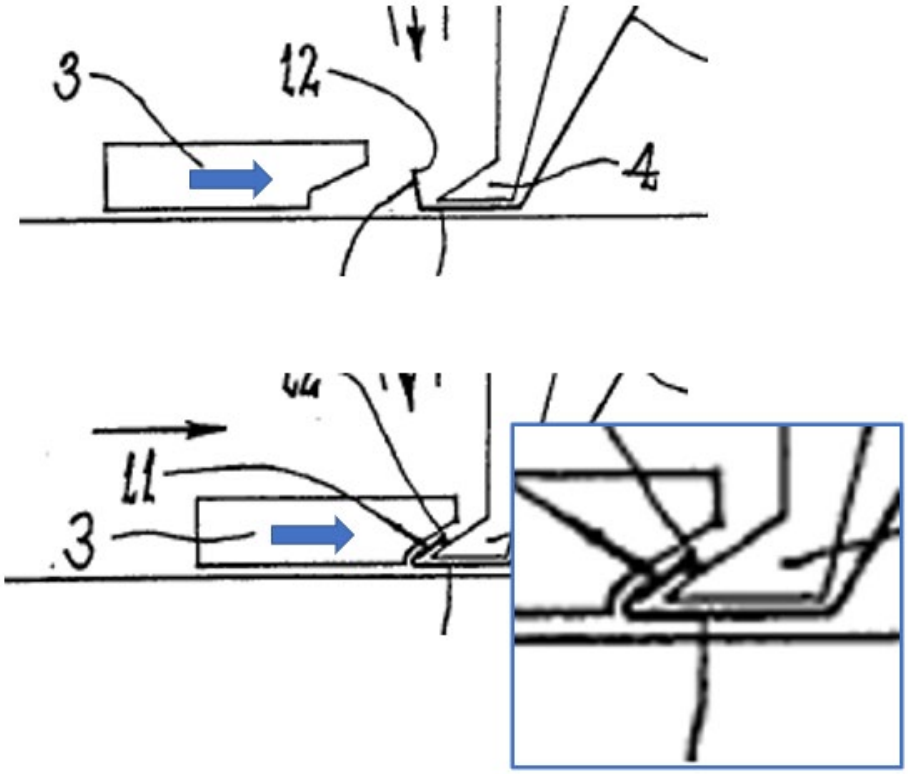


FIG 2

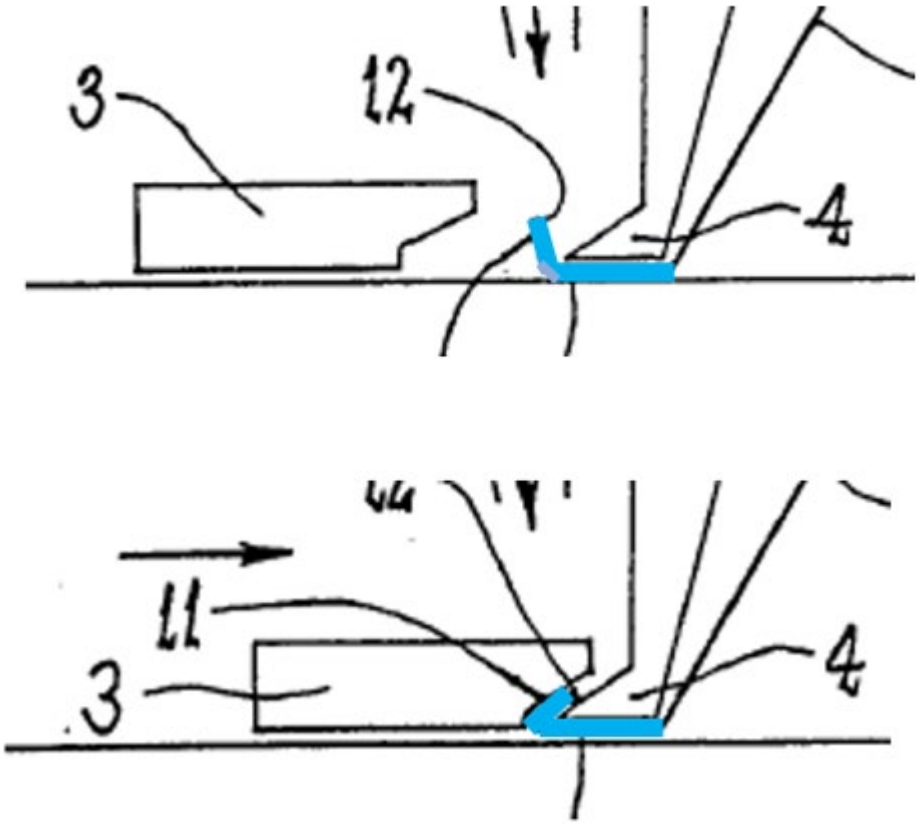
Portelli, Figs. 1 and 2 (annotated). See also Figs. 3-6.

125. A closer inspection of Portelli's Figs. 1 and 2 show this in further detail:



Portelli, Figs. 1 and 2 (excerpted and annotated).

126. As noted previously, excerpts of 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, as seen here:



Portelli, Figs. 1 and 2 (excerpted and annotations added).

127. Portelli similarly demonstrates in Figs. 7 and 8 the ram moving towards the peripheral flange in increments, with Fig. 7's ram still some distance from the peripheral flange, and Fig. 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.

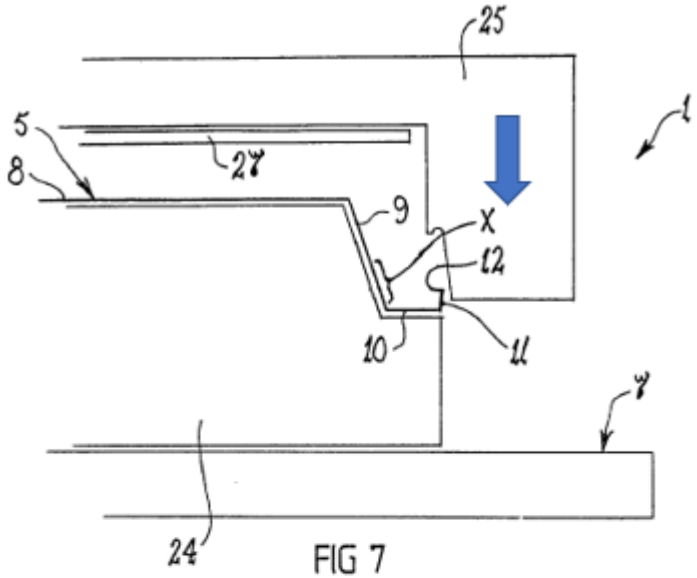


FIG 7

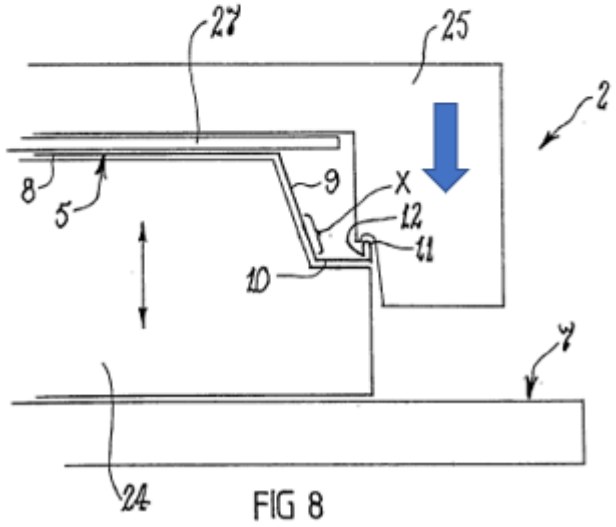
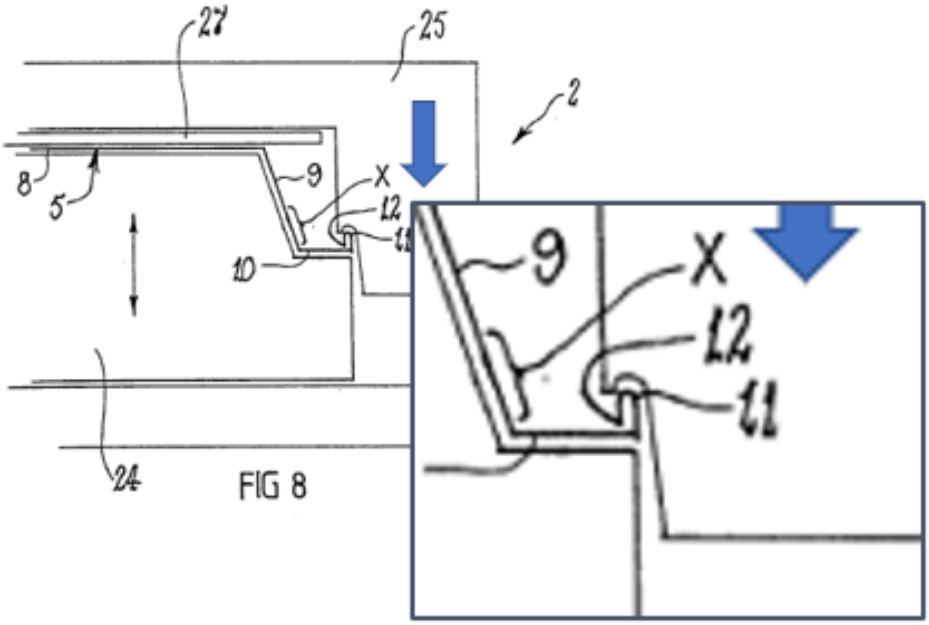


FIG 8

Portelli, Figs. 7 and 8 (annotated).

128. A closer view of Fig 8 shows this in further detail:



Portelli, Fig. 8 (excerpted and annotated).

129. Portelli provides even further disclosures on the "further impinging" aspects of his method and apparatus, 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. 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.

130. A POSITA would therefore understand from Portelli's teachings that impinging the ram against the peripheral flange and heating the bent portion to at least the glass transition temperature are disclosed by Portelli in order to achieve the

flange displacement and smooth periphery described and shown in his method, apparatus, and tray profile geometries.

k. **Element 1i: "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.*"**

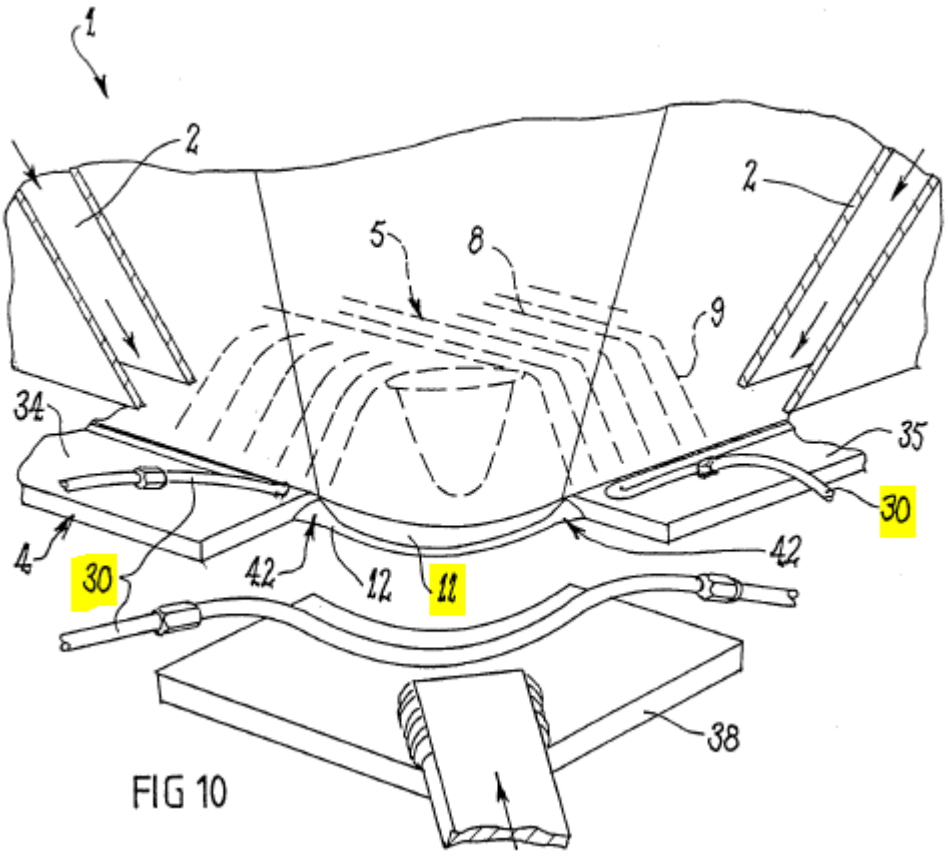
131. Portelli discloses "The former 3 is then moved outwardly away from the peripheral edge region 11 and the clamping foot 9 is pivoted inwardly and upwardly relative to the clacker box 14 to free it from the deformed peripheral edge region 11." Id. 10:1-3. Similarly, Portelli describes "The straight 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." 11:8-14.

132. In sum, Portelli renders obvious the '222 patent Claim 1, considering Portelli's teachings noted above, the skill and knowledge of a POSITA, and the Patent Owner's own interpretation of Claim 1 elements shown above.

2. **Claim 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."**

133. Portelli's method and apparatus teachings repeatedly describe cooling of the article's bent portion after displacing the sharp peripheral edge. For example, he states "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." Id. 3:6-8. Portelli further describes a method of cooling to include "…the cooling includes actively cooling the peripheral edge region of the tray using cooling water." Id. 4:10-12. Still further, Portelli discloses that "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. Again, Portelli describes a cooling feature, stating, "Cooling means (not shown) in the form of water cooling are also provided." Id. 8:25-26. Cooling is again described by Portelli for his Fig. 2 apparatus, stating "The hot air blast is then interrupted and the peripheral edge region 11 of the tray 5 is cooled so that it sets in the deformed configuration." Id. 9:27-29. Further disclosure is found in his statement "The cycle time for the entire operation would be of the order of three to five seconds. Of this the cooling time would be a half to three quarters of a second." Id 10:6-8. In describing his 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. Fig. 10 is shown below for reference:

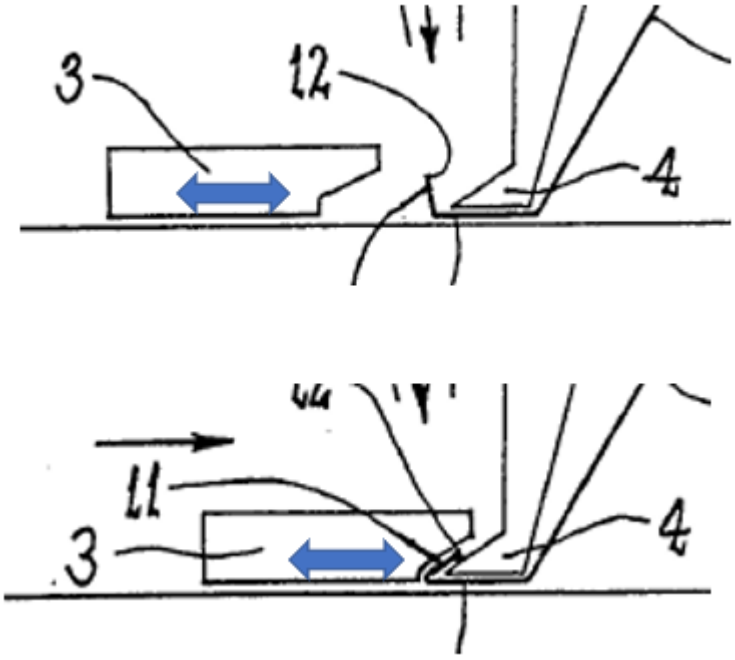


Portelli, Fig. 10 (annotated).

134. Portelli also teaches disengaging the ram from the deflectable flange. He states "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. As previously noted, Portelli describes the ram configuration and movement in his Fig. 1, stating, "The former [ram] 3 is a solid block slidable along the support surface 7 ***towards and away*** from the anvil 4. The former may be driven by any suitable mechanical drive means. Such drive means are well known to persons skilled in the art and as such will not be described in

Ningbo Linhua Plastic Ex. 1003, p. 120

any further detail here." Id. 9:4-7. Portelli's Figs. 1 and 2 depict the slidable ram (3) which can move to engage and disengage the deflectable flange (11):



Portelli, Fig. 1 and 2 (excerpted and annotated).

135. Likewise, Portelli's Figs. 7 and 8 show the slidable ram (25) which can move to engage and disengage the deflectable flange (11):

Ningbo Linhua Plastic Ex. 1003, p. 121

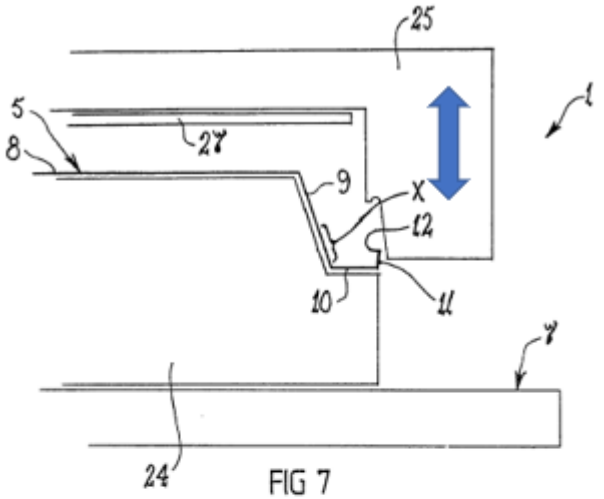


FIG 7

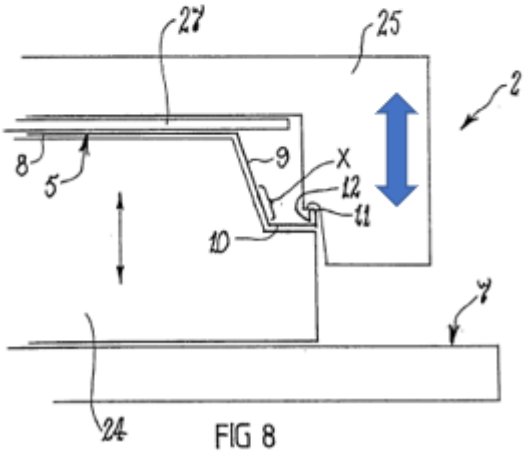


FIG 8

Portelli, Fig. 7 and 8 (excerpted and annotated).

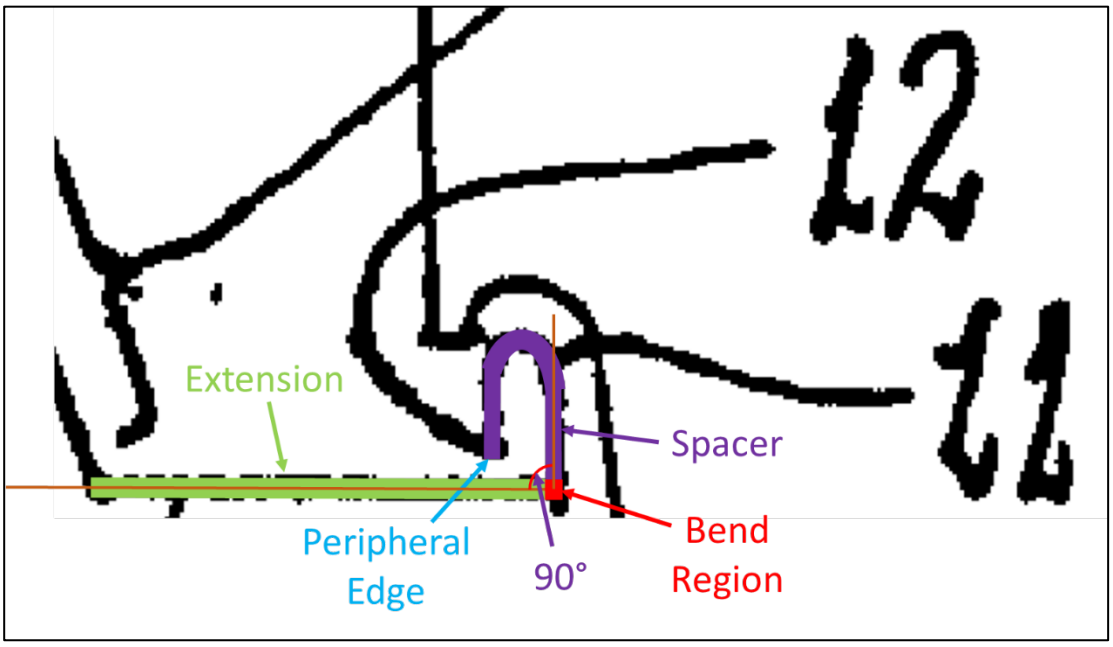
136. Furthermore, at the time of the '222 Patent application, common equipment and tooling used for forming, shaping and molding thermoplastic articles was typically equipped with water cooling systems whereby chilled water was circulated through the tooling to quickly cool selected areas of the component. A POSITA would be 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 and is common industry practice.

137. These and other Portelli teachings disclose the limitation "wherein the bent portion is cooled below the glass transition temperature prior to disengaging the ram from the deflectable flange."

3. **Claim 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."**

138. Portelli's 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, and is less than 105 degrees, as shown below:

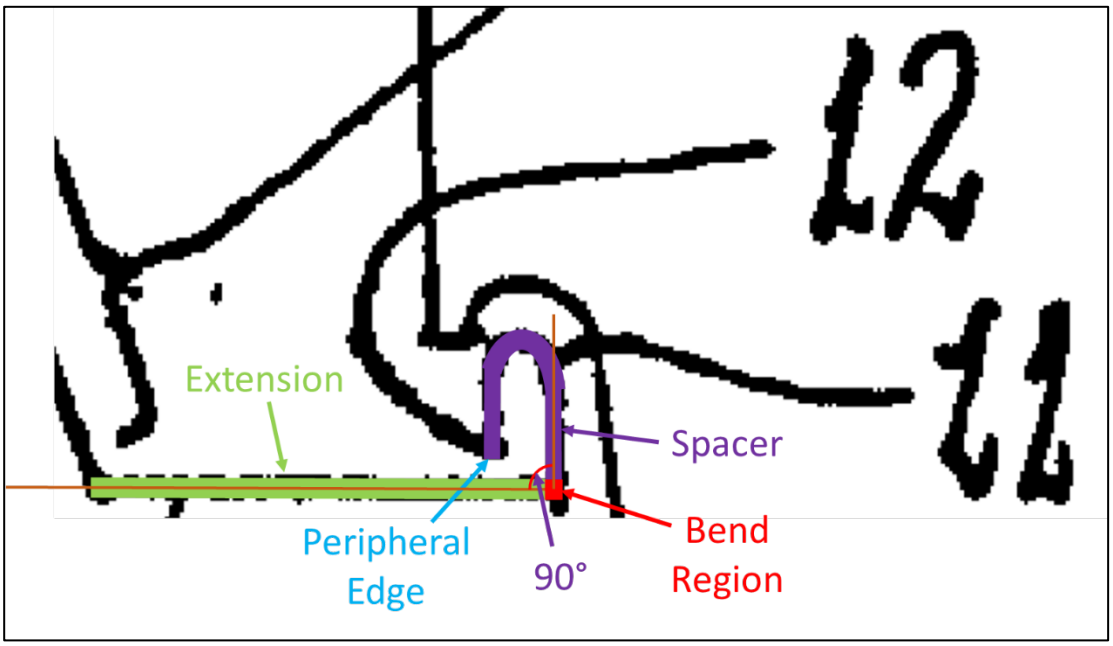


Portelli, Fig. 8 (excerpted and annotations added).

Again, starting from the above-excerpted portions of Fig. 8, if one draws lines through and parallel to (a) the horizontal portion of the extension, and (b) the spacer, which comprises or begins with the vertical segment in the middle, the angle between those two lines is 90 degrees.

4. **Claim 4: "The method of claim 1, wherein the bend region interconnects the spacer with the extension at an angle of about 87-93 degrees."**

139. . As shown directly above, Portelli's Fig. 8 discloses a bend region which interconnects the spacer with the extension at an angle of 90 degrees, which is not less than 87 degrees, and is less than 93 degrees, as shown below:

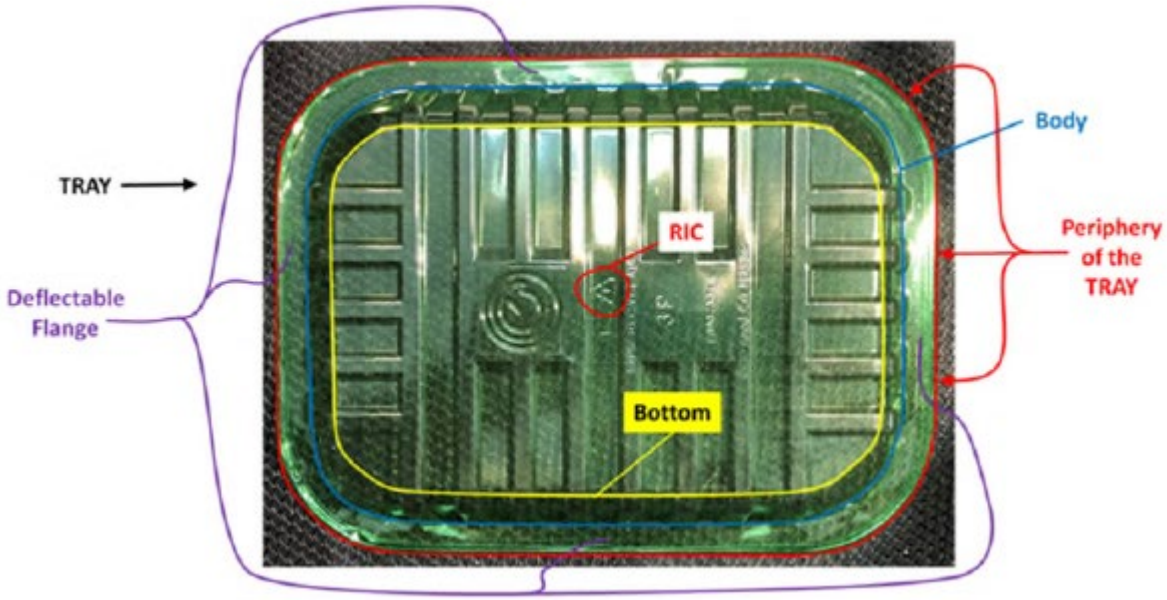


Portelli, Fig. 8 (excerpted and annotations added).

140. As noted above, starting from the above-excerpted portions of Fig. 8, if one draws lines through and parallel to (a) the horizontal portion of the extension, and (b) the spacer, which comprises or begins with the vertical segment in the middle, the angle between those two lines is 90 degrees.

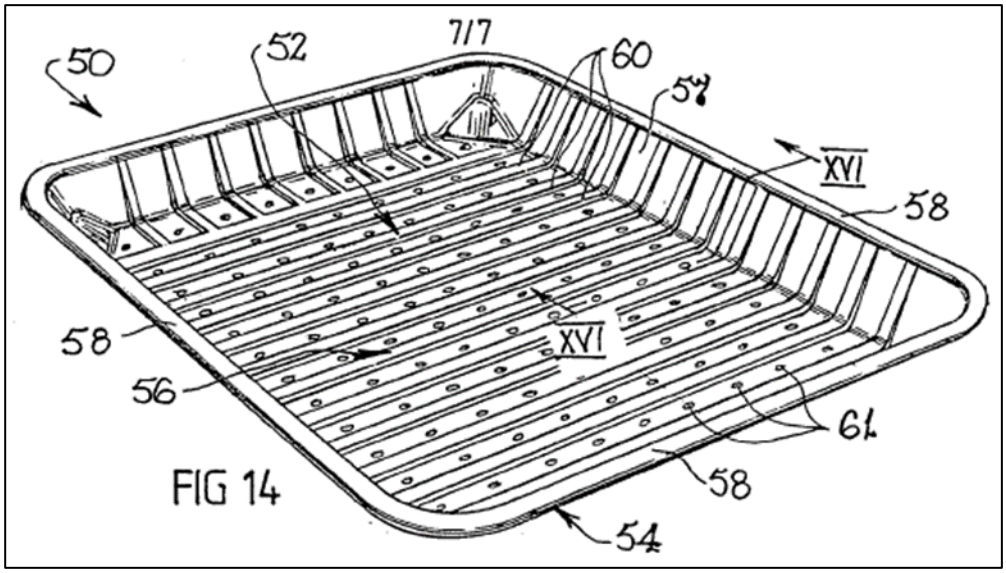
5. **Claim 5: "The method of claim 1, wherein the thermoplastic is formed into a shape comprising the body and having the deflectable flange about its entire periphery."**

141. As previously noted, Patent owners in their First Amended Complaint refer to an article with a body and deflectable flange:



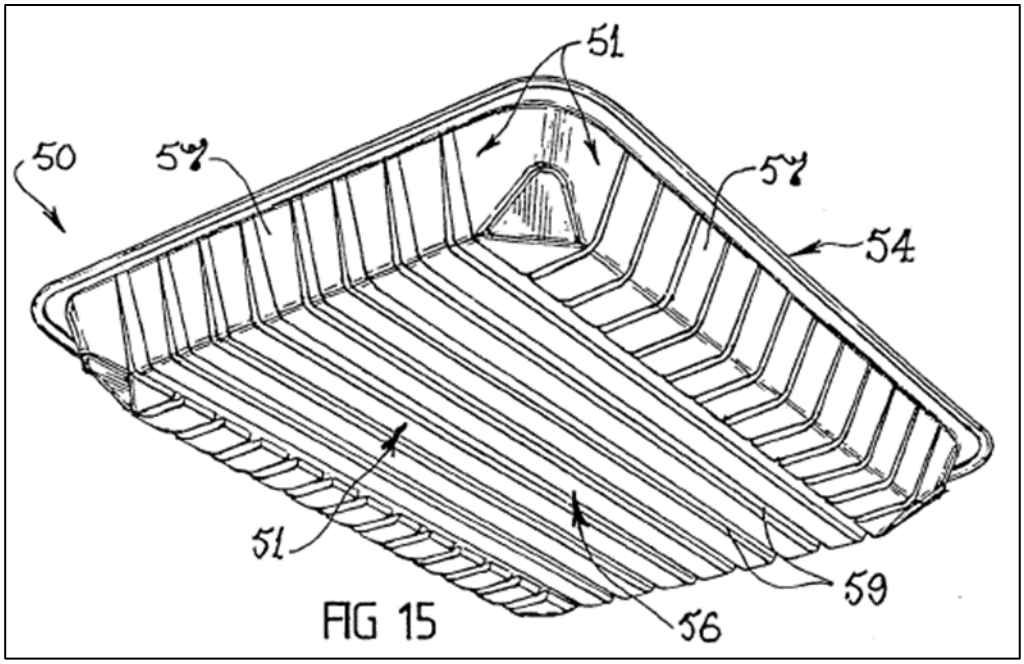
Ex. 1007, p. 8

142. Portelli discloses an article, and method and apparatus for producing an article, wherein the thermoplastic is formed into a shape comprising the body and having the deflectable flange about its entire periphery. As noted earlier, Portelli discloses and portrays a "base member 51" and a "cover member 52," both of which are "thermoformed from plastic" and include a tray with a deflectable flange (initially sharp terminal edge) surrounding the periphery:



Portelli, Fig. 14.

Ningbo Linhua Plastic Ex. 1003, p. 126



Portelli, Fig. 15; *see also id.* 15:12-16, Fig. 11 (item 5).

143. 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". 9:17-24 Portelli explains that his method and apparatus are used to deform article's flange, i.e. a "deflectable flange." He further discloses "heating the peripheral edge region of the tray such that said ***peripheral edge region becomes malleable***," again a reference to a "deflectable flange." *Id*. 2:22-30 (emphasis added). He further shows the flange of his thermoplastic shape being deflected in his Figs. 3 and 4, where the sharp terminal edge 12 in Fig 3 is deflected and displaced in Fig 4:

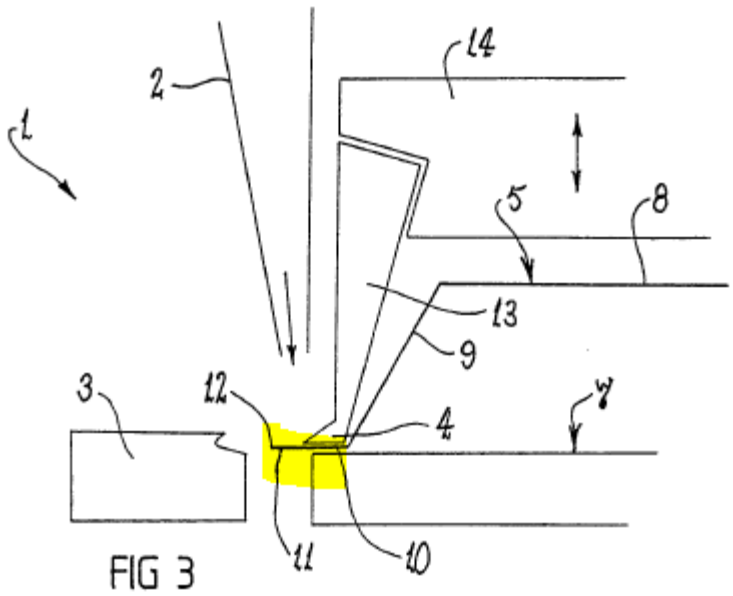


FIG 3

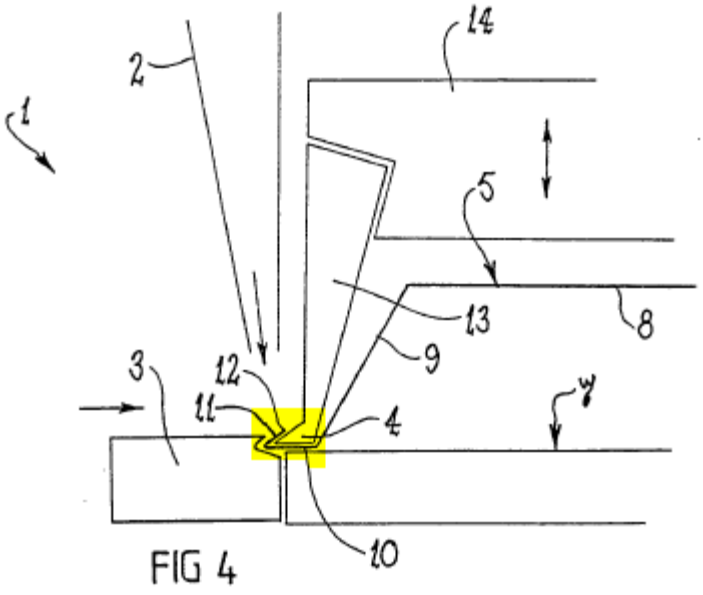


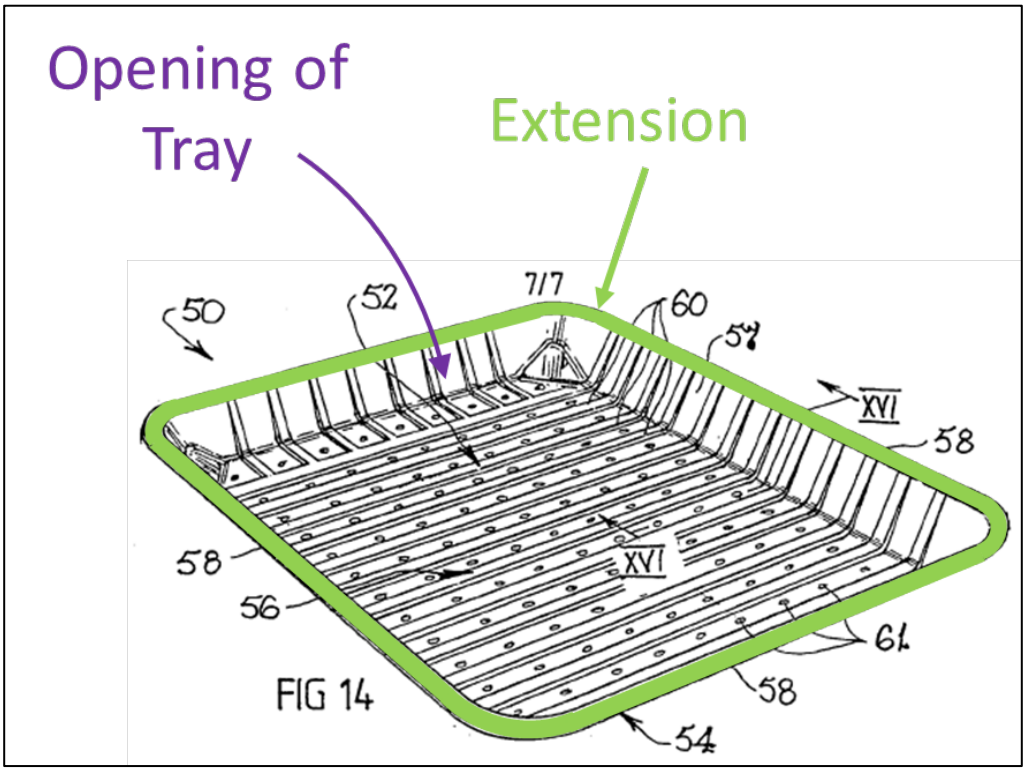
FIG 4

Id. Figs 3 and 4 annotated; *see also* Figs. 1-2, 5-8.

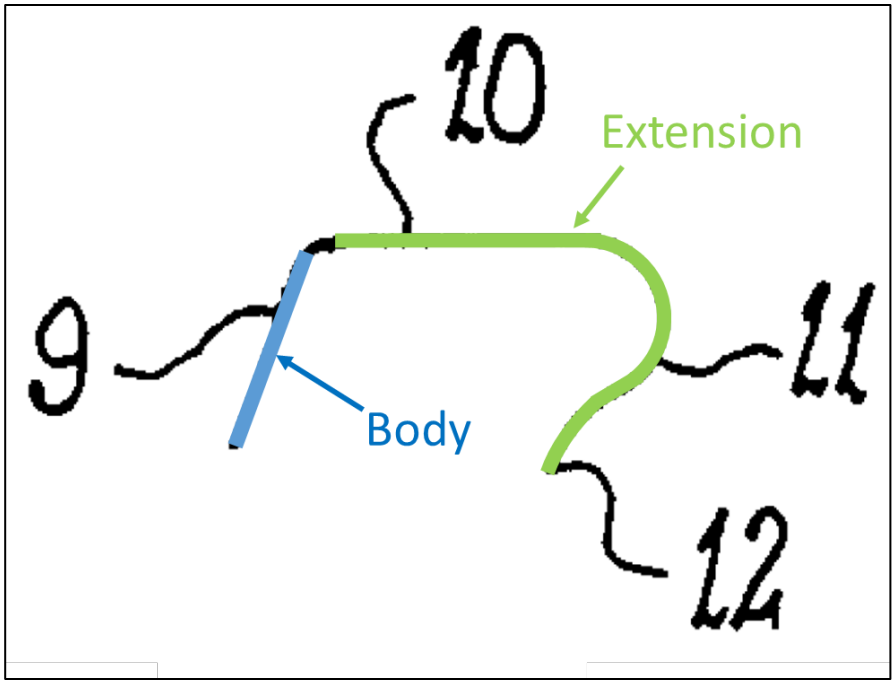
144. Regarding shape, the thermoformable article in Portelli is repeatedly described as a tray, and is even described specifically as a "rectangular tray." *See, e.g., id*. 1:1-5 ("[T]his invention relates to trays for packaging …."), 1:7-8 ("trays used for the packaging of foodstuffs such as red meat, fish, poultry, garden produce and the like"), 5:25 ("plastic tray"), 10:17-18 (referring to "rectangular tray 5"), 18:6 ("providing a plastic tray"). While Portelli's Fig. 14 and Fig. 15 clearly identify a shape with a body and deflectable flange in the form of a rectangular tray, Portelli also explains that "In this specification, the term "tray" shall not be limited to flat or shallow containers. Further the term shall not be limited to containers having four straight edged sides. For example, it is specifically envisaged that the trays defined in this specification might contain chickens and that the tray might be configured to conform with the outline of the shape of the chicken." Id. 1:12-16 (emphasis added).

145. 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 about its entire periphery." Specifically, Portelli describes a tray with a deflectable flange comprising an extension (the combination of Fig. 13's features 10, 11, and 12) which extends peripherally or outward, away from Fig 14's sidewall 57 and the base 56, which together comprise the tray's body. Portelli demonstrates a rim 10/58 is connected to "a peripheral edge region 11 and a terminal edge 12." *Id*. Fig 13 and at 14:11-13. 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. 14 annotated, 15:28-30.



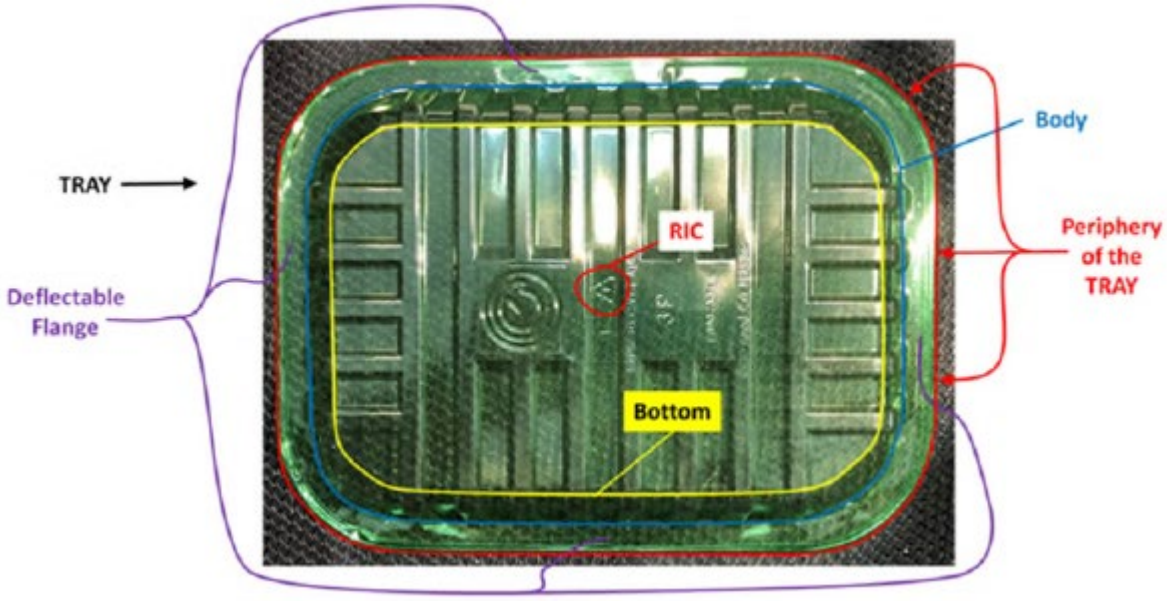
Portelli, Fig. 13 (annotations added), showing Portelli's extension, i.e. deflectable flange, connecting to the article's body.

146. Regarding the claim's reference to "thermoplastic," Portelli likewise teaches that "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…***"). 1:12-16, 9:17-24, 14:10-14, 15:12-14, 16:15-17, Figs. 14, 15 (emphasis added). Portelli repeatedly refers to the application of heat in thermoforming processes, apparatus, and operations, further describing parameters for the shaping of thermoplastic materials. Portelli even 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." *Id*. 15:4-8 (emphasis added).

i. <u>Claim 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."</u>

147. As noted earlier, the '222 Patent Owners in their First Amended Complaint refer to an article with a body and a deflectable flange about the entire periphery of the opening:



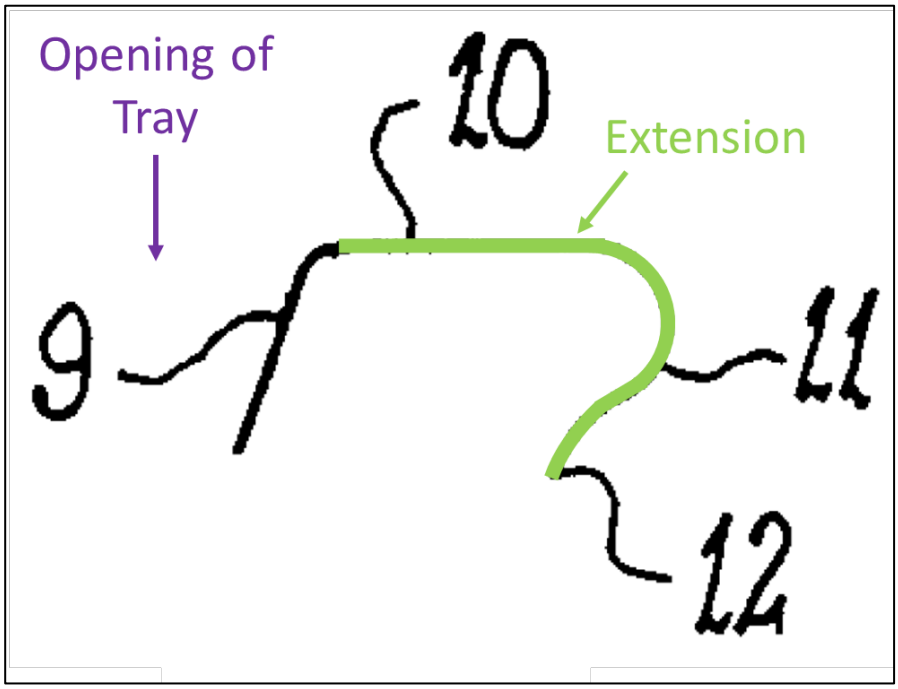
Ex. 1007, p. 8

148. As noted above, Portelli likewise discloses an article with a body and a deflectable flange about the entire periphery of the opening, specifically portraying a thermoplastic formed into the shape of a tray, and is even described specifically as a

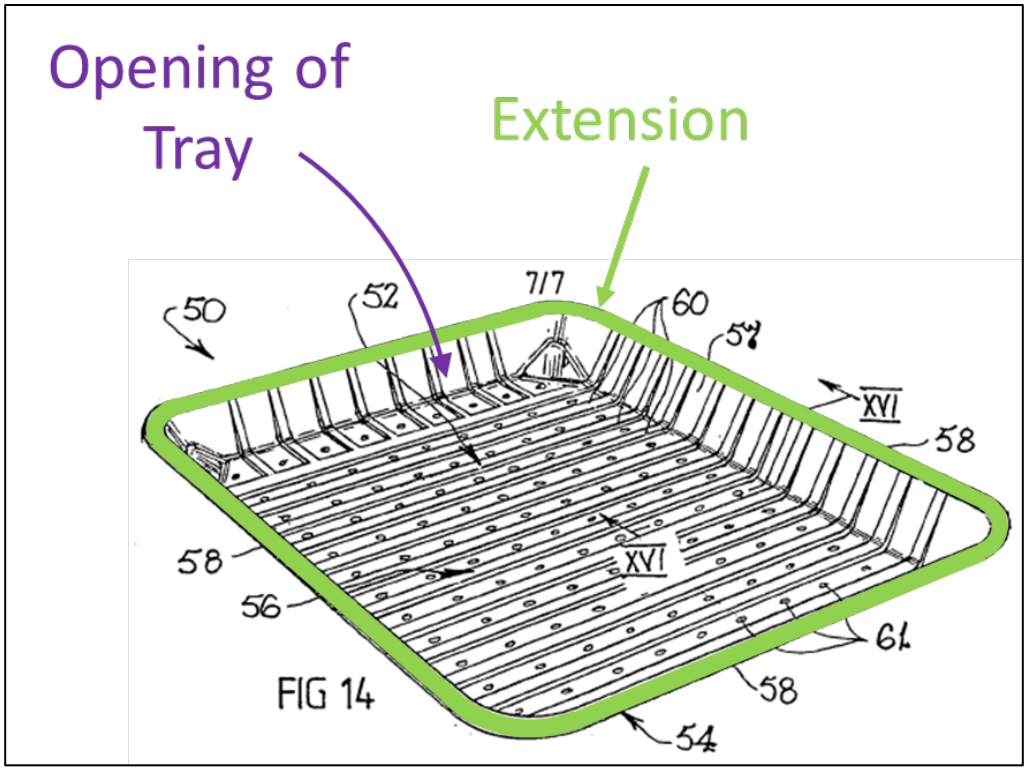
"rectangular tray." *See, e.g., id*. 1:1-5 ("[T]his invention relates to trays for packaging …."), 1:7-8 ("trays used for the packaging of foodstuffs such as red meat, fish, poultry, garden produce and the like"), 5:25 ("plastic tray"), 10:17-18 (referring to "rectangular tray 5"), 18:6 ("providing a plastic tray"). While Portelli's Fig. 14 and Fig. 15 clearly identify a shape with a body and deflectable flange in the form of a rectangular tray, Portelli also explains that "In this specification, the term "tray" shall not be limited to flat or shallow containers. Further the term shall not be limited to containers having four straight edged sides. For example, it is specifically envisaged that the trays defined in this specification might contain chickens and that the tray might be configured to conform with the outline of the shape of the chicken." Id. 1:12-16.

149. A POSITA would understand that for Portelli's tray to ***contain*** chicken or other items as described in the specifications, the tray must include a concave compartment with an opening. Portelli shows such an example of a thermoplastic tray shape which includes a body having a concave compartment with an opening and deflectable flange in his Fig. 14, described as "base member 51" and a "cover member 52," both of which are "thermoformed from plastic" and include a tray with a deflectable flange (initially sharp terminal edge) surrounding the article: 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 (annotations added).



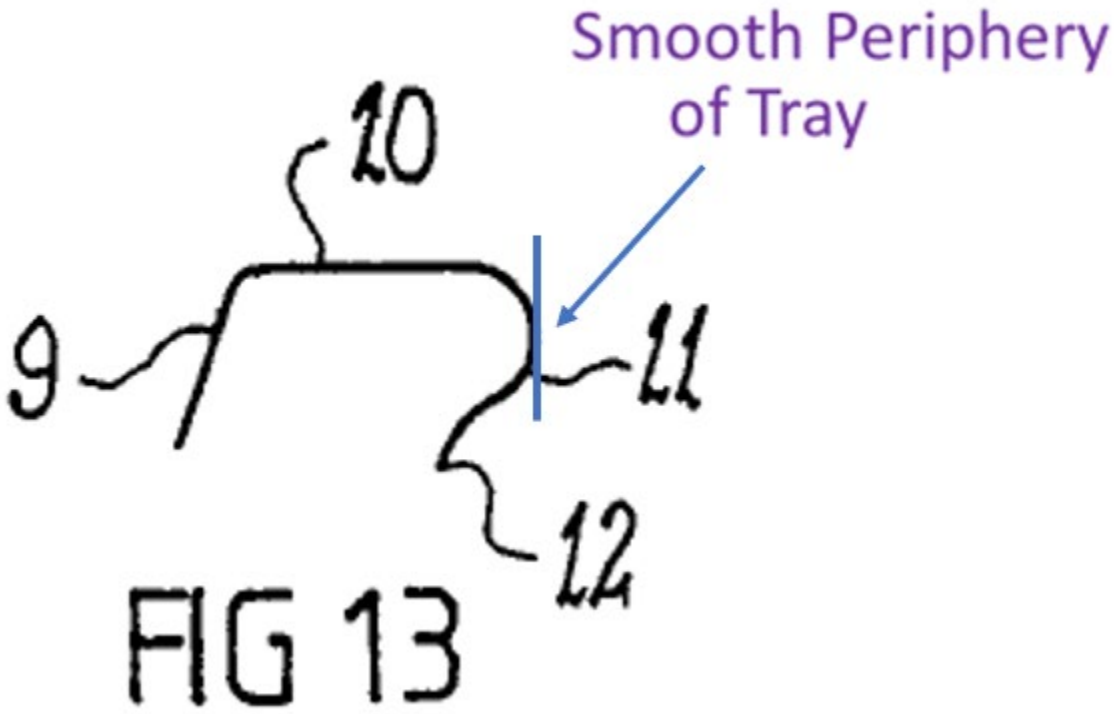
Portelli, Fig. 14, showing extension, i.e. deflectable flange about the entire periphery of the opening (annotations added).

i. **Claim 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."**

150. Portelli recognized the need for a thermoplastic tray with a smooth periphery that would not damage sealing film. He states, "However, such [existing] trays have a sharp terminal edge forming the periphery thereof with an unfortunate tendency to tear or cut through plastic film within which the trays are wrapped… it has not been possible to provide a tray in which the terminal edge faces away from the path transversed by plastic film which is wrapped around the tray (hereinafter referred to as

the wrap path). This problem of the sharp terminal edge tending to cut or tear the wrap within which the tray is wrapped leads to substantial productivity losses." Id. 1:30-2:10.

151. 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 (annotations added).

152. 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. He states "More specifically 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.

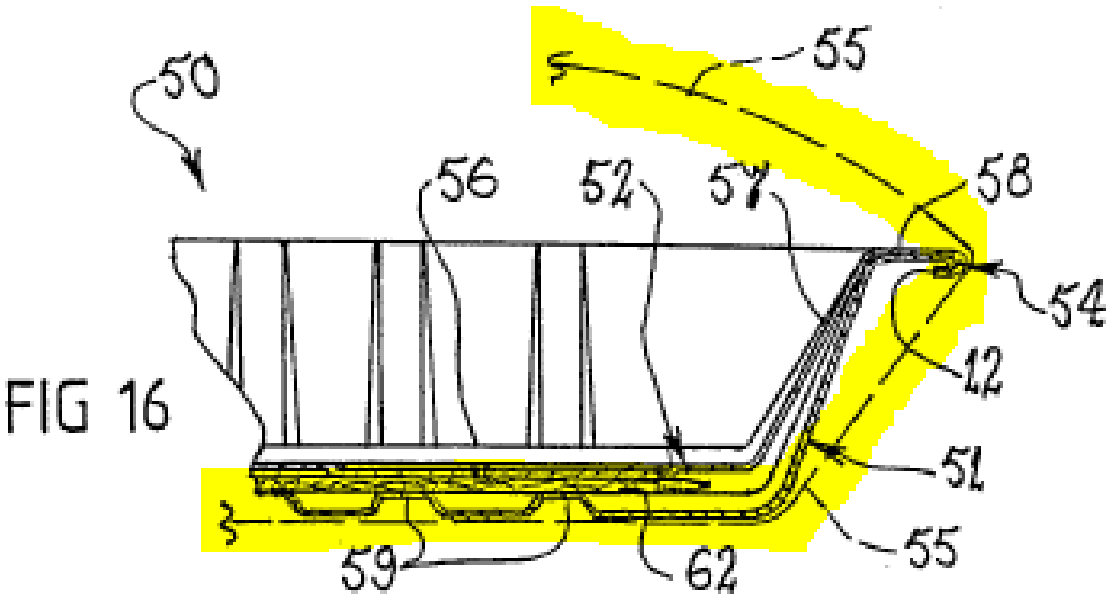
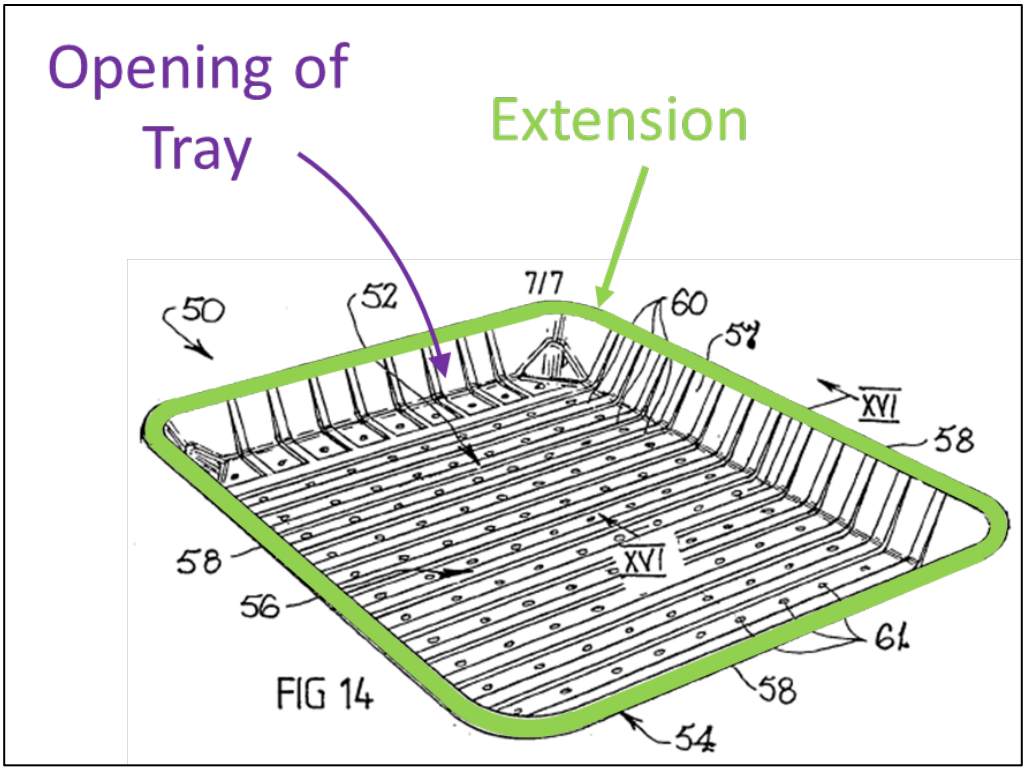


FIG 16

Portelli, Fig. 16, showing sealing compartment using film that contacts the smooth periphery of the body

153. As noted above, the extension, i.e. deflectable flange encircles the entire periphery of Portelli's thermoplastic article. A POSITA would readily understand that common film-wrapping applications such as shrink wrapping or stretch wrapping would necessarily contact Portelli's smooth periphery of the body about the entire periphery of the opening.

Ningbo Linhua Plastic Ex. 1003, p. 137



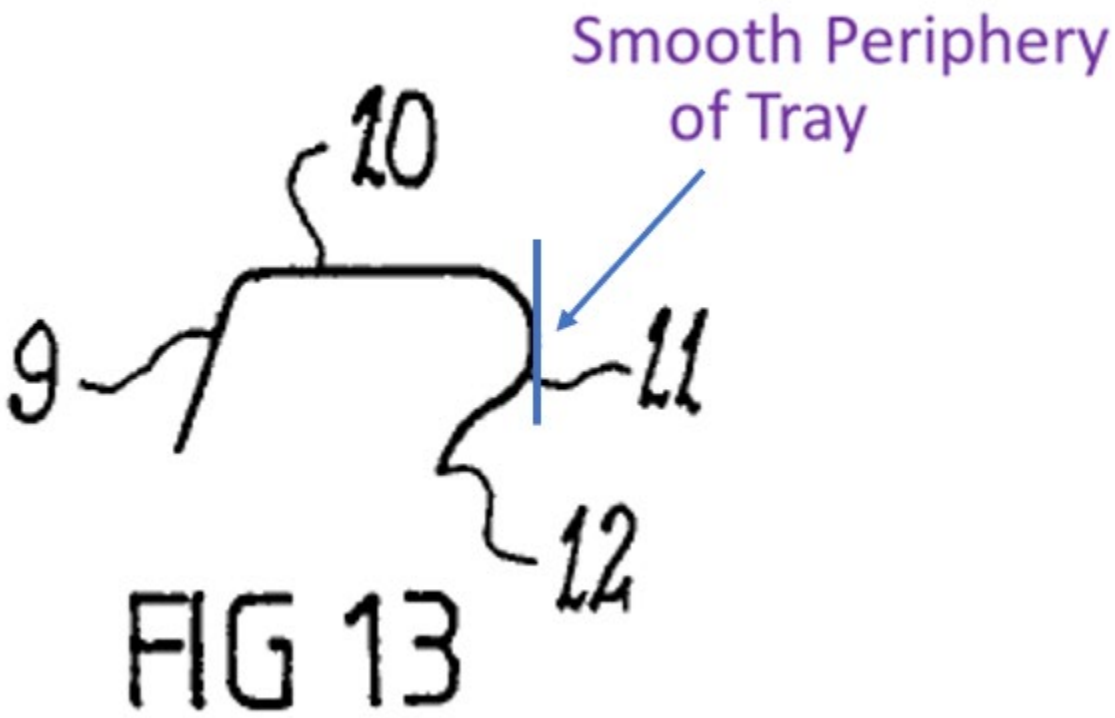
Portelli, Fig. 14, showing extension, i.e. smooth deflectable flange about the entire periphery of the opening (annotations added).

i. Claim 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."

154. As noted above, Portelli recognized the need for a thermoplastic tray with a smooth periphery that would not damage sealing film. He states, "However, such [existing] trays have a sharp terminal edge forming the periphery thereof with an unfortunate tendency to tear or cut through plastic film within which the trays are wrapped… it has not been possible to provide a tray in which the terminal edge faces

away from the path transversed by plastic film which is wrapped around the tray (hereinafter referred to as the wrap path). This problem of the sharp terminal edge tending to cut or tear the wrap within which the tray is wrapped leads to substantial productivity losses." Id. 1:30-2:10.

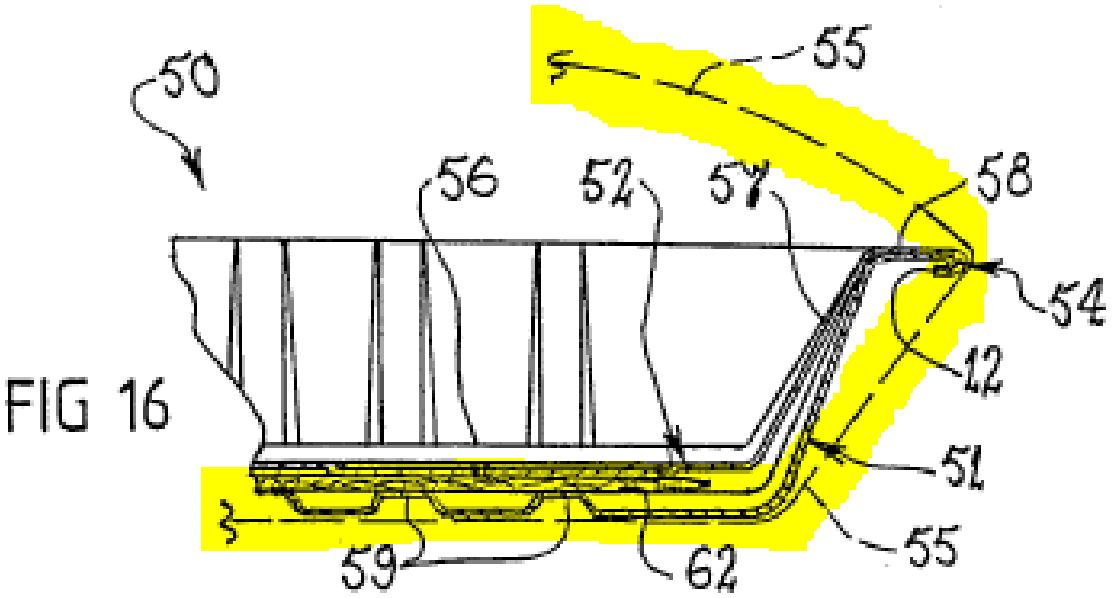
155. Portelli discloses a smooth periphery at the outermost perimeter of the tray. This smooth periphery is shown in Portelli Fig. 13, marked at the far right of the "peripheral edge region 11":



Portelli, Fig. 13 (annotations added).

156. 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. He states

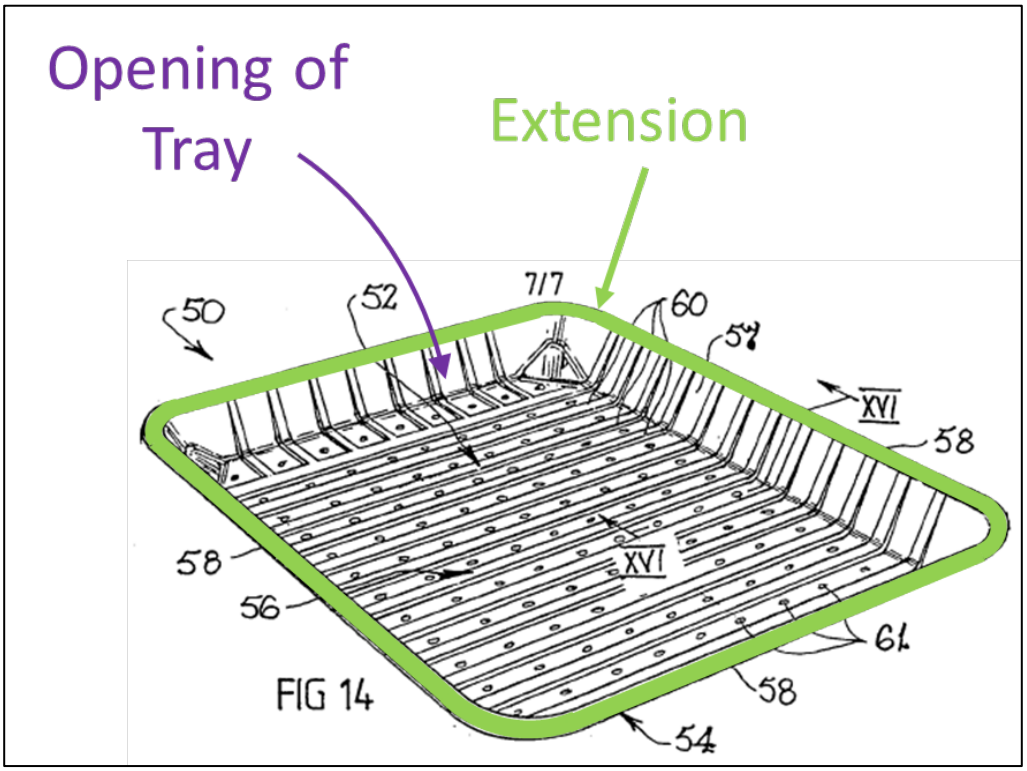
"More specifically this invention relates to ***trays for packaging which are wrapped in plastic film or plastic wrap***, methods of producing such trays, and apparatus for producing such trays." Id. 1:2-5. Portelli's Fig. 16 shows the "terminal edges 12… are folded downwardly inwardly well out of the 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 over wrap film that seals to itself to envelop the body.

157. As noted above, 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, showing body and periphery about which an over wrap film would seal to itself (annotations added).

i. Claim 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."

158. Portelli teaches a tray wherein the compartment is sealed by applying the film across the opening of the compartment and sealing the film about the periphery. A POSITA would be very familiar with heat sealing film across the opening of trays

and similar articles. To do so is widely understood to require a flat and horizontal surface area around the cavity to be sealed.

159. Portelli Fig. 13 shows an extension which includes a flat, horizontal portion (annotated in red), also identified as item 10:

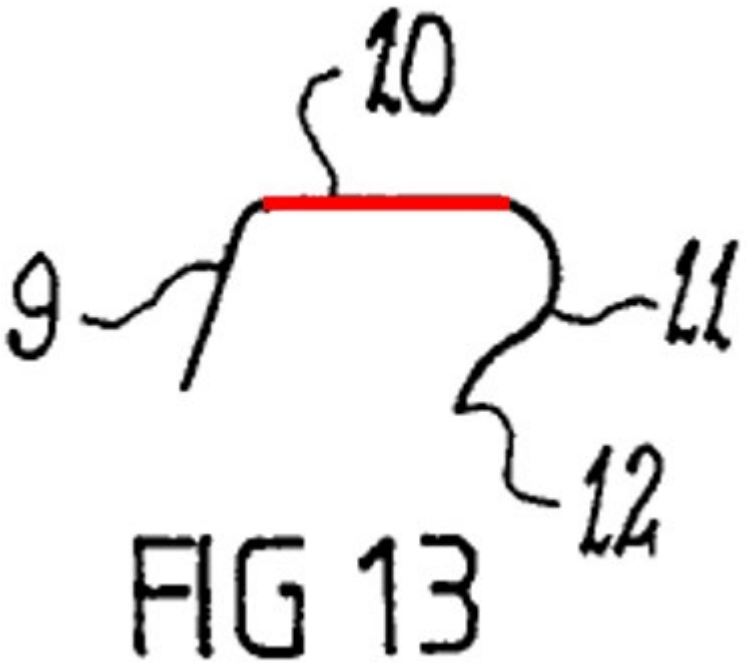
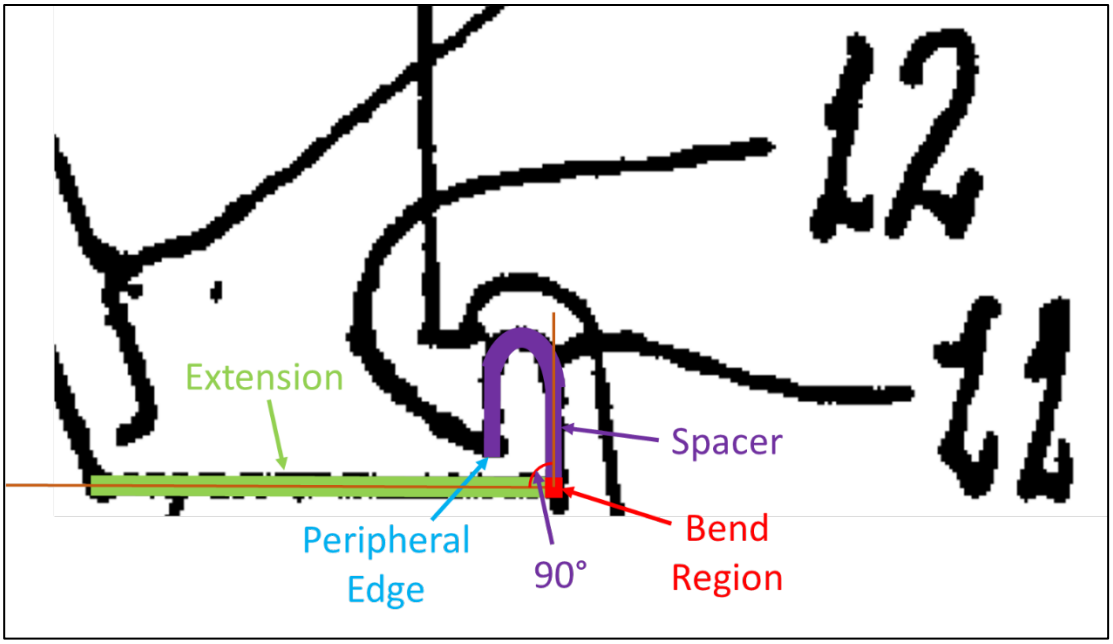


FIG 13

Portelli, Fig. 13, showing flat, horizontal sealing portion of extension (10, red)

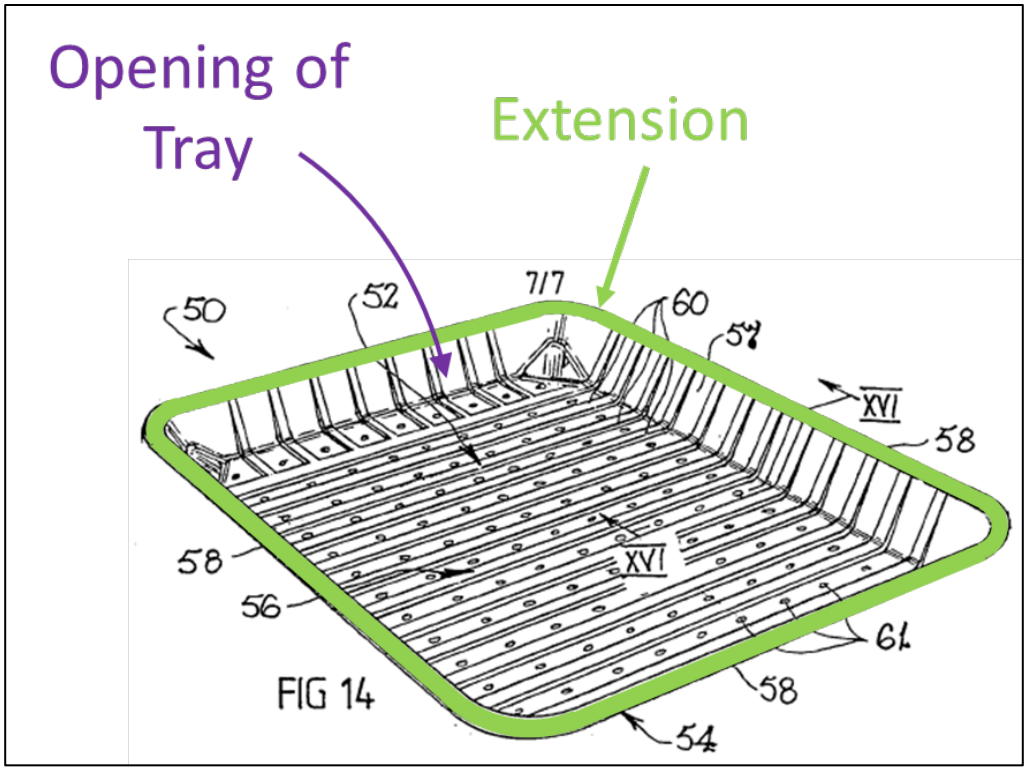
160. As another example, Portelli Fig. 8 shows a flat, horizontal extension portion, annotated in green below:

Ningbo Linhua Plastic Ex. 1003, p. 142



Portelli, Fig. 8 showing flat, horizontal sealing portion of extension in green (excerpted and annotations added).

161. As noted above, the extension encircles the entire periphery of Portelli's thermoplastic article.



Portelli, Fig. 14, showing body and periphery about which a film would be sealed (annotations added).

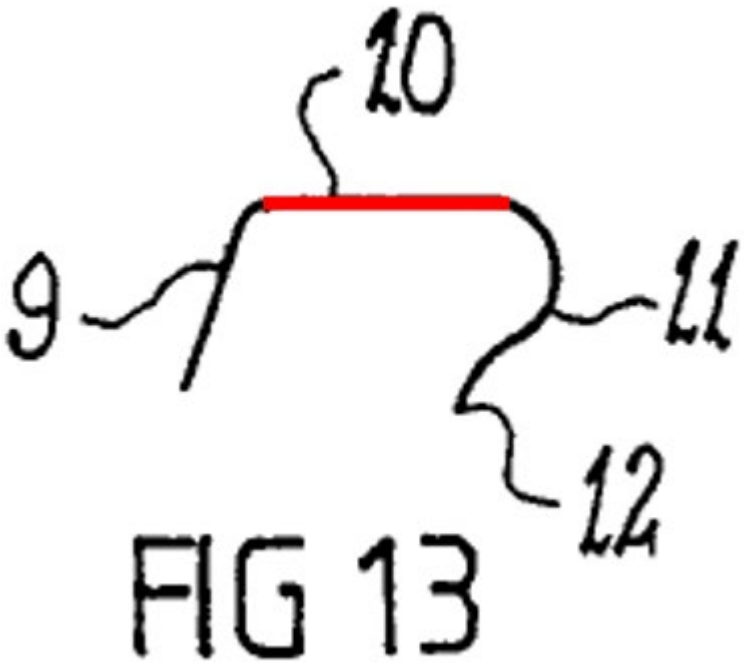
162. A POSITA would readily understand that common techniques for "applying a film across the opening of the compartment and sealing the film about the periphery" would include the common practice of heat sealing. A POSITA would further understand that Portelli's tray includes the necessary flat, horizontal 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.

Ningbo Linhua Plastic Ex. 1003, p. 144

i. Claim 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."

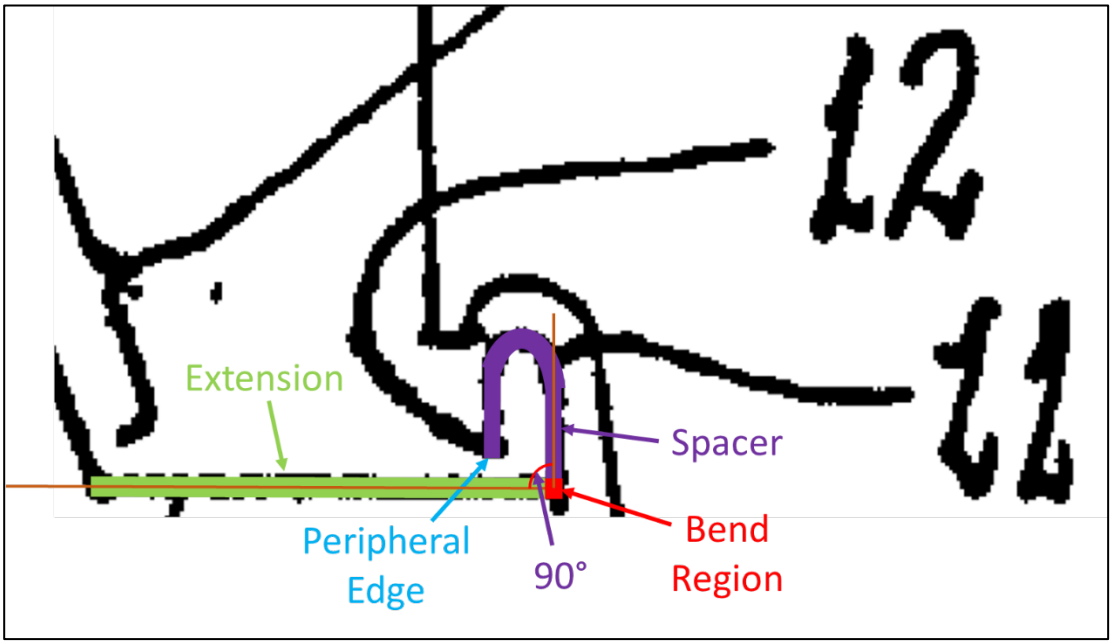
163. Here, the '222 Patent appears to be referring to a tray sealing technique commonly known in the art as "VSP," or vacuum sealed packaging, also known as vacuum skin packaging, due to the thin, form-fitting film application. This is one technique for enabling extended shelf life of perishable or non-shelf-stable food products. VSP involves applying a negative pressure, or vacuum force, between a film and the package containing product, at which time the film is sealed to the exposed portions of the tray. Such applications are widely understood to require a relatively pliable film that stretches, and which can be heated to promote further stretching as it contours and "thermoforms" to the tray and its contents during application. During removal from the package, the cooled VSP film requires peeling and "stretching outwardly." Like the common and ubiquitous "heat sealing" technique mentioned above it is desirable to have a flat, horizontal peripheral flange around the body of the tray, in this case for both pulling the vacuum between the film and package, as well as for sealing the VSP film to.

164. As previously noted above, Portelli Fig. 13 shows an extension which includes a flat, horizontal portion (annotated in red), also identified as item 10:



Portelli, Fig. 13, showing flat, horizontal sealing portion of extension (10, red)

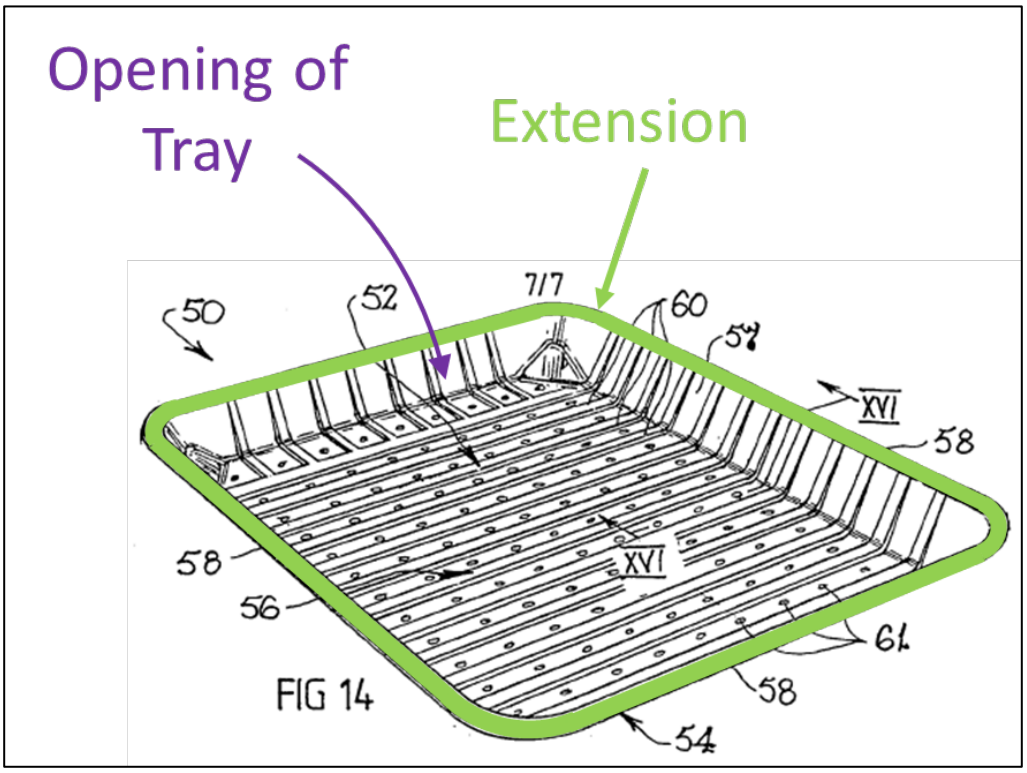
165. As another example, Portelli Fig. 8 shows a flat, horizontal extension portion, annotated in green below:



Ningbo Linhua Plastic Ex. 1003, p. 146

Portelli, Fig. 8 showing flat, horizontal sealing portion of extension in green (excerpted and annotations added).

166. As further noted above, 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 (annotations added).

167. A POSITA would readily 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 for film which is thermoformable and is disposed in a softened state around the smooth periphery of the body and cooled below

Ningbo Linhua Plastic Ex. 1003, p. 147

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.

i. <u>Claim 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."</u>

168. According to Patent '222, Fig. 1C illustrates ram 300 and peripheral edge of article 100, as shown below:

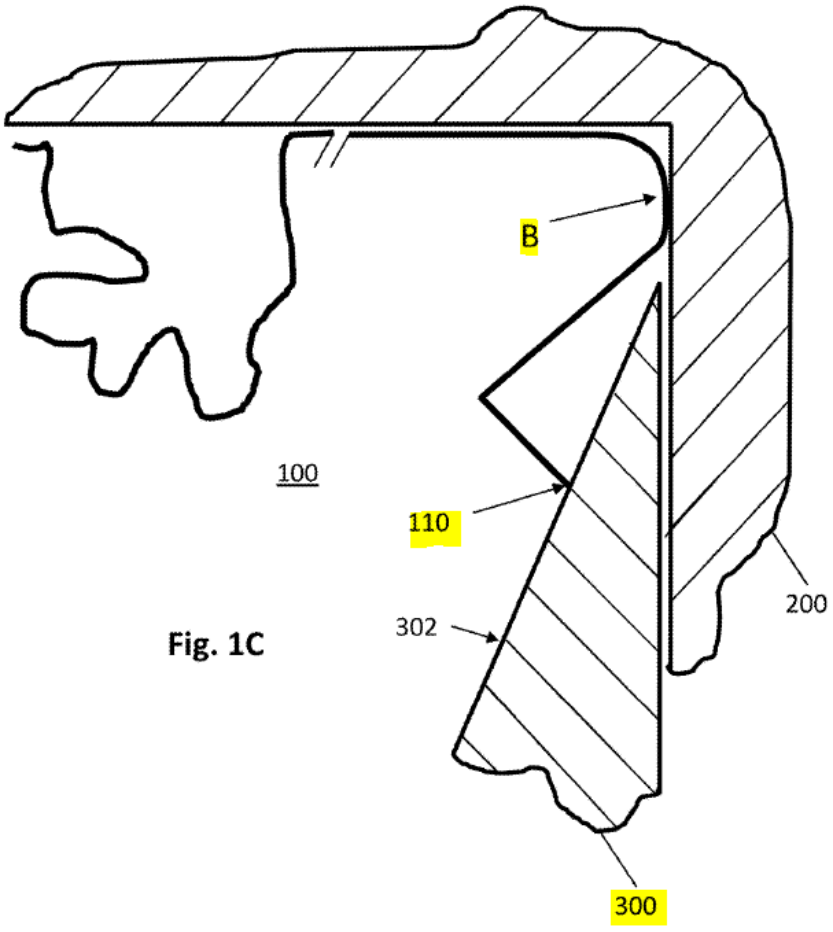


Fig. 1C

Ex. 1001 Fig. 1C, annotated.

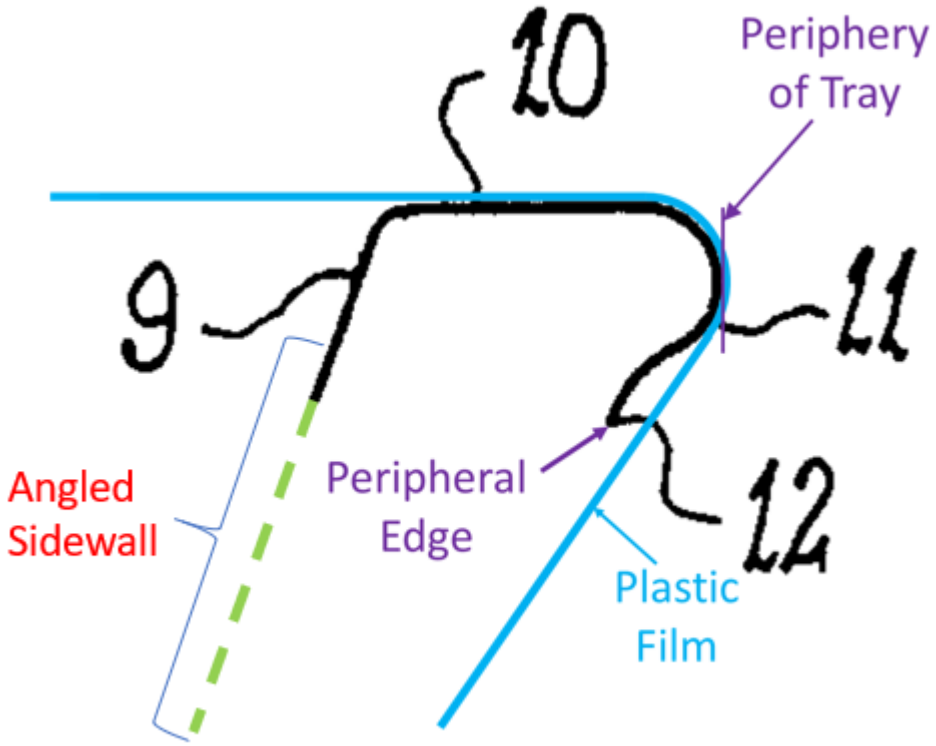
169. See my additional references regarding ram impinging against the deflectable flange to deflect the peripheral edge away from the periphery of the shaped article in my explanation of Claim 1e, which Portelli teaches in Figs. 8 and 13, among other Figs., specifications, and claims, as noted earlier. My Claim 1 references are incorporated herein in their entirety.

170. With respect to the '222 Patent claim 11 limitation regarding deflecting the peripheral edge "…sufficiently that a flexible film that tautly over-wraps the shape article after cooling the bent portion does not contact the peripheral edge," Portelli teaches this with abundance. Portelli contains several references to displacing the thermoform tray's sharp peripheral edge inwardly so that it avoids the path of the film around the tray, i.e. the "wrap path". *See* Portelli, Abstract (The "***terminal edge (12)*** … ***is deformed inwardly out of a wrap path around the tray*** (5)."), 1:29-2:18 (purpose of invention is to solve a problem of conventional trays which "have a sharp terminal edge forming the periphery thereof with an unfortunate tendency to tear or cut through plastic film within which the trays are wrapped."), 1:29-2:18 (referring to previous trays with "a sharp terminal edge forming the periphery thereof with an unfortunate tendency to tear or cut through plastic film within which the trays are wrapped." Portelli offers the solution of "provid[ing] a tray which has a terminal edge which does not

Ningbo Linhua Plastic Ex. 1003, p. 149

form the peripheral edge of the tray [, i.e.,] a tray in which the ***terminal edge faces away from the path transversed by plastic film which is wrapped around the tray (hereinafter referred to as the wrap path***."), 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***"), 5:1-2, 12, 5:25-28 ("This invention also extends to a plastic tray including a ***peripheral edge region terminating in a terminal edge, wherein the peripheral edge region is deformed laterally inwardly such that the terminal edge is displaced out of a wrap path around the tray***."), 5:29-6:3, 15:20-23 ("[T]he ***terminal edges 12 of the two members 51 and 52 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."), 18:3-5, 20:11-16, 24-27, 21:17-23.

171. Portelli Fig. 13 teaches this solution where the peripheral edge 12 will not contact, cut or damage the plastic overwrap film, since peripheral edge is displaced sufficiently away from the "wrap path", as shown below:



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

172. This is also illustrated in Fig. 16 of Portelli, which shows the peripheral edge 12 displaced inward, well away from the film 55 so that the film 55 does not contact the peripheral edge 12:

Ningbo Linhua Plastic Ex. 1003, p. 151

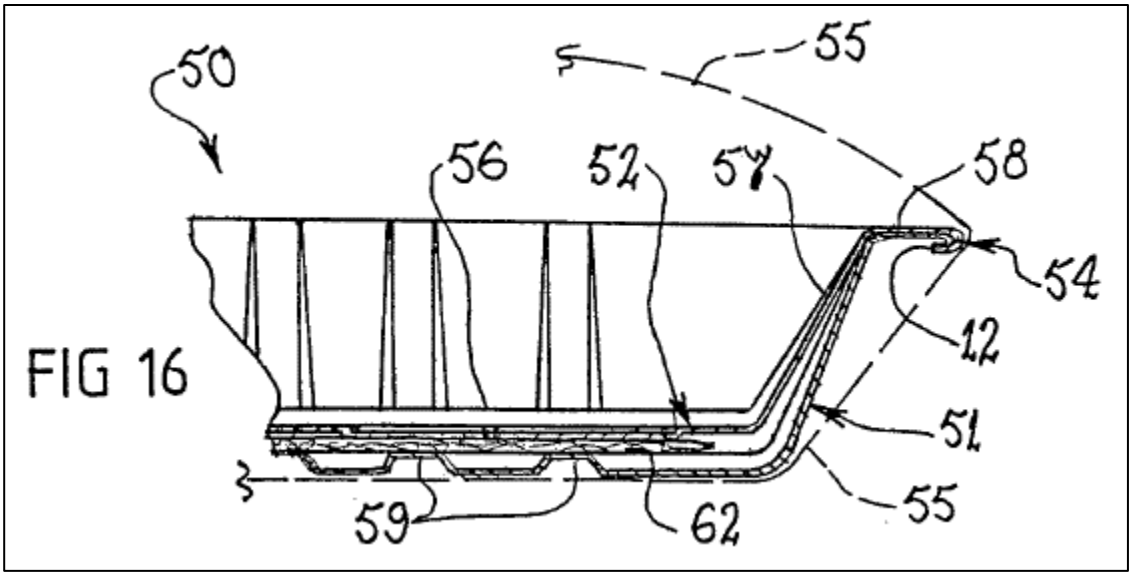


FIG 16

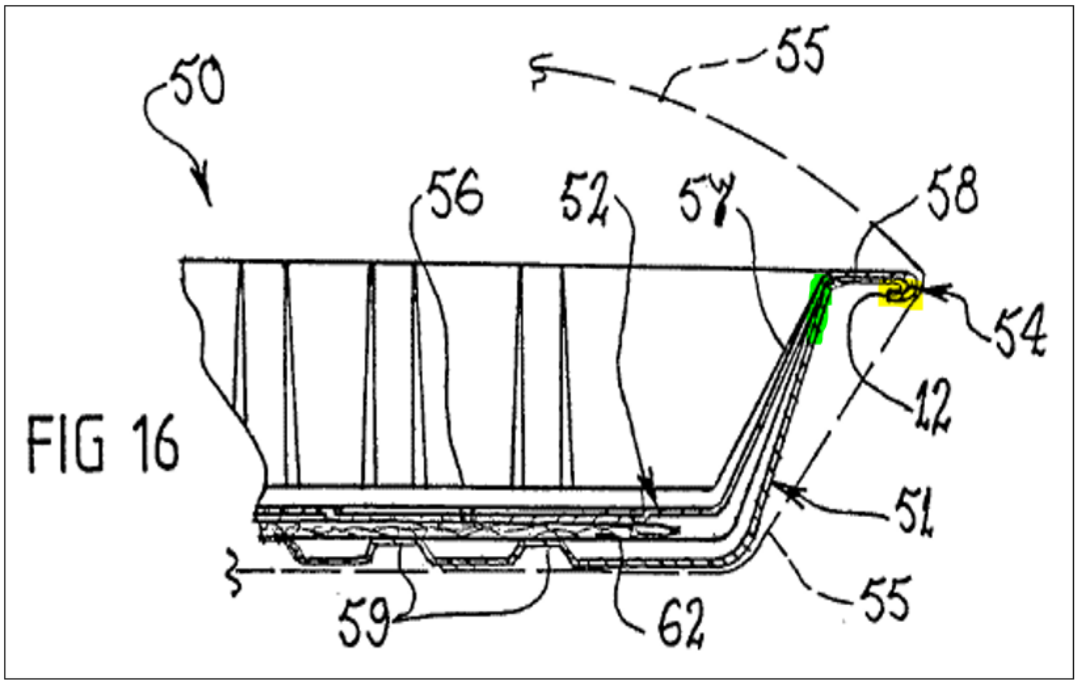
Portelli, Fig. 16.

173. For at least these reasons, Portelli teaches 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.

i. Claim 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."

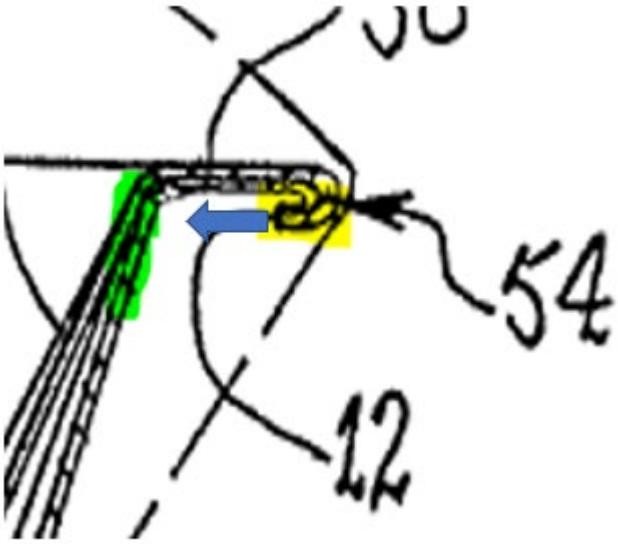
174. See above and my Claim 1e references regarding ram impinging against the deflectable flange to deflect the peripheral edge away from the periphery of the shaped article, which Portelli teaches in Figs. 8 and 13, among other Figs., specifications, and claims, as noted earlier. My Claim 1 references are incorporated herein in their entirety.

175. With respect to '222 Patent claim 12 further limitation regarding deflecting "…the peripheral edge sufficiently that the peripheral edge points at the body after cooling the bent portion," Portelli discloses this as well. For example, Fig. 16 of Portelli, which shows the peripheral edge 12 (yellow), after formation and cooling of the bent portion, displaced inward and in fact ***points at the tray's body*** **(green)**:



Portelli, Fig. 16.

176. For reference, an excerpt of Fig 16 is shown here, again with the peripheral edge 12 (yellow), after formation and cooling of the bent portion, displaced inward and in fact ***pointing*** **(blue arrow)** ***at the tray's body*** **(green)**:



Portelli, Fig. 16, showing peripheral edge 12 (yellow) points at (blue arrow) the body (green). (excerpted and annotated).

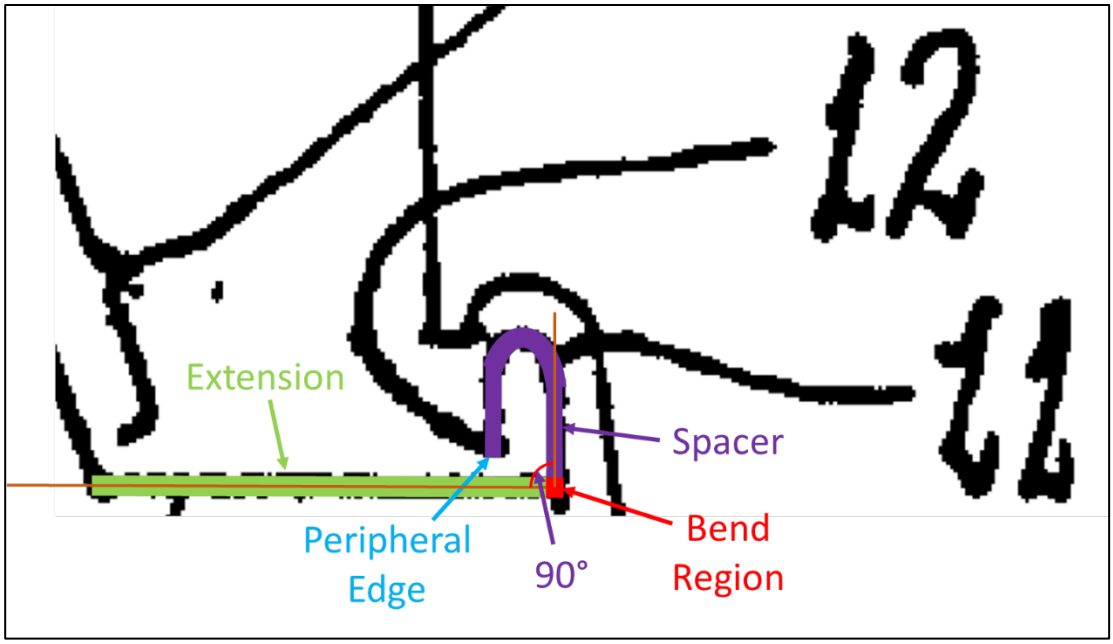
177. A POSITA would recognize that the displacement location and ultimate direction of the peripheral edge is a choice well within their capability, and would consider factors such as tray body depth and technique of film application when choosing this detail. Portelli shows several locations and displacements of the peripheral edge, including that of Figs. 8, 13, and 16, demonstrating that this is a matter of choice and configuration of apparatus.

Ningbo Linhua Plastic Ex. 1003, p. 154

i. Claim 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."

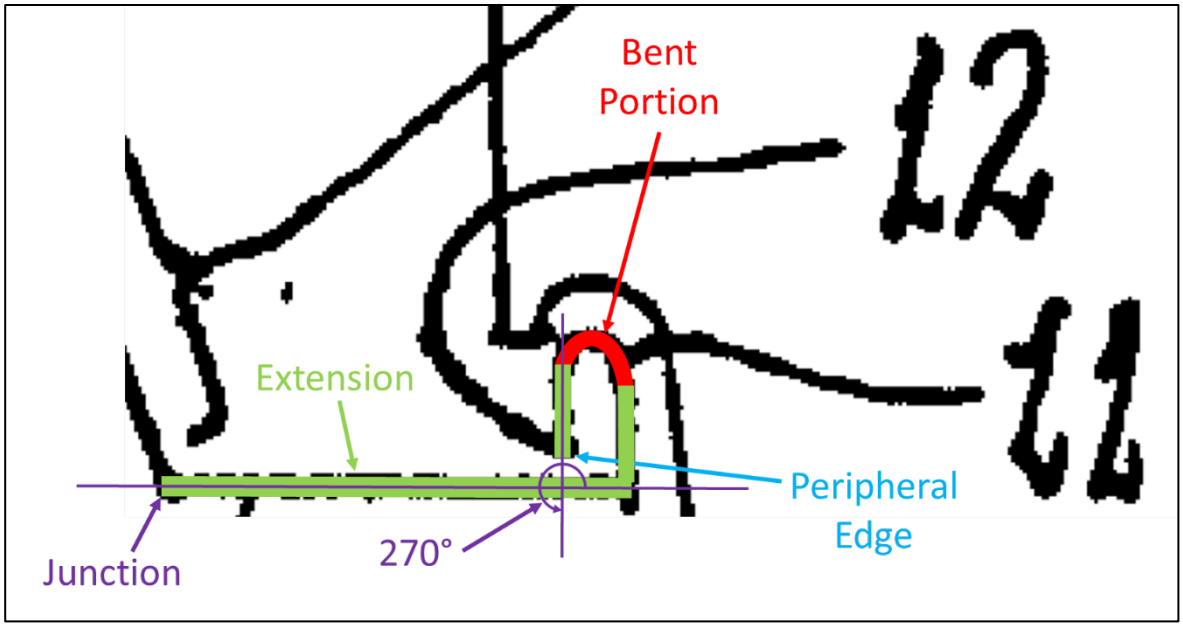
178. See above and my Claim 1e. references regarding a ram impinging against the deflectable flange to deflect the peripheral edge away from the periphery of the shaped article, which Portelli teaches in Figs. 8 and 13, among other Figs., specifications, and claims, as noted earlier. My Claim 1 references are incorporated herein in their entirety.

179. With respect to the '222 Patent claim 13 limitation regarding deflecting "…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," Portelli discloses this as well. As previously shown, Portelli's Fig. 8 discloses a bend region which interconnects the spacer with the extension at an angle of 90 degrees, as shown below:



Portelli, Fig. 8 (excerpted and annotations added).

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



Portelli, Fig. 8 (excerpted and annotations added).

181. For the purpose of this discussion, the extensions illustrated in Portelli Figs 8 and 13 are interchangeable and can be combined, even though they are not shown as being identical. This is owing to the fact both drawings are referenced by Portelli in disclosing the prior art of rolled flanges with displaced peripheral flanges resulting in smooth tray peripheries. Furthermore, when working with food trays in produce and other food applications involving film overwrap, I have developed and tested trays with rolled flanges having various degrees of rolling or bending in their flanges. In those examples, I found the bent portions to function similarly regarding preventing film cutting or damage, provided that the flanges were sufficiently displaced from the tray periphery.

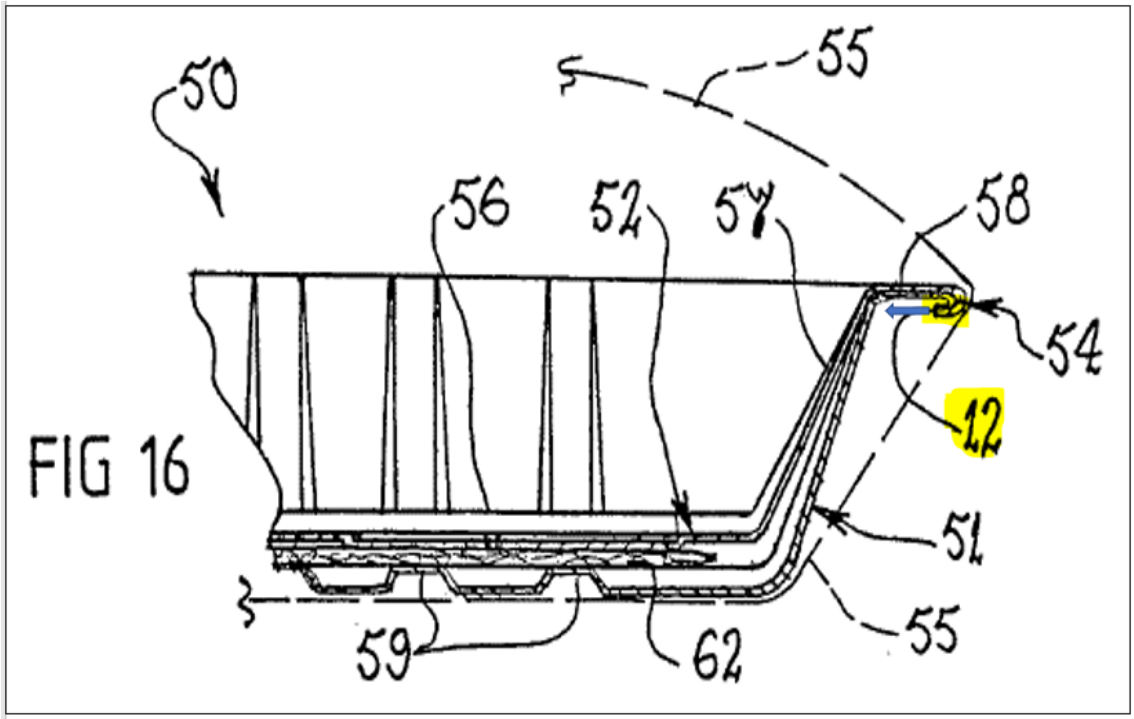
182. Accordingly, as shown in Portelli's Fig. 8, the peripheral edge of Fig. 13 could be bent all the way over into a 270-degree angle just as Portelli discloses in Fig. 8. Portelli even references "the apparatus of Figs. 7 and 8." *Id*. 14:10-28, and provides a description of processing the tray extensions of the invention using that apparatus. A POSITA would interpret this portion of Portelli's prior art 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 like that shown in Portelli Fig. 8:

Ningbo Linhua Plastic Ex. 1003, p. 158



Portelli, Fig. 13 peripheral edge 12 bent to 270 degrees with Fig. 8 ram 25 (excerpted and annotated).

183. Additionally, Portelli discloses the peripheral edge is offset from the plane of the extension by an angle of not less than 180 degrees. 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*** (annotated).

184. For reference, an excerpt of Fig 16 is shown here, again with the peripheral edge 12 (yellow), after formation and cooling of the bent portion, displaced inward and in fact ***offset from the plane of extension 180 degrees*** **i.e. <u>not less than 180 degrees</u>, as required**:



Portelli, Fig. 16 showing peripheral edge 12 ***offset from the plane of extension 180 degrees*** (excerpted and annotated).

185. A POSITA would recognize that the displacement location and ultimate direction of the peripheral edge is a choice well within their capability, and would consider factors such as tray body depth and technique of film application when choosing this detail. Portelli shows several locations and displacements of the peripheral edge, including that of Figs. 8, 13, and 16, demonstrating that this is a matter of choice and configuration of apparatus.

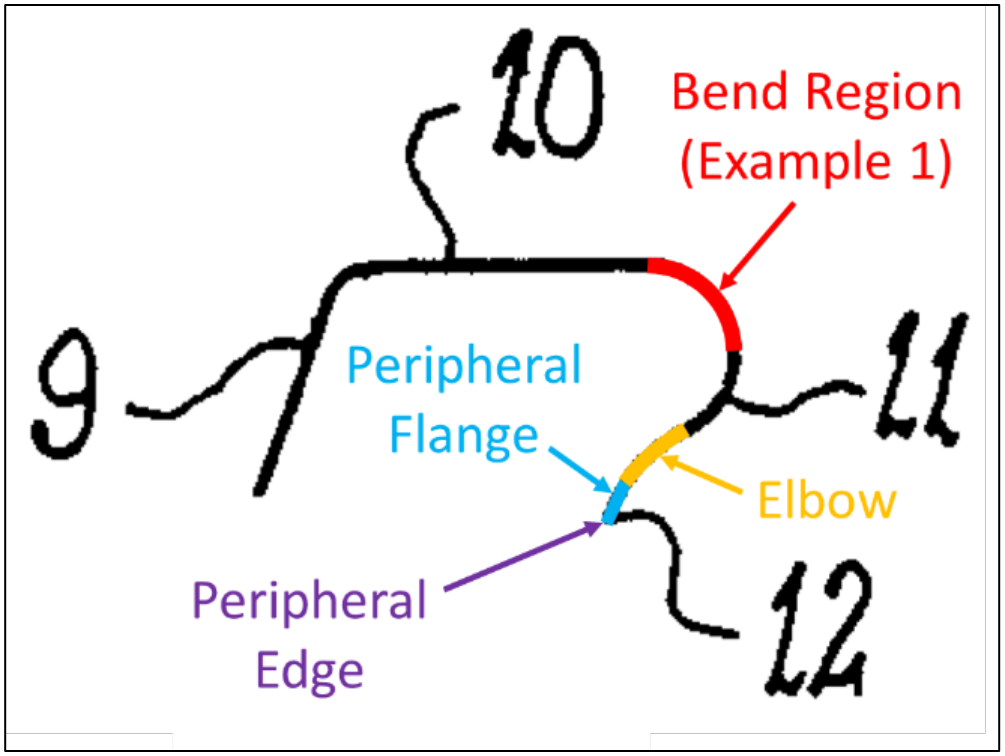
186. For at least these reasons, Portelli teaches the ram is impinged against the deflectable flange to deflect the peripheral edge to a position at which a plane through

Ningbo Linhua Plastic Ex. 1003, p. 161

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.

i. Claim 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."

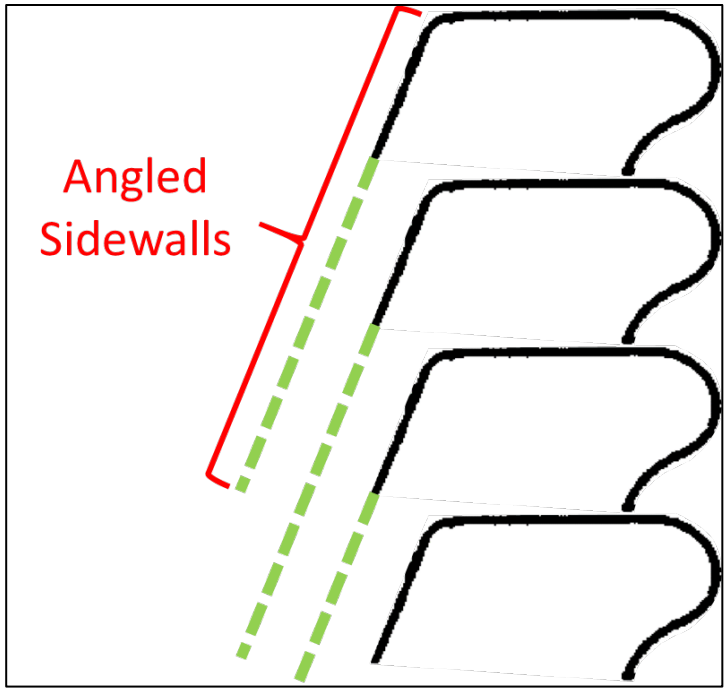
187. Portelli teaches a deflectable flange is deflected to differing degrees at selected portions of the ram, whereby the height of the deflected peripheral flange differs at peripheral portions corresponding to the selected portions after cooling the bent portion. This is why Portelli's Fig. 13 shows differing heights and geometries for the various features of the deflectable flange, i.e. a bend region, an elbow, and a peripheral flange, as shown here:



Portelli, Fig. 13 (annotated).

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

Ningbo Linhua Plastic Ex. 1003, p. 163



Portelli, Fig. 13 (duplicate shapes and annotations added).

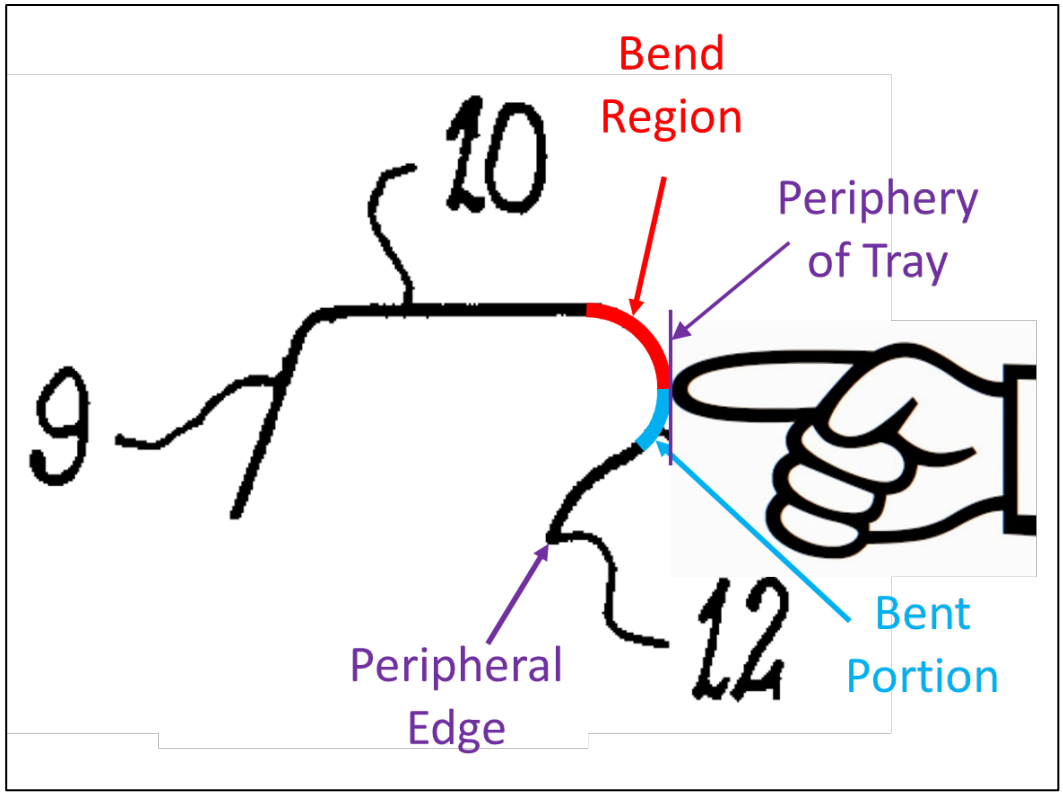
I have had direct experience with nesting of thermoformed articles with rolled flanges where, when multiple articles were nested together, the geometry of the rolled flange extension of each article rested on top of the underlying identical article, supporting it about the periphery in a similar manner to that shown above in the annotated Portelli Fig 13. For example, such was the case with the Method Home Products thermoform developed in/around 2006. Additionally, part nesting is also enabled by the inherent requirement of draft angles in the body of thermoformed articles, where the sidewalls are sloped or angled. While draft angles of only 1.5 to 4 degrees are required for non-nested articles, fully nested articles require steeper sidewall draft angles, typically around 7 to 10 degrees. Portelli teaches a sidewall with generous draft angles

conducive to stacking (or nesting) and de-stacking (or de-nesting) when combined with the geometry of his peripheral extension geometry.

i. Claim 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."

189. See previously mentioned references to a ram impinging against the deflectable flange.

190. Portelli's tray also teaches 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. For example, Portelli Fig. 13 discloses this, as shown here:



Portelli, Fig. 13 (annotations added).

191. The prior art of Portelli further teaches the peripheral edge being displaced sufficiently out of the "wrap path" where plastic film wrapping around the tray would be located. *See 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***"), 5:1-2, 12, 5:25-28 ("This invention also extends to a plastic tray including a ***peripheral edge region terminating in a terminal edge, wherein the peripheral edge region is deformed laterally inwardly such that the terminal edge is displaced out of a wrap path around***

the tray."), 5:29-6:3, 15:20-23 ("[T]he ***terminal edges 12 of the two members 51 and 52 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."), 18:3-5, 20:11-16, 24-27, 21:17-23 (all emphasis added). The person running a finger along the periphery of the tray would not be able to perceive the peripheral edge which is displaced out of the wrap path, since the plastic film is wrapped around the periphery of the tray, which is the same location that a person running a finger along the periphery would touch the tray.. I have had direct experience developing and testing similar thermoformed articles with rolled flanges, where the peripheral edge was displaced sufficiently away from the periphery so that I could not feel or perceive the peripheral edge when moving my finger along the article's periphery.

i. Claim 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."

192. See previous references to the ram being urged against the peripheral flange. In addition, Portelli discloses Claim 16 limitations through his Figs. 3-4, which show a ram 3 is urged against the peripheral flange by applying force to at least the extension 11 in the direction of the ram. The extension 11 in these Figs. extends

Ningbo Linhua Plastic Ex. 1003, p. 167

laterally in a plane (see Fig. 3 below) about the entire periphery (see Fig 8 below, among others). Portelli shows the flange of his thermoplastic shape being deflected in his Fig. 4 as plug (previously inserted foot 4) inhibits inward displacement of the deflectable flange:

Ningbo Linhua Plastic Ex. 1003, p. 168

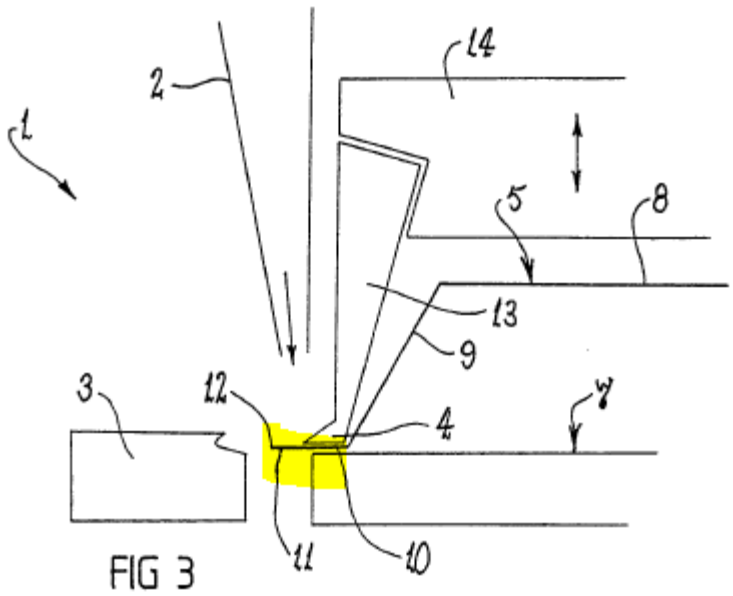


FIG 3

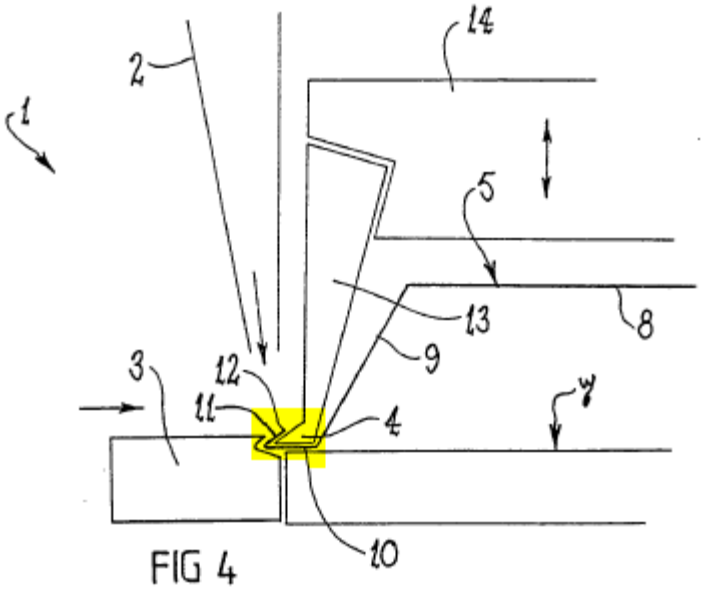
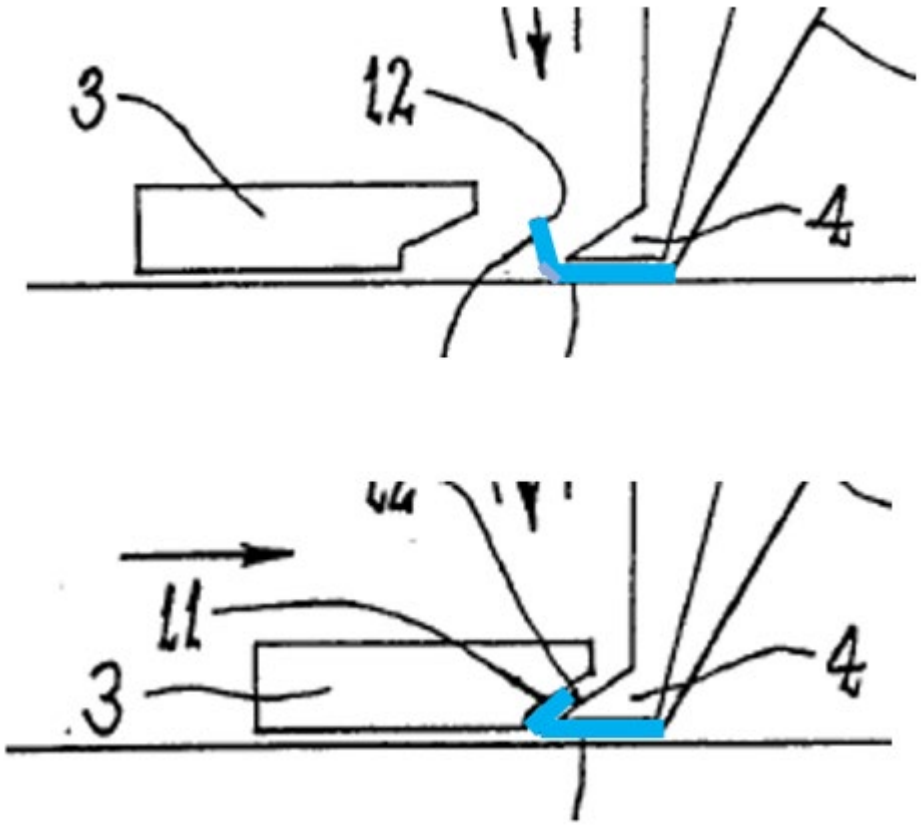


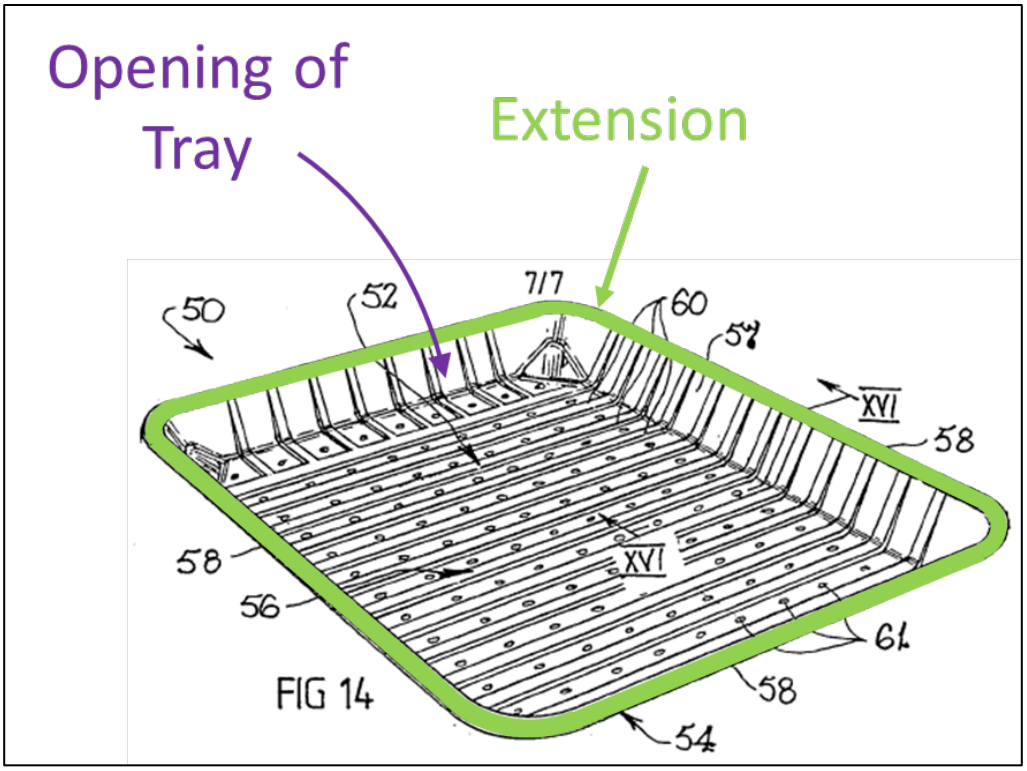
FIG 4

Portelli, Figs 3 and 4 annotated.

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



Portelli, Figs. 1 and 2 (excerpted and annotations added).



Portelli, Fig. 14, showing extension extends laterally in a plane about the entire periphery of the opening of a concave compartment in the body (annotations added).

194. Portelli further describes the embodiment in Figs. 3 and 4, explaining, "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. (emphasis added).

195. Continuing with his description of the ram (former 3) and plug (anvil 4) in his Figs. 3-4, Portelli explains, "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.

196. To the extent that the court determines that Portelli's plug (anvil 4) is not inserted within "a concave compartment in the body" of the article, Portelli also describes the importance of executing his method of displacing the peripheral edge concurrent with molding the body of the article, in order to take advantage of the residual heat inherent in the newly-formed thermoplastic article and flange. Specifically, Portelli states, "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.

197. 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 necessarily "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, and was so well before the application for the '222 Patent was filed. In fact, "plug assist" thermoforming is a common methodology and apparatus.

Ningbo Linhua Plastic Ex. 1003, p. 172

198. Thus, 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.

199. Still further, Portelli describes further means for inhibiting inward displacement of the deflectable flange. He states regarding his Fig. 11, "***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 laterally 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 the former portions 34-41 defining the end of the stroke thereof." Id. 11:15-26. (emphasis added). Note that "support surface 7" which supports the *inside* of tray 5 is equivalent to Patent '222's recited "plug that substantially fills the opening is inserted therein prior

Ningbo Linhua Plastic Ex. 1003, p. 173

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:

Ningbo Linhua Plastic Ex. 1003, p. 174

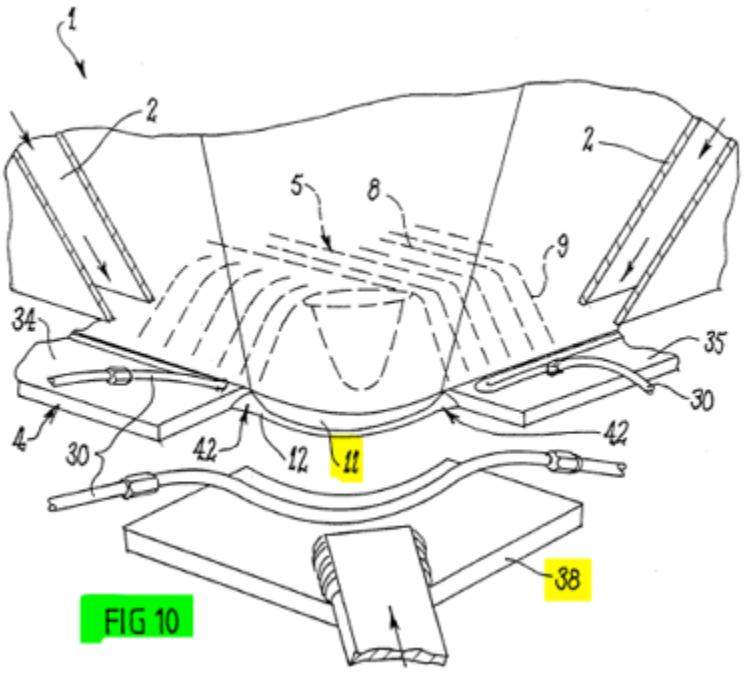
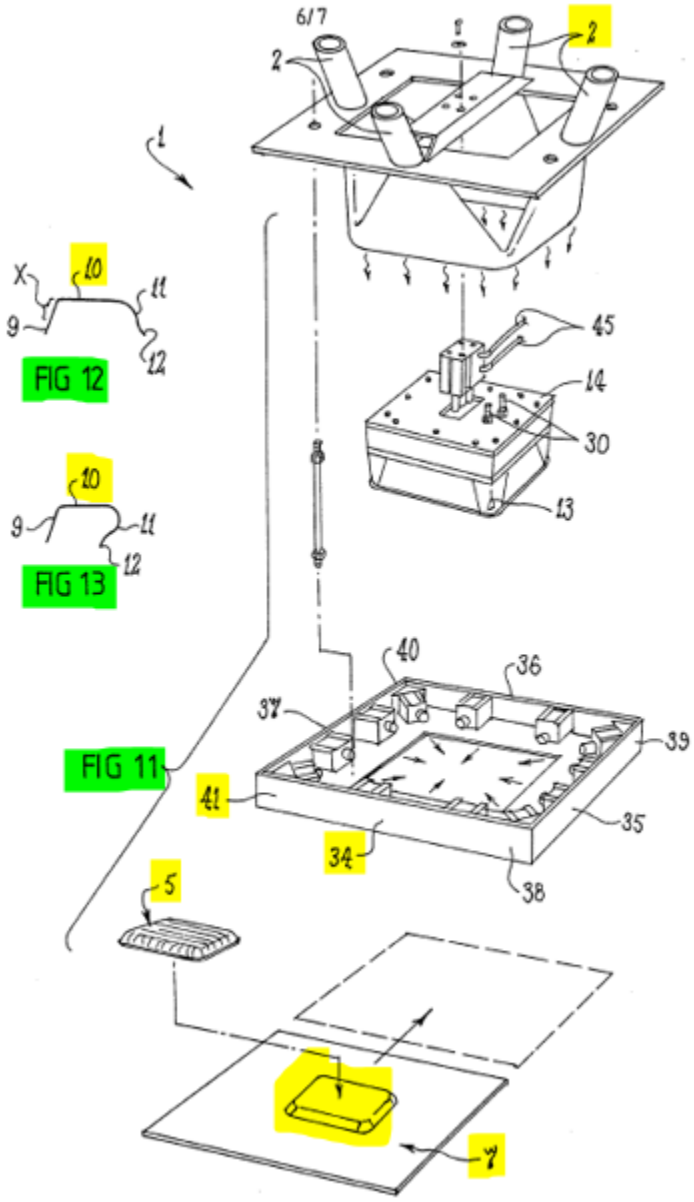


FIG 10



Portelli, Figs 10-13 annotated.

200. For at least these reasons, Portelli Figs. 3 and 4 disclose the ram (former 3) is urged against the peripheral flange (11) by applying force to at least the extension (11) in the direction of the ram, wherein the extension (11) extends laterally in a plane about the entire periphery of the opening of a concave compartment in the body and

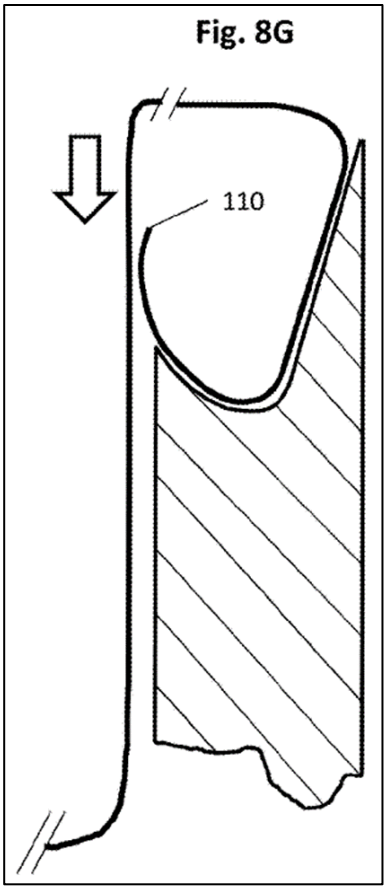
wherein a plug that substantially fills the opening is inserted therein prior to urging the ram against the peripheral flange, whereby the plug inhibits inward displacement of the deflectable flange.

i. Claim 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."

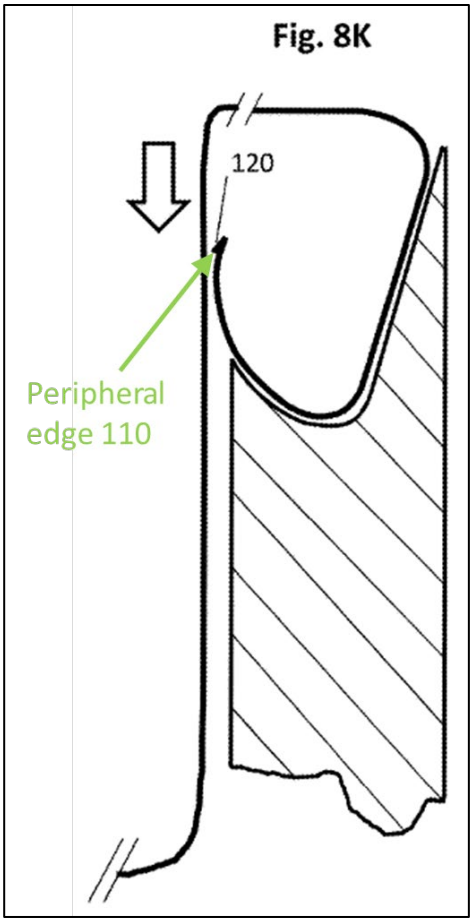
201. See Claim 1 references above, including claim element 1e., regarding ram impinging against the deflectable flange to deflect the peripheral edge away from the periphery of the shaped article, which Portelli teaches in Figs. 8 and 13, among other Figs., specifications, and claims, as noted earlier. My Claim 1 references are incorporated herein in their entirety.

202. The '222 patent illustrates in Figs. 8G and 8K ram 300 impinging the 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:

Ningbo Linhua Plastic Ex. 1003, p. 177



Ningbo Linhua Plastic Ex. 1003, p. 178

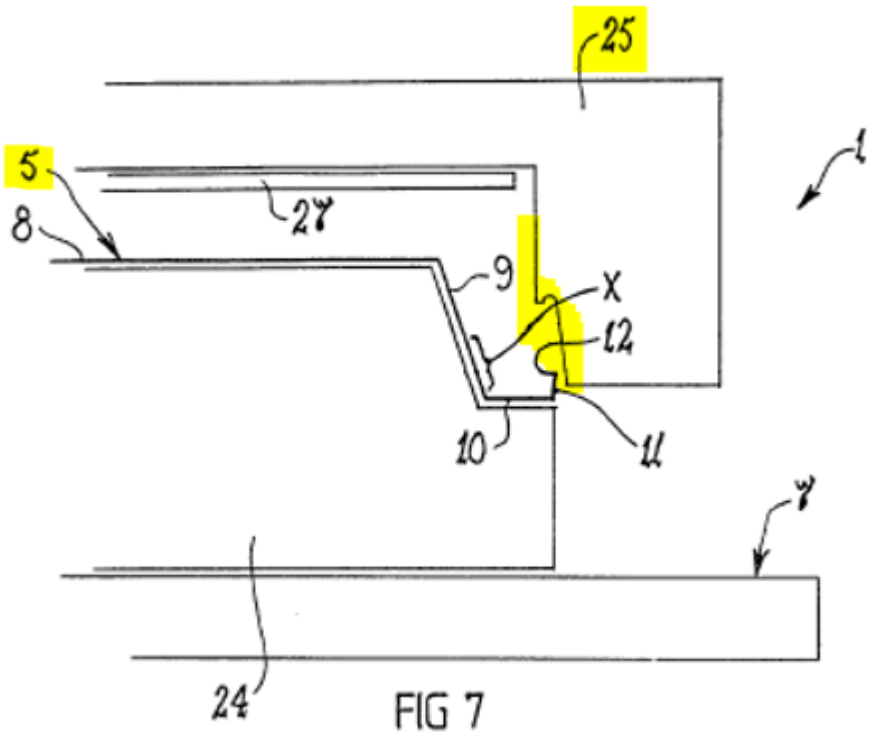


Ex. 1001, Figs 1C, 8G, 8K (annotated).

203. As noted above regarding the similar claim 13 of the '222 Patent, Portelli teaches "…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." Portelli Fig. 7 discloses a

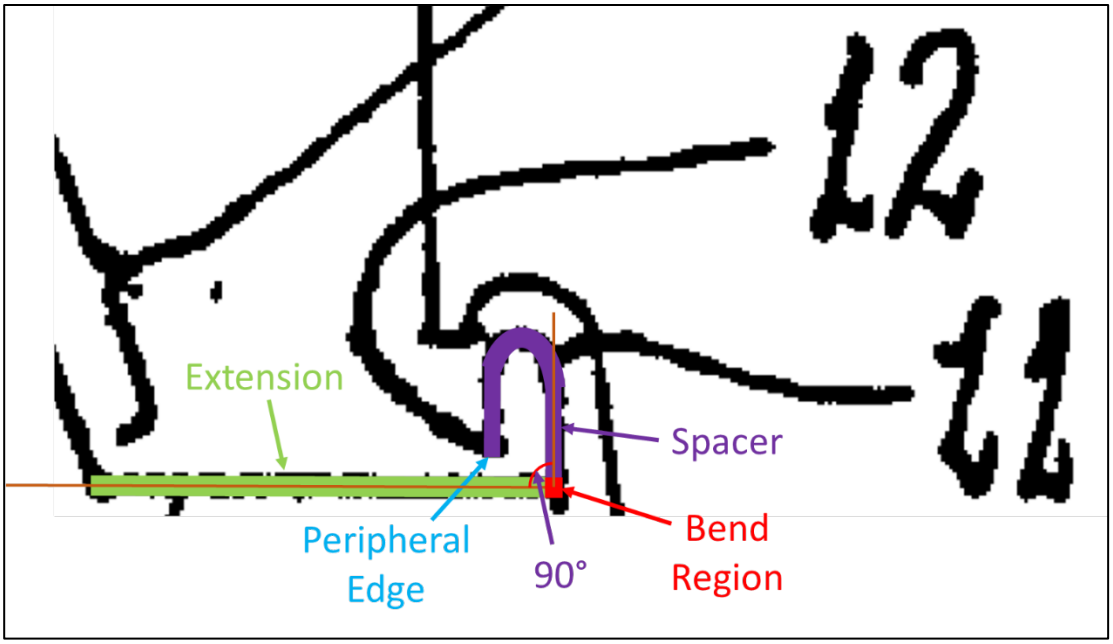
Ningbo Linhua Plastic Ex. 1003, p. 179

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:



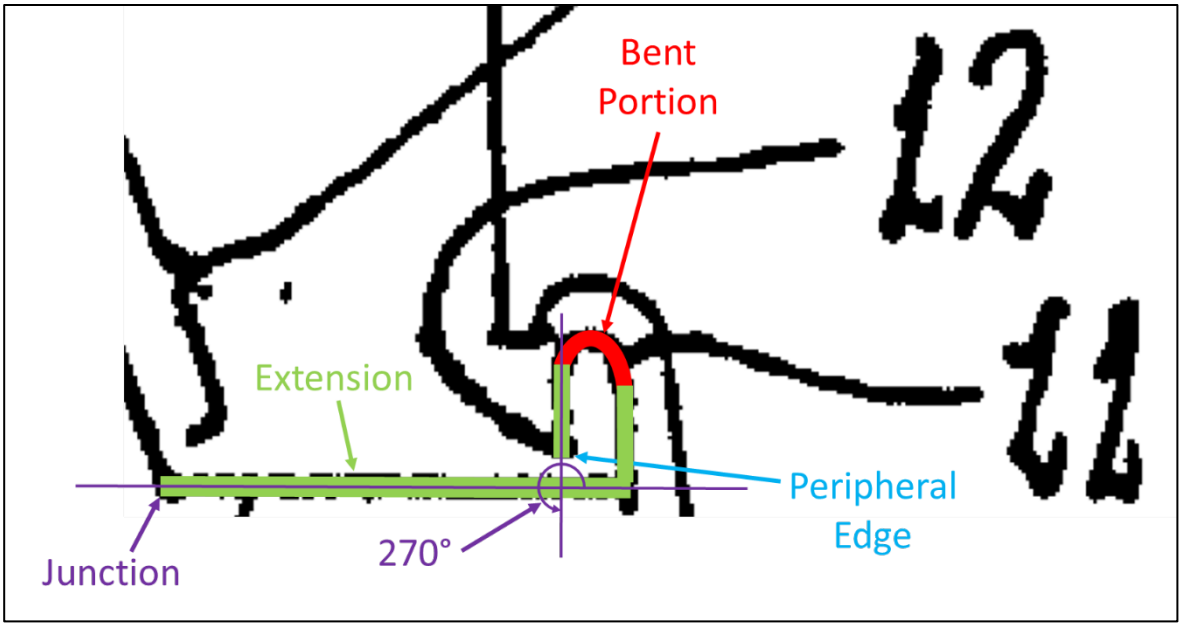
Portelli, Fig 7, annotated to show ram 25 "upper face"

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



Portelli, Fig. 8 (excerpted and annotations added).

205. Furthermore, Portelli teaches a tray, illustrated in Fig. 8, in which the deflectable flange is impinged by the ram so that the peripheral edge nearly touches the horizontal part of the extension. As noted earlier, I measured the angle between those two lines by scanning and importing Portelli Fig. 8 digitized file into QCAD 2D CAD version 3.26.1 software, selecting figure elements related to peripheral edge and extension, and drawing lines on Fig. 8 through and parallel to the peripheral edge and the horizontal portion of the extension. Using the software's angle measurement tool, I determined the angle to be 270 degrees, which more than "at least about 180 degrees" recited by the '222 Patent claim 17:



Portelli, Fig. 8 (excerpted and annotations added).

206. For the purpose of this discussion, and as previously mentioned, the extensions illustrated in Portelli Figs 8 and 13 are interchangeable and can be combined, even though they are not shown as being identical. This is owing to the fact both drawings are referenced by Portelli in disclosing the prior art of rolled flanges with displaced peripheral flanges resulting in smooth tray peripheries. Furthermore, when working with food trays in produce and other food applications involving film overwrap, I have developed and tested trays with rolled flanges having various degrees of rolling or bending in their flanges. In those examples, I found the bent portions to function similarly regarding preventing film cutting or damage, provided that the flanges were sufficiently displaced from the tray periphery.

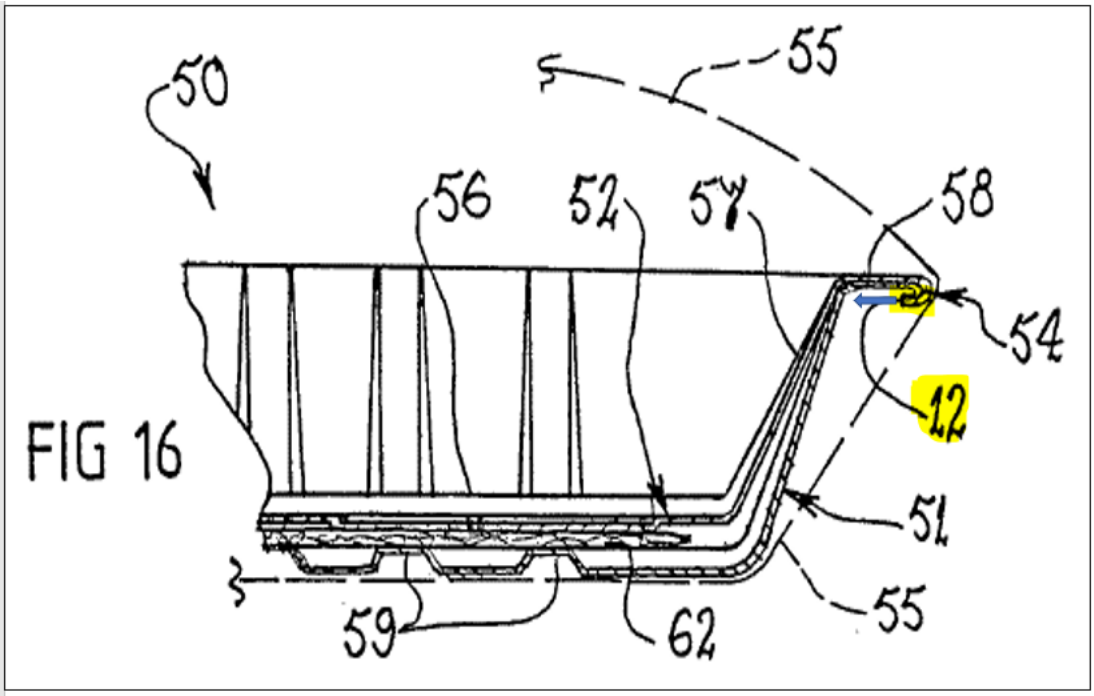
207. Accordingly, as shown in Portelli's Fig. 8, the peripheral edge of Fig. 13 could be bent all the way over into a 270-degree angle just as Portelli discloses in Fig. 8. Portelli even references "the apparatus of Figs. 7 and 8." *Id*. 14:10-28, and provides a description of processing the tray extensions of the invention using that apparatus. A POSITA would interpret this portion of Portelli's prior art 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 peripheral edge 12 bent to 270 degrees with Fig. 8 ram 25 (excerpted and annotated).

Ningbo Linhua Plastic Ex. 1003, p. 184

208. Additionally, Portelli discloses the peripheral edge is offset from the plane of the extension by an angle of not less than 180 degrees. 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. "at least about 180 degrees" as recited by the '222 Patent claim 17:



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

209. For reference, an excerpt of Fig 16 is shown here, again with the peripheral edge 12 (yellow), after formation and cooling of the bent portion, displaced inward and in fact ***offset from the plane of extension 180 degrees*** **i.e. "at least about 180 degrees," as required**:



Portelli, Fig. 16 showing peripheral edge 12 ***offset from the plane of extension 180 degrees*** (excerpted and annotated).

210. A POSITA would recognize that the displacement location and ultimate direction of the peripheral edge is a choice well within their capability, and would consider factors such as tray body depth and technique of film application when choosing this detail. Portelli shows several locations and displacements of the peripheral edge, including that of Figs. 8, 13, and 16, demonstrating that this is a matter of choice and configuration of apparatus.

211. For at least these reasons, Portelli teaches "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

Ningbo Linhua Plastic Ex. 1003, p. 186

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."

i. Claim 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."

212. Portelli specifications, Figures and claims teach softening the spacer sequentially by impinging sequential portions against the ram in a plurality of discrete, incremental advances. For example, Portelli's method, apparatus and flange geometry are capable of "incremental advances" and "sequential impinging." Portelli illustrates various degrees and increments of impinging the ram against the peripheral flange, as a POSITA would understand that Portelli's ram is slidably movable, and thus can selectively impinge the deflectable flange and its spacer. Indeed, Portelli describes the ram configuration and movement in his Fig. 1, stating, "The former [ram] 3 is a solid block **slidable along the support surface 7** towards and away from the anvil 4. The former may be driven by any suitable mechanical drive means. Such drive means are well known to persons skilled in the art and as such will not be described in any further detail here." Id. 9:4-7. (emphasis added).

213. Accordingly, Figs. 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:

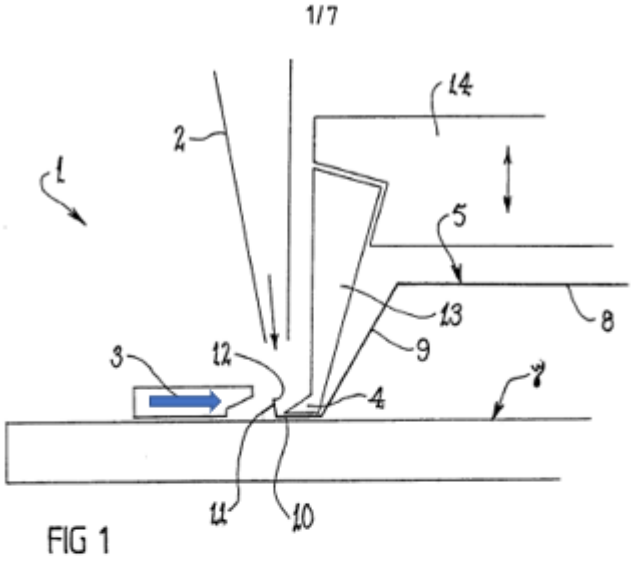


FIG 1

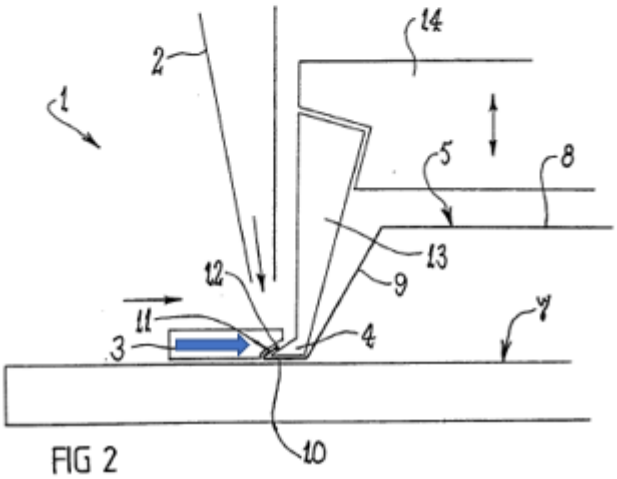
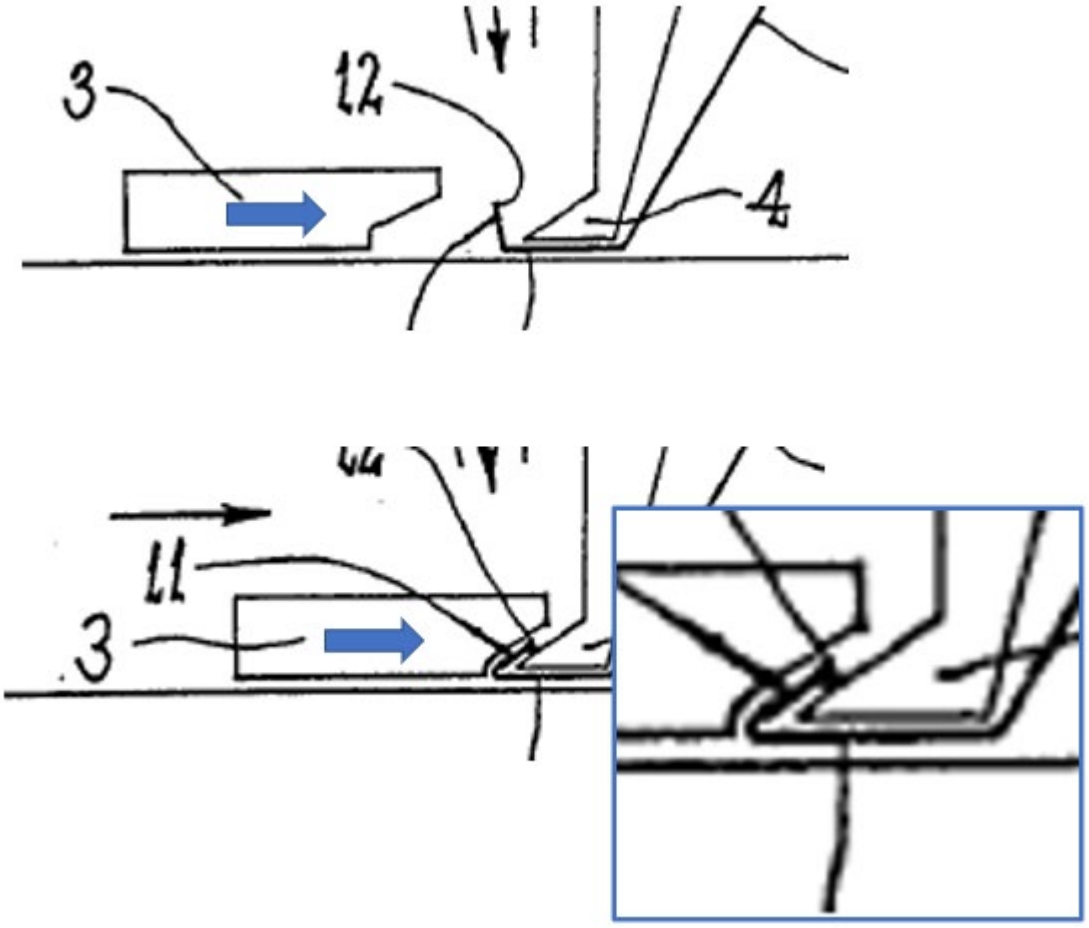


FIG 2

Portelli, Figs. 1 and 2 (annotated). See also Figs. 3-6.

214. A closer inspection of Portelli's Figs. 1 and 2 show this in further detail:



Portelli, Figs. 1 and 2 (excerpted and annotated).

215. Portelli similarly demonstrates in Figs. 7 and 8 the ram moving towards the peripheral flange in increments, with Fig. 7's ram still some distance from the peripheral flange and its spacer. Fig. 8 shows the ram having contacted the deflectable flange and deflected the spacer, but still having a "discrete, incremental

advancement" to travel and sequentially engage the ram with the deflectable flange and its spacer.

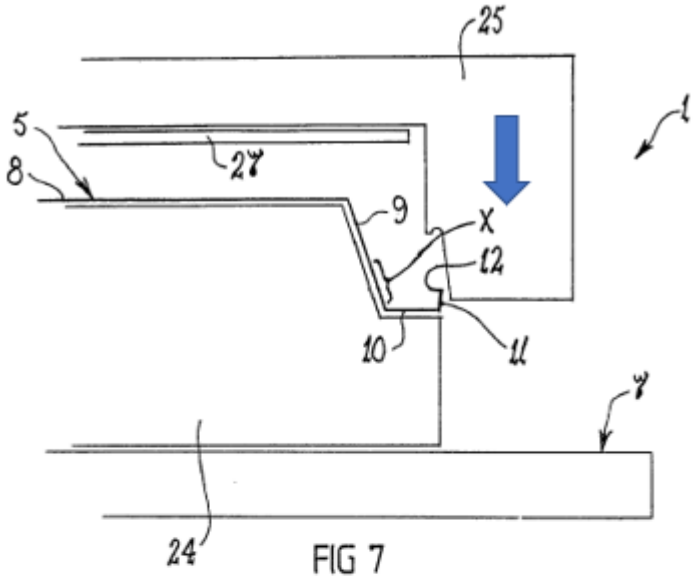


FIG 7

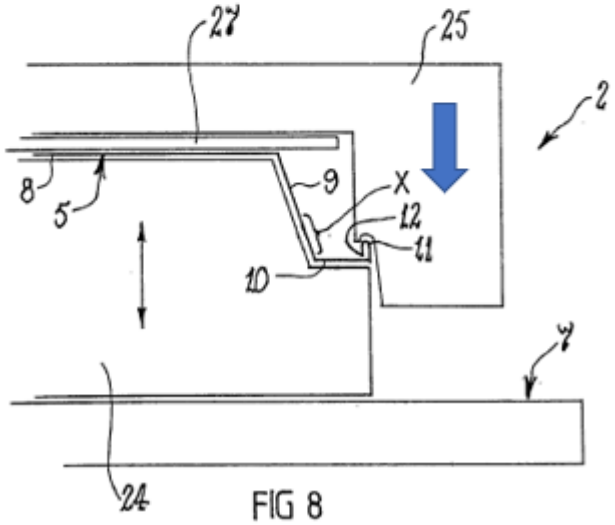
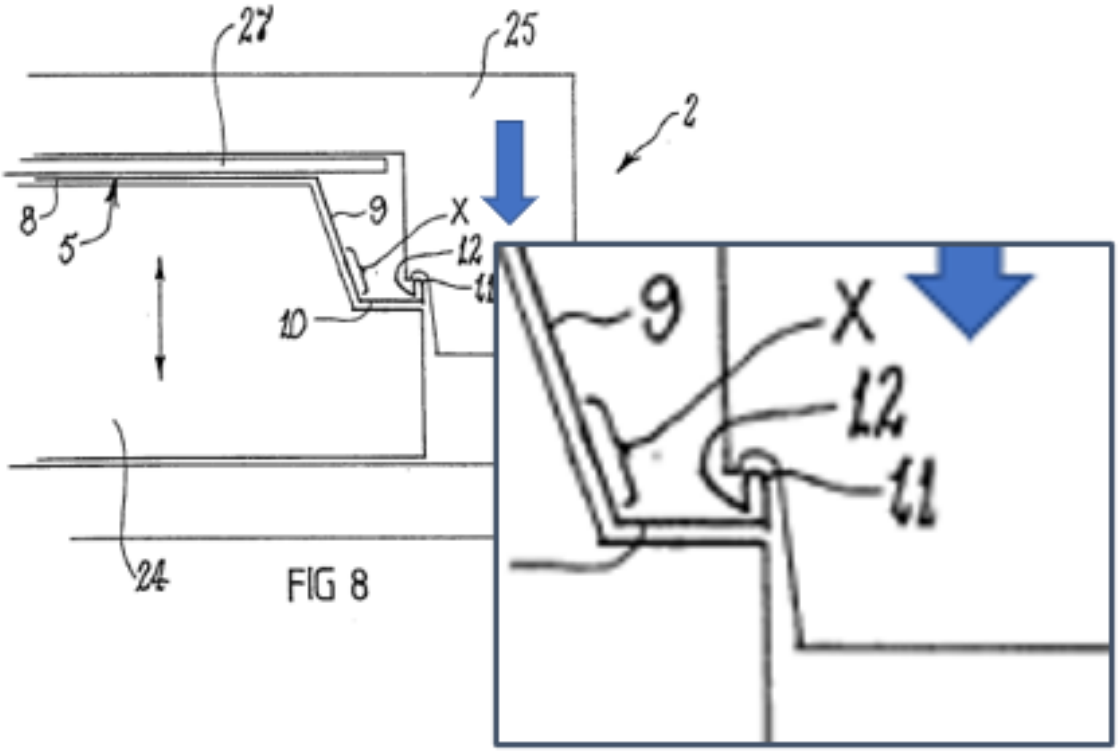


FIG 8

Portelli, Figs. 7 and 8 (annotated).

216. A closer view of Fig 8 shows this in further detail:



Portelli, Fig. 8 (excerpted and annotated).

217. Portelli provides even further disclosures on the "further impinging" aspects of his method and apparatus, 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. 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.

Ningbo Linhua Plastic Ex. 1003, p. 191

218. Portelli further discloses the use of a plurality of discrete, incremental advances of the rams in his description of Figs. 9-11. He states, "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 form 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). Portelli is describing the use of a plurality of discrete, incremental advances of the rams.

219. Furthermore, a POSITA would be very familiar with incremental 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 well understood to have a virtually infinite incremental advancement capability, and are extremely precise in their movement, meaning that "further

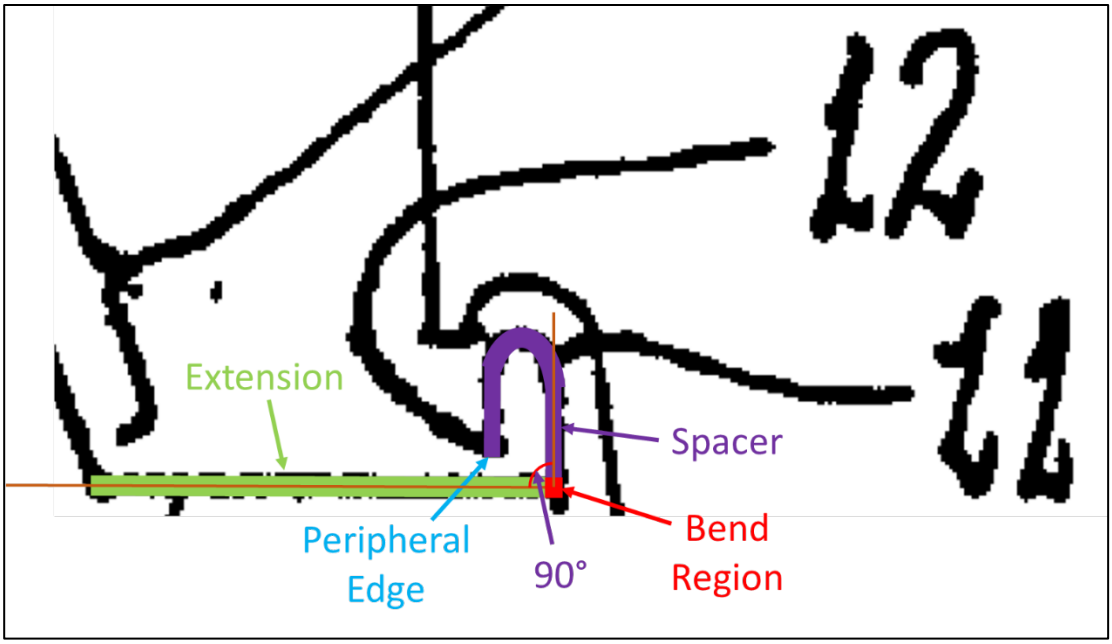
Ningbo Linhua Plastic Ex. 1003, p. 192

impinging a ram against the peripheral flange" would be a routine matter and well within the capability of both a POSITA and their equipment. This is especially true when combined with the curved ram facings disclosed by the prior art.

220. A POSITA would also readily understand from Portelli's teachings that sequential portions of the spacer are softened by impinging the sequential portions against the ram in a plurality of discrete, incremental advances.

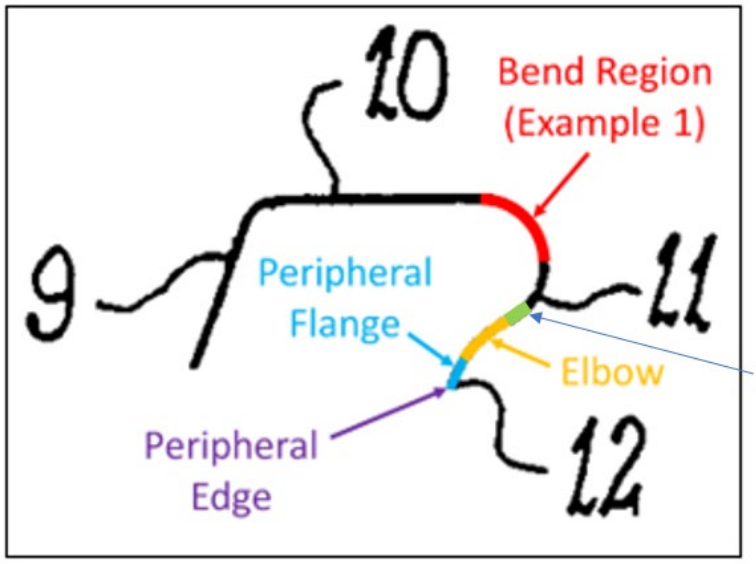
i. Claim 19: "The method of claim 1, wherein sequential portions of the spacer are softened by impinging the sequential portions against the ram in a single smooth motion."

221. Portelli also describes in his Figures, specifications and claims that sequential portions of the spacer are softened by impinging the sequential portions against the ram in a single smooth motion. First, the sequential portions of the spacer are illustrated in, for example, Portelli Figs. 8 and 13, as previously discussed, and shown here:



Portelli, Fig. 8 (excerpted and annotations added).

222.



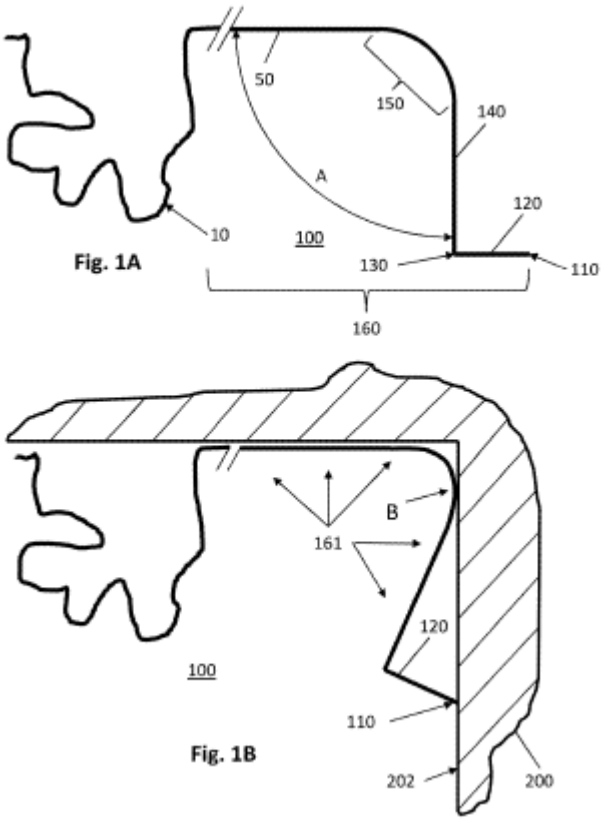
Portelli, Fig. 13 (excerpted and annotations added).

223. Portelli explicitly describes the use of a single motion to impinge the deflectable flange and spacer against the ram, stating "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).

224. Furthermore, 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 well understood to have a virtually infinite advancement capability, and are extremely precise and fluid in their movement, meaning that "softening sequential portions of the spacer by impinging them against the ram in a single smooth motion" would be a routine matter and well within the capability of both a POSITA and their equipment. This is especially true when combined with the curved ram facings disclosed by the prior art.

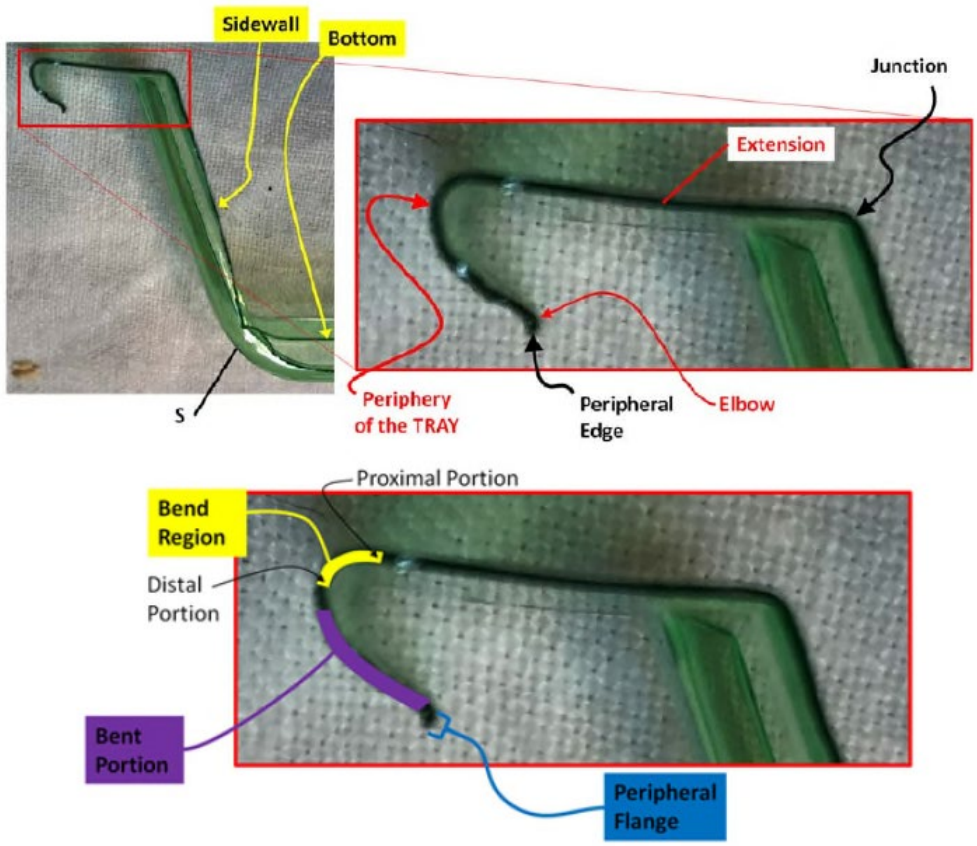
i. Claim 20: "The method of claim 1, wherein the elbow connects the peripheral flange to the spacer at an angle of from 60 to 120 degrees."

225. As noted previously, the '222 Patent refers to spacer 140, elbow 130, and peripheral flange 120, as shown here in Figs. 1A and 1B.



Ex. 1001, Figs. 1A, 1B

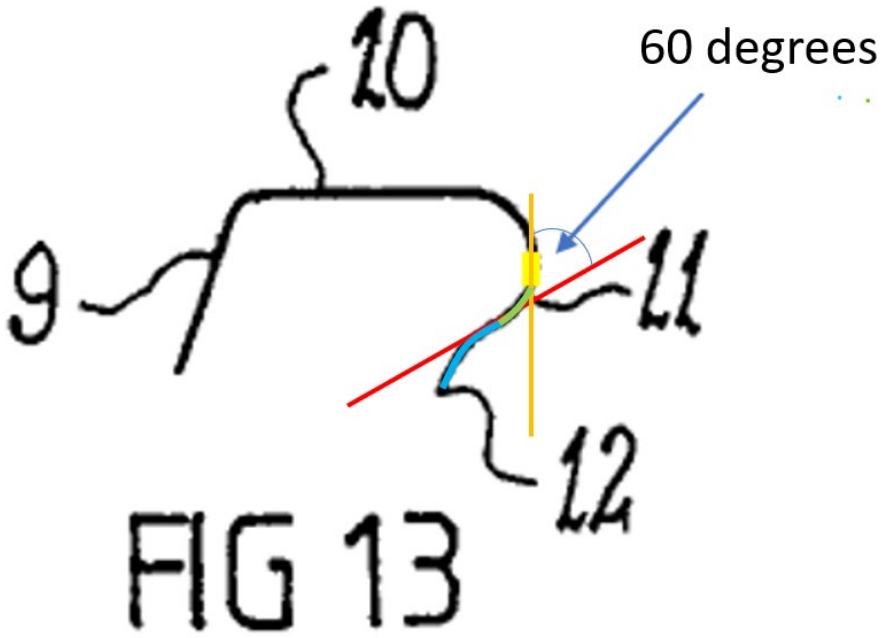
226. Furthermore, the Patent Owner applied the terms "elbow" and "peripheral flange," to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in litigation related to the '222 Patent, as seen here:



Ex. 1007, p. 8

227. Portelli teaches "the elbow connects the peripheral flange to the spacer at an angle of from 60 to 120 degrees." For example, in paragraph 80 above, it was shown that Portelli Fig. 13 teaches various options for the claimed spacer. As shown below, I measured the angle between one such spacer (yellow) and peripheral flange (blue) connected by an elbow (green) as disclosed by Portelli by scanning and importing Portelli Fig. 13 digitized file into QCAD 2D CAD version 3.26.1 software, selecting those features, and drawing lines through and parallel to them as shown below with annotations. Using the software's angle measurement tool, I determined the angle to

be 60 degrees, which meets the '222 Patent's claim 20 recited "from 60 to 120 degrees," as shown here:



Portelli, Fig. 13 (excerpted and annotations added).

i. Claim 21:

a. **Preamble: "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…"**

228. The preamble of the '222 Patent is taught by the prior art of Portelli, which discloses a method of making a shaped, 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. A method of

applying heat to render the tray's edge region malleable, deforming it with a die to bend and roll over the flange or extension region, and allowing the flange to cool and harden into the shape with a smooth periphery *Id.* Abstract ("The peripheral edge region (11) of the tray (5) is heated to render it malleable The region (11) is deformed by bringing [a] die into engagement with the malleable region (11) and rolling that region (11). The region (11) is then cooled such that it sets and hardens in the deformed condition."), 1:6-20 (referring to materials "which may be shaped when soft and then hardened"); 2:28-3:3 (referring to "heating the peripheral edge region of the tray such that said peripheral edge region becomes malleable and the remainder of the tray remains non-malleable; and deforming the peripheral edge region of the tray by bringing an appropriately configured deforming means into engagement with said peripheral edge region of the tray"), 5:25-26 ("This invention also extends to a plastic tray including a peripheral edge region terminating in a terminal edge."); 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") (emphasis added).

Ningbo Linhua Plastic Ex. 1003, p. 199

229. A POSITA would understand that this method and apparatus refer 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 ("This invention relates broadly to packaging. 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**.") Id. 1:1-5 (emphasis added). A POSITA would recognize that the materials used in Portelli's tray would have sufficient rigidity to define the conformation of the tray, , since they include plastics which are "shaped when soft and then hardened," *e.g.*, *id*. 1:17-20,

230. As previously mentioned, Portelli discloses a container formed from a thermoformable sheet, and having a "sharp terminal edge 12." Portelli, 9:17-18, which is synonymous with what the '222 patent calls a 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, marked as feature 110, and is also illustrated in Fig. 8K (annotated below), though it is not marked in that illustration:

Ningbo Linhua Plastic Ex. 1003, p. 200

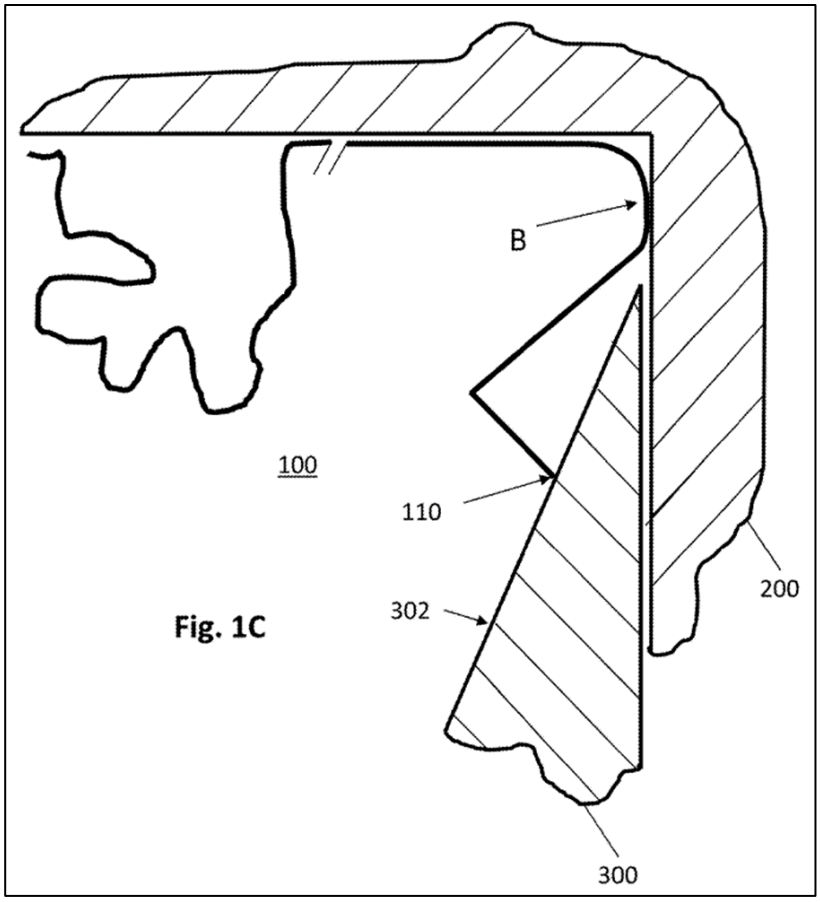
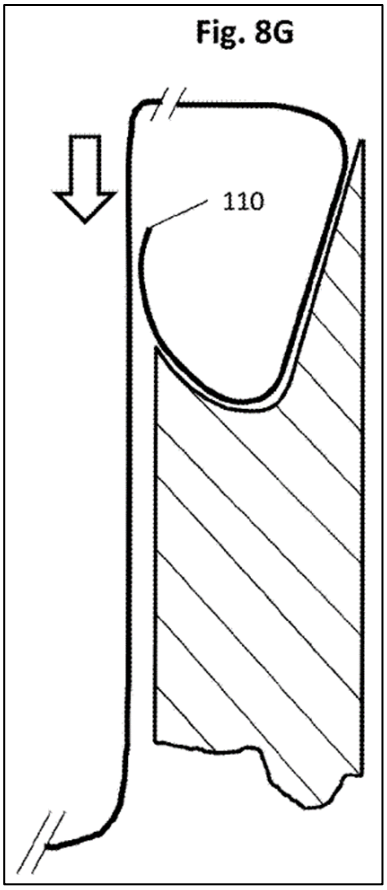
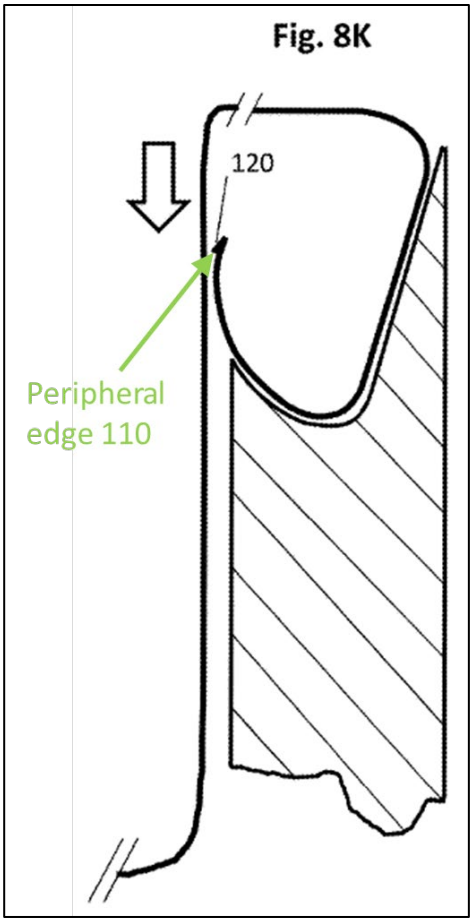


Fig. 1C

Ningbo Linhua Plastic Ex. 1003, p. 201



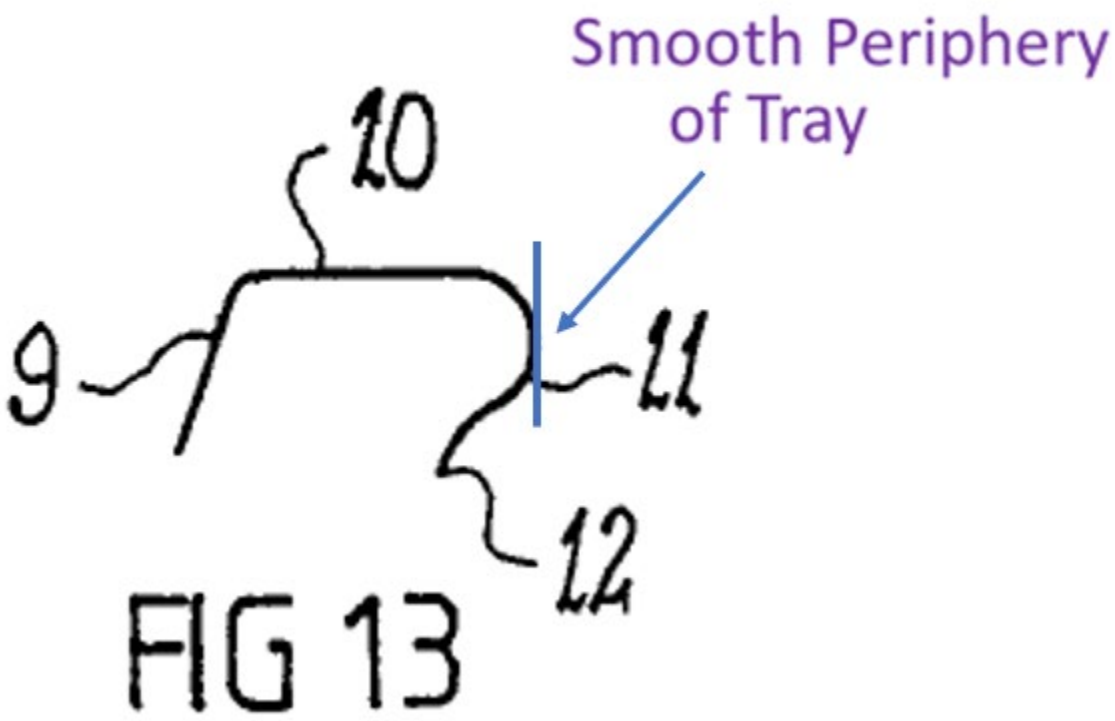
Ningbo Linhua Plastic Ex. 1003, p. 202



Ex. 1001 Figs. 1C, 8G, 8K.

231. In the same manner as the '222 Patent, Portelli's tray includes a a smooth periphery at the outermost perimeter of the tray. This smooth periphery is shown in examples below of Portelli Fig. 13, marked at the far right of the "peripheral edge region 11":

Ningbo Linhua Plastic Ex. 1003, p. 203



Portelli, Fig. 13 (annotations added).

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. In addition to Portelli's illustrations showing a smooth periphery, Portelli further describes in writing how the peripheral edge is displaced away from the periphery. *See, e.g., id*. 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 (referring to improvement over prior trays by "provid[ing] a tray with a ***terminal edge which does not form the peripheral edge of the tray*** [, i.e.,] a tray where the ***terminal edge faces away from the path transversed by plastic film which is wrapped around the tray***

(hereinafter referred to as the wrap path."), 3:17-19 ("[D]eforming the peripheral edge region includes rolling the peripheral edge region. Preferably the edge region around the full periphery of the tray is rolled substantially simultaneously."). A POSITA at the time of the '222 filing would equate Portelli's "terminal edge (12)" terminology to the '222 Patent's "peripheral edge." Furthermore, a POSITA would equate Portelli's "peripheral edge region (11)" terminology to the '222 Patent's "periphery of the article."

b. **Element 21a: "forming a deflectable flange about the peripheral edge of the article,"**

232. As noted previously, the '222 Patent refers to article 100 with deflectable flange 160, as shown here in Figs. 1A and 1B.

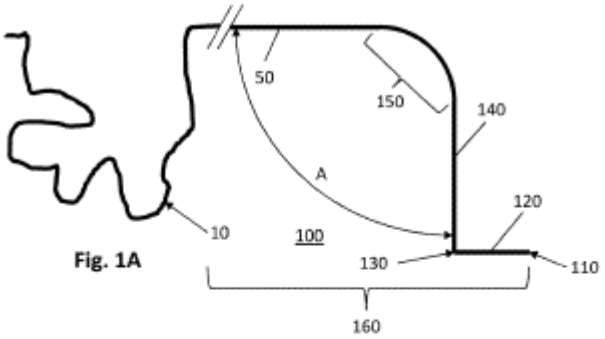


Fig. 1A

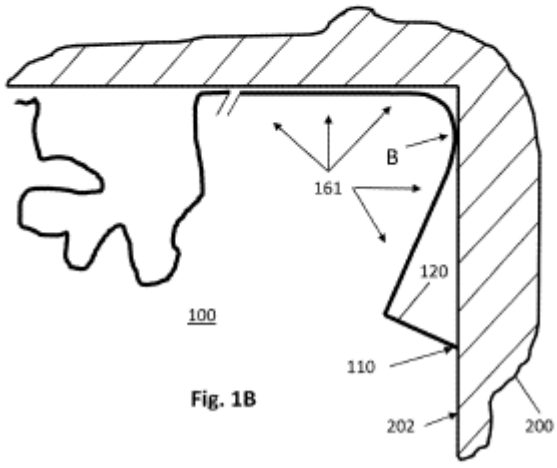
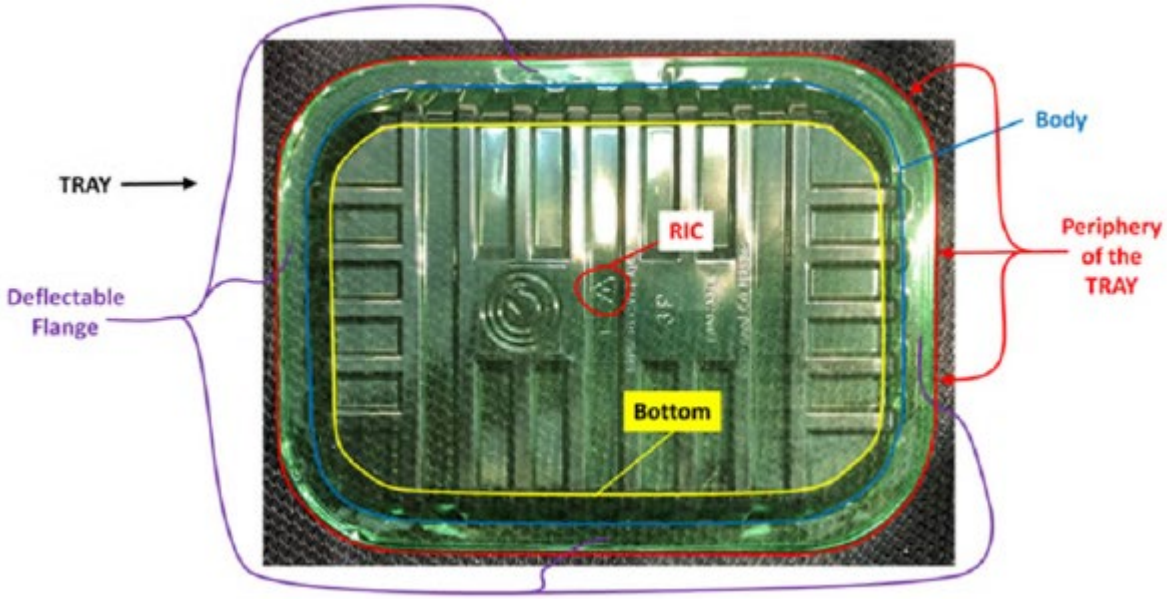


Fig. 1B

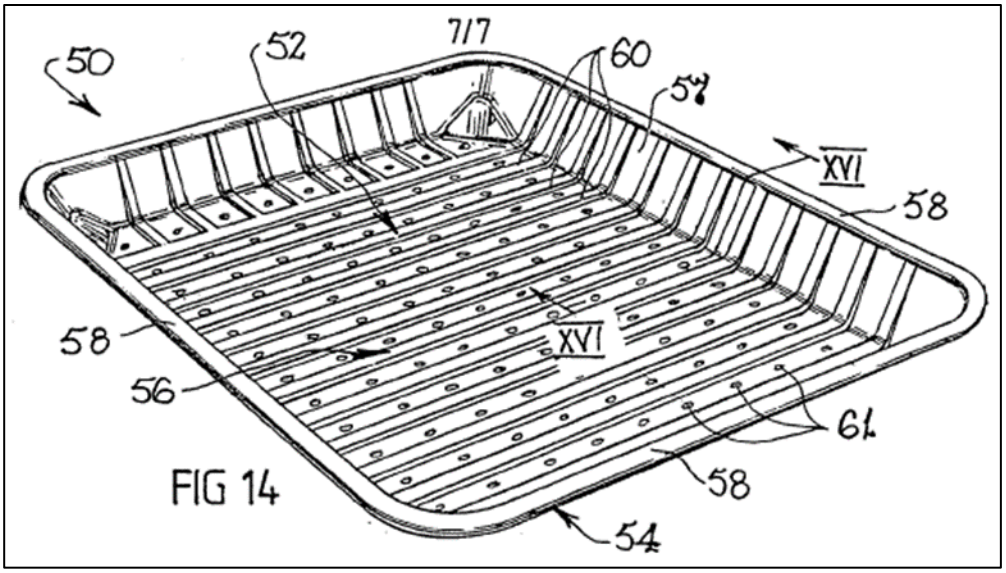
Ex. 1001, Figs. 1A, 1B

233. As previously shown, Patent Owners in their First Amended Response in related litigation refer to a deflectable flange about the peripheral edge of the article:

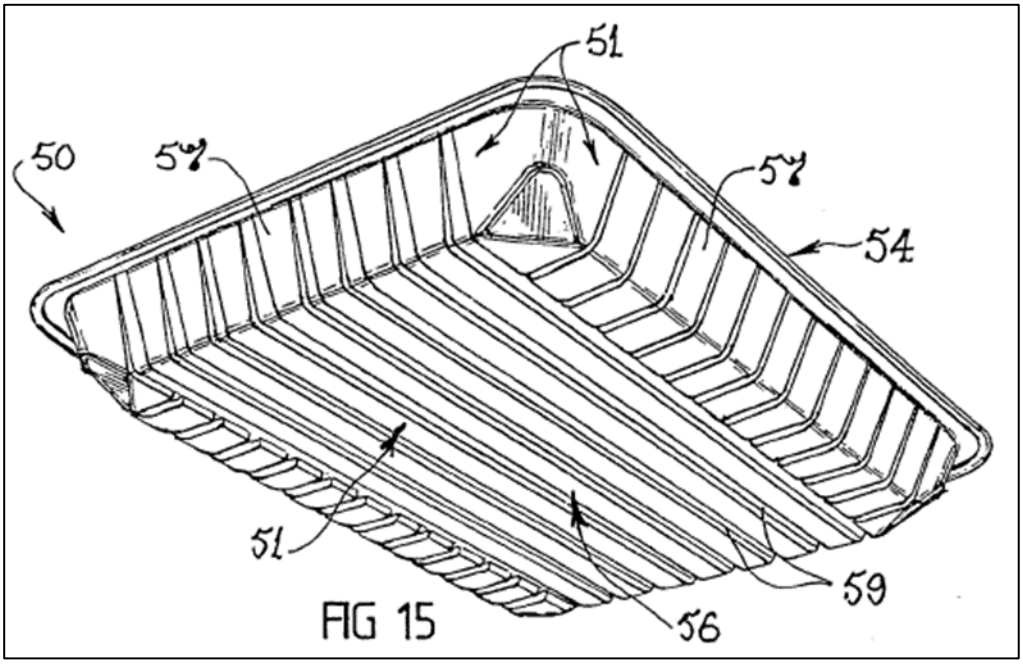


Ex. 1007, p. 8

234. Portelli discloses and portrays a "base member 51" and a "cover member 52," both of 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; *see also id.* 15:12-16, Fig. 11 (item 5).

235. 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***". 9:17-24 Portelli explains that his method and apparatus are used to deform

article's flange, i.e. a "deflectable flange." He further discloses that "heating the peripheral edge region of the tray such that said ***peripheral edge region becomes malleable***," again a reference to a "deflectable flange." *Id*. 2:22-30 (emphasis added). He further shows the flanged of his thermoplastic shape being deflected in his Figs. 3 and 4, where the sharp terminal edge 12 in Fig 3 is deflected and displaced in Fig 4:

Ningbo Linhua Plastic Ex. 1003, p. 208

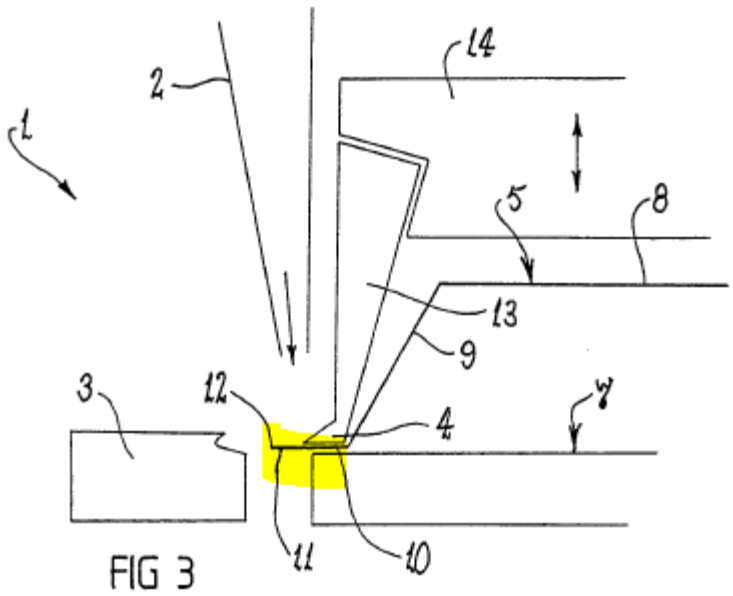


FIG 3

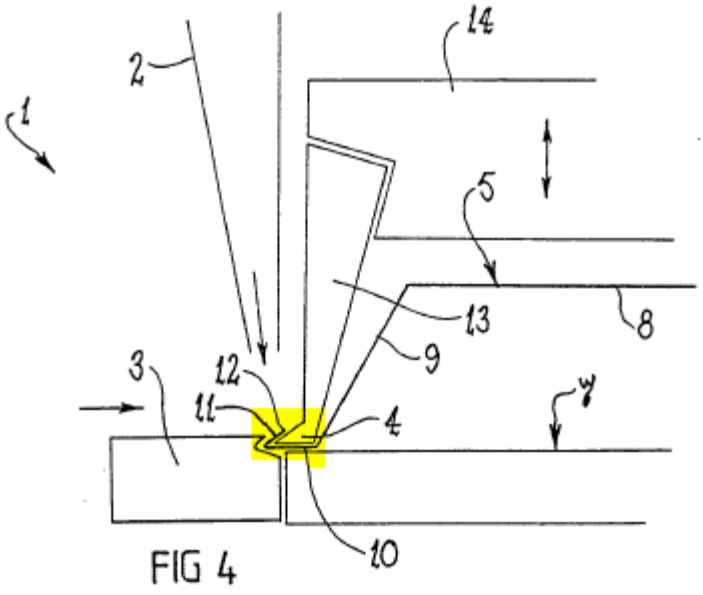


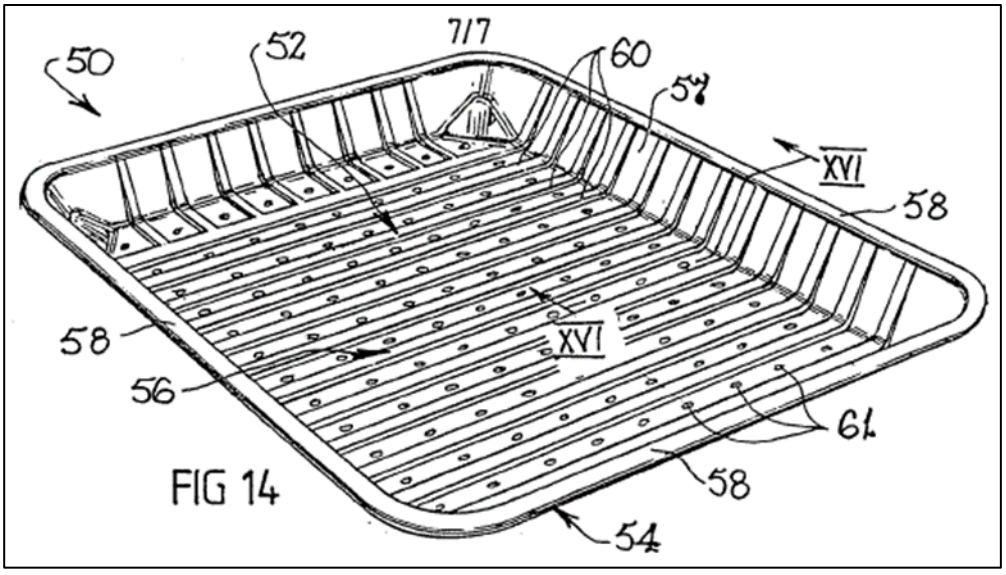
FIG 4

Id. Figs 3 and 4 annotated; *see also* Figs. 1-2, 5-8.

236. Regarding shape, the thermoformable article in Portelli is repeatedly described as a tray, and is even described specifically as a "rectangular tray." *See, e.g., id*. 1:1-5 ("[T]his invention relates to trays for packaging …."), 1:7-8 ("trays used for the packaging of foodstuffs such as red meat, fish, poultry, garden produce and the like"), 5:25 ("plastic tray"), 10:17-18 (referring to "rectangular tray 5"), 18:6 ("providing a plastic tray"). While Portelli's Fig. 14 and Fig. 15 clearly identify a shape with a body and deflectable flange in the form of a rectangular tray, Portelli also explains that "In this specification, the term "tray" shall not be limited to flat or shallow containers. Further the term shall not be limited to containers having four straight edged sides. For example, it is specifically envisaged that the trays defined in this specification might contain chickens and that **the tray might be configured to conform with the outline of the shape of the chicken**." Id. 1:12-16 (emphasis added).

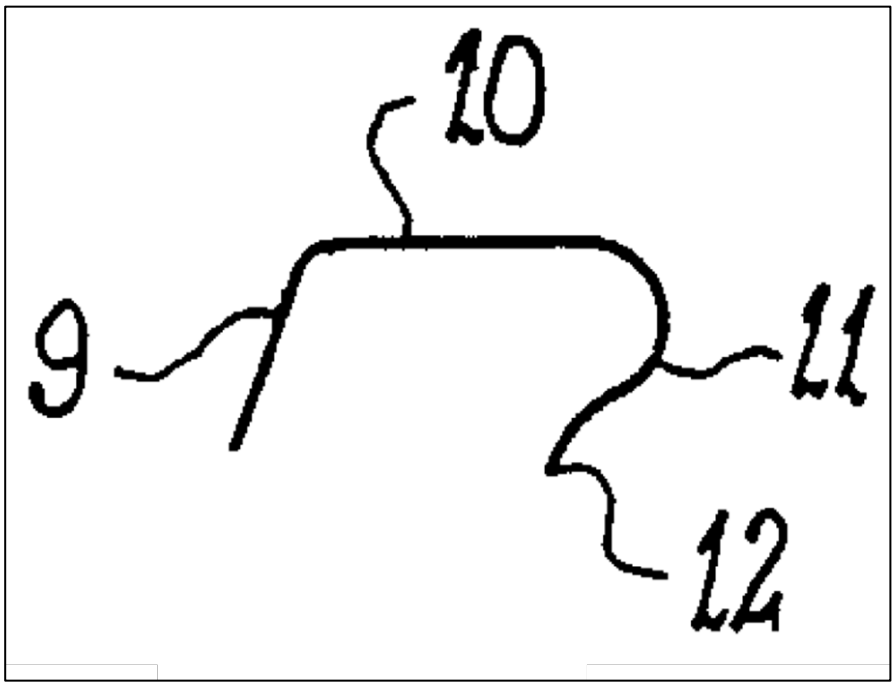
237. Portelli's tray includes a "circumferential peripheral rim 58 [which] projects outwardly away from the upper end of the side wall 57," i.e. a "deflectable flange at a peripheral portion of the body":

Ningbo Linhua Plastic Ex. 1003, p. 210



Portelli, Fig. 14, 15:28-30.

238. The "deflectable flange" is illustrated as item 10 in Portelli Fig. 13:



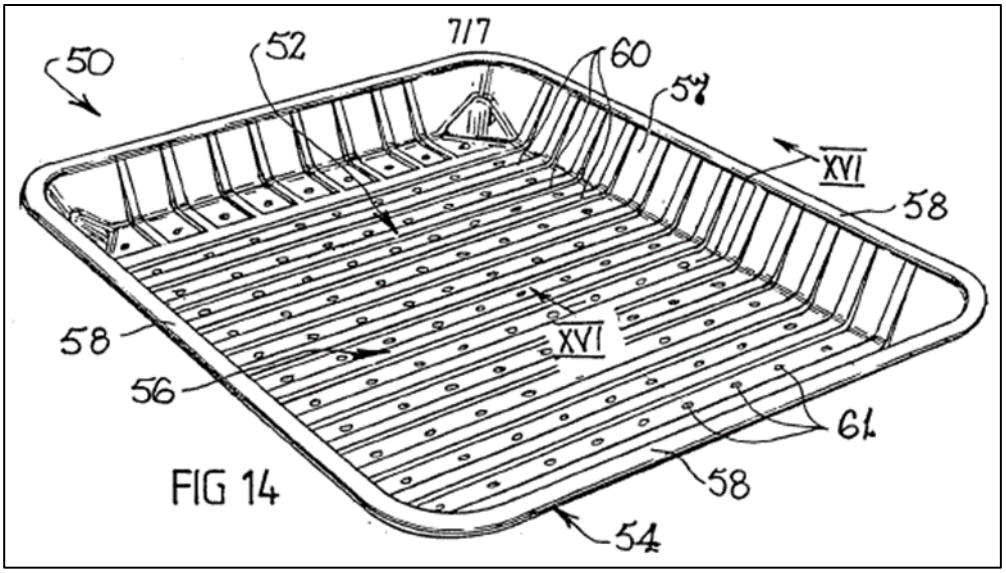
Portelli, Fig. 13.

Ningbo Linhua Plastic Ex. 1003, p. 211

239. Regarding the claim's reference to "thermoplastic," Portelli likewise teaches that "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…***"). 1:12-16, 9:17-24, 14:10-14, 15:12-14, 16:15-17, Figs. 14, 15 (emphasis added). Portelli repeatedly refers to the application of heat in thermoforming processes, apparatus, and operations, further describing parameters for the shaping of thermoplastic materials. Portelli even 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." *Id*. 15:4-8 (emphasis added).

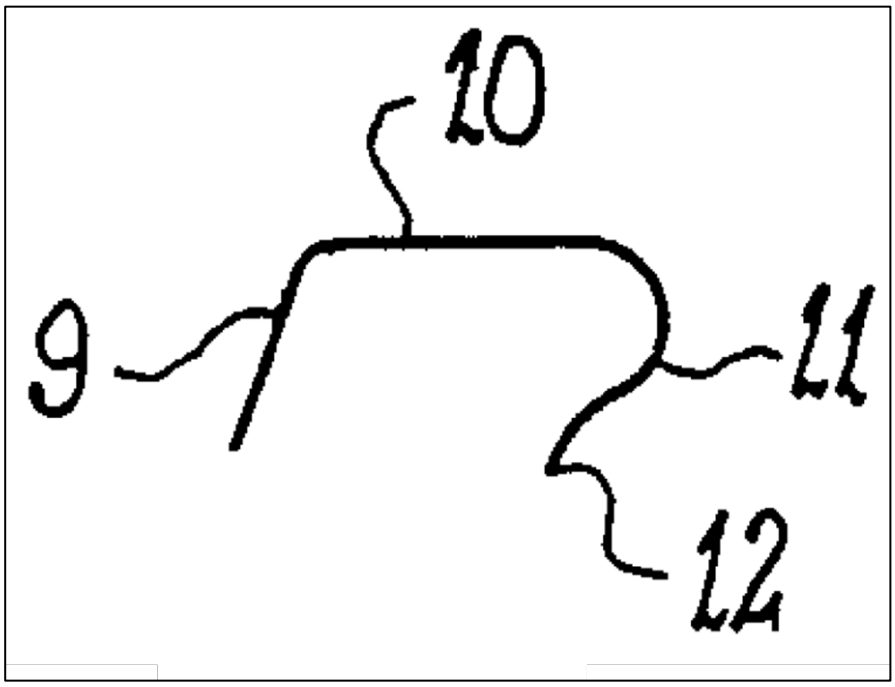
240. Portelli's tray includes a "circumferential peripheral rim 58 [which] projects outwardly away from the upper end of the side wall 57":

Ningbo Linhua Plastic Ex. 1003, p. 212



Portelli, Fig. 14, 15:28-30.

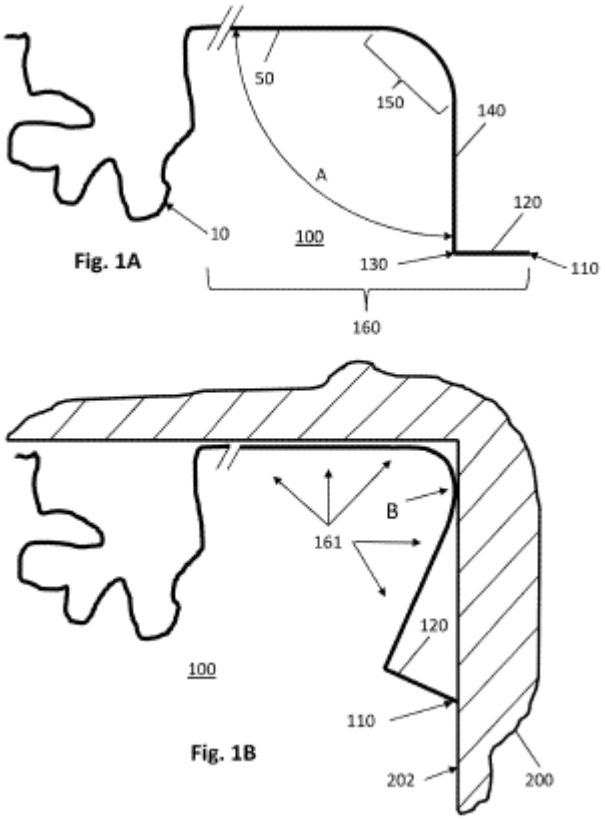
241. The rim 58 is illustrated as item 10 in Portelli Fig. 13:



Portelli, Fig. 13.

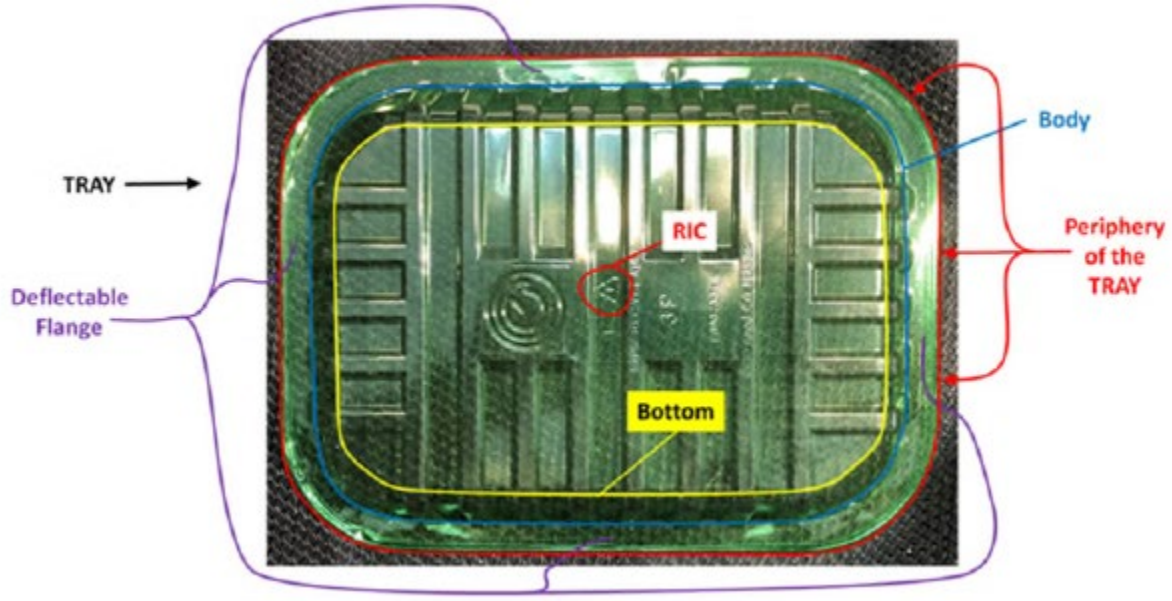
c. **Element 21b: "the deflectable flange comprising an extension that extends peripherally away from the body and connects thereto"**

242. As noted previously, the '222 Patent refers to an article 100 with body 10, deflectable flange 160, and extension 50, as shown here in Figs. 1A and 1B.



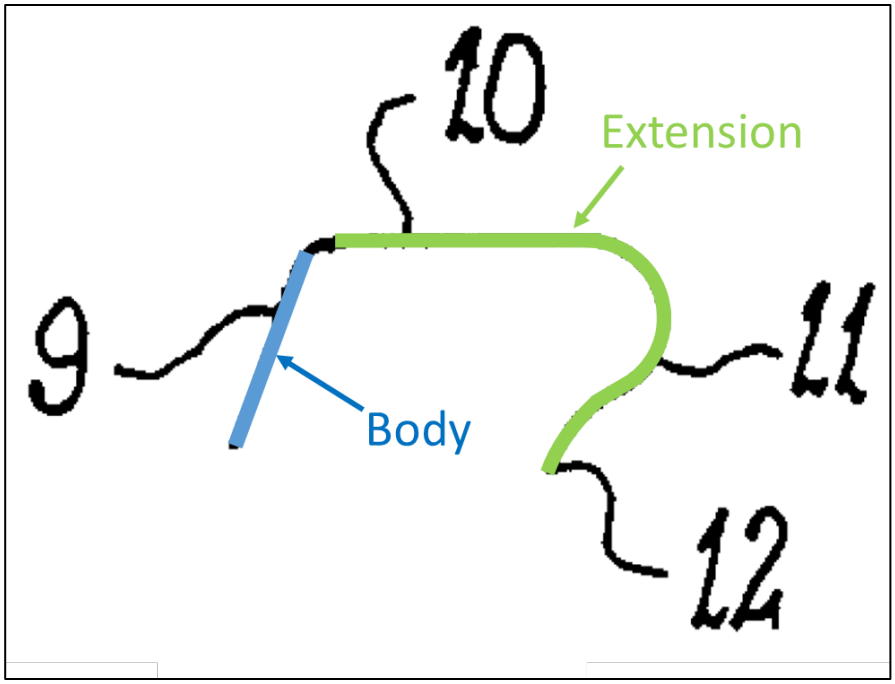
Ex. 1001, Figs. 1A, 1B

243. Furthermore, the Patent Owner applied the terms "periphery" and "extension" to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in litigation related to the '222 Patent:



244. Ex. 1007, p. 8

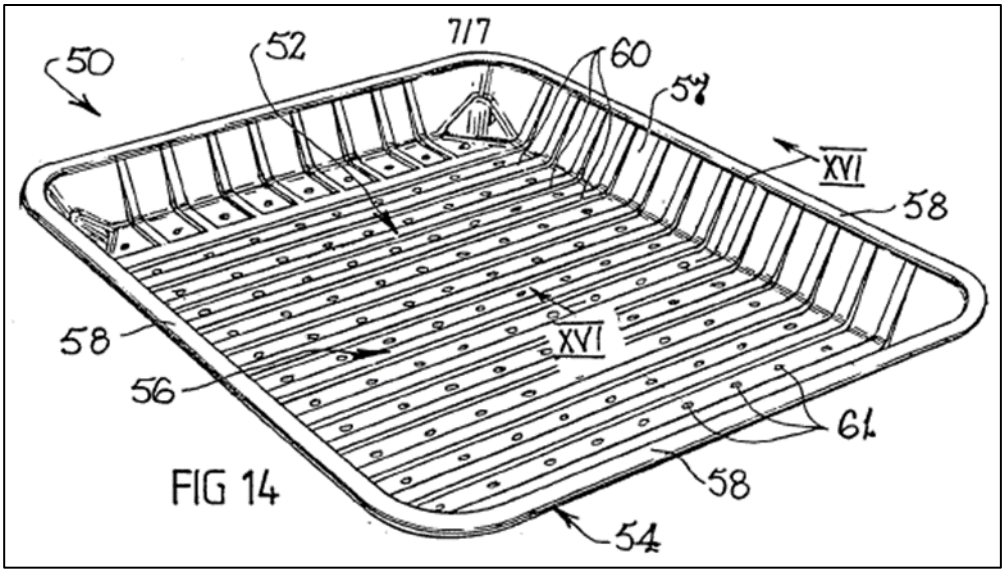
245. Portelli teaches a tray with a deflectable flange comprising an extension that extends peripherally away from the body and connects thereto. Portelli demonstrates a rim 10/58 is connected to "a peripheral edge region 11 and a terminal edge 12." *Id*. 14:11-13. The combination of the rim 10/58, "peripheral edge region 11," and terminal edge 12 (same as '222 patent's "peripheral edge") form an extension:



Portelli, Fig. 13 (annotations added), showing Portelli's extension connecting to the article's body.

246. 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 that his tray includes a "circumferential peripheral rim 58 [which] projects outwardly away from the upper end of the side wall 57":

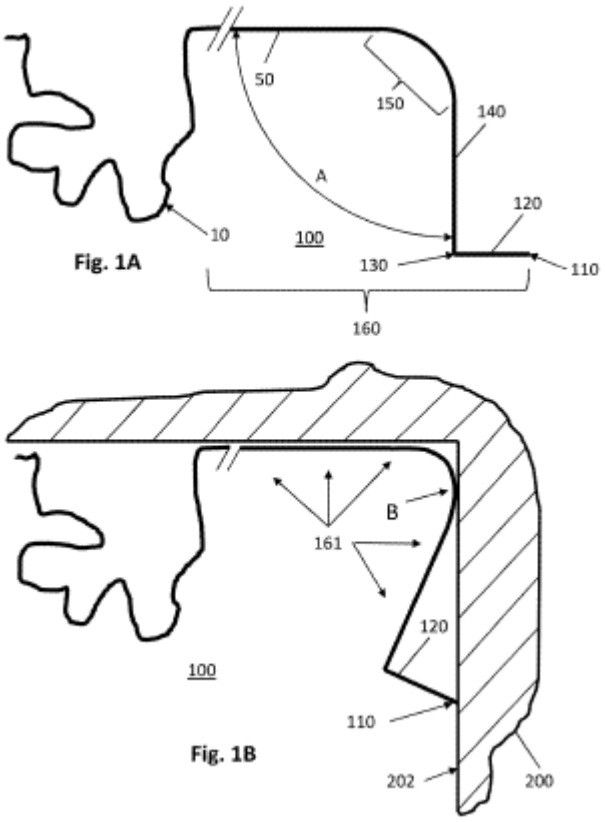
Ningbo Linhua Plastic Ex. 1003, p. 216



Portelli, Fig. 14, 15:28-30.

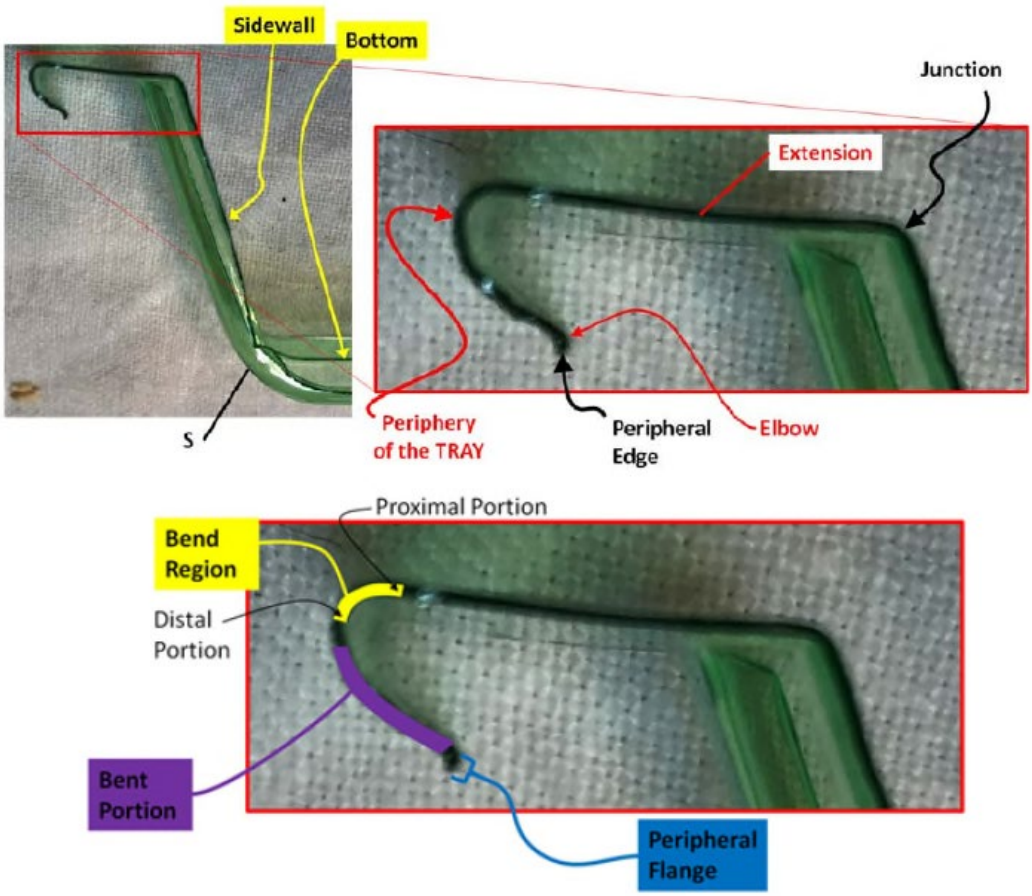
d. **Element 21c: "a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer that is connected with…"**

As noted previously, the '222 Patent refers to article 100 with extension 50, spacer 140, and bend region 150, as shown here in Figs. 1A and 1B.



Ex. 1001, Figs. 1A, 1B

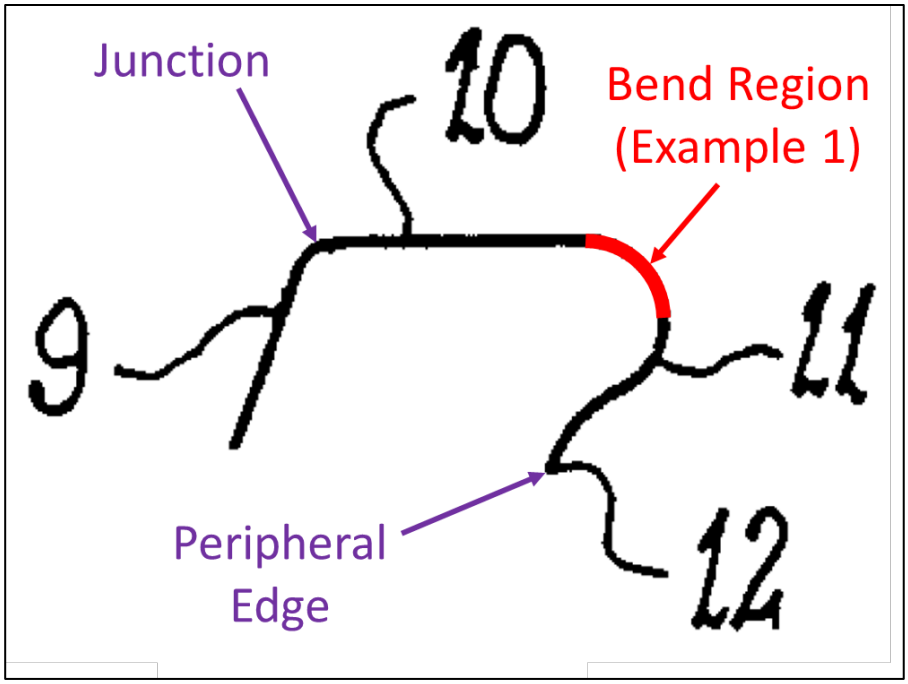
247. Furthermore, the Patent Owner applied the terms "extension" and "bend region," to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in litigation related to the '222 Patent:



Ex. 1007, p. 8

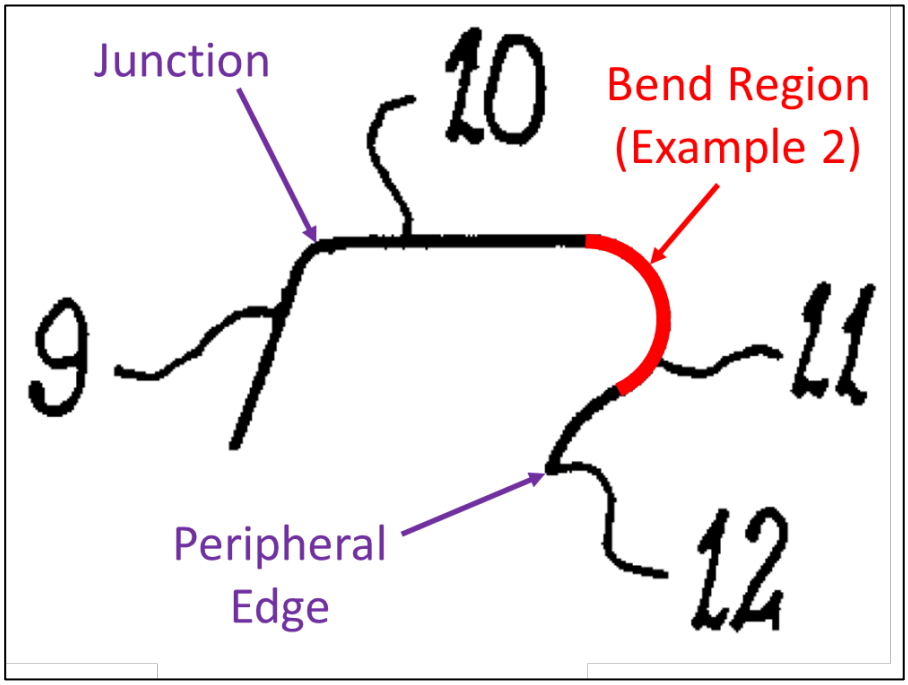
248. Portelli teaches a deflectable flange with a bend region having a smooth contour and interconnecting the extension.

249. Portelli shows the bend region between the peripheral edge and the junction between the body and the extension, and beginning at the straight section connecting the body of the tray. Portelli's "bend region" can be the upper portion of the curve at the right side of Fig. 13, as shown in Example 1 below:



Portelli, Fig. 13 (annotations added).

250. The "bend region" can also be a combination of the upper and lower portions of the curve at the right side of Fig. 13, as shown in Example 2 below:

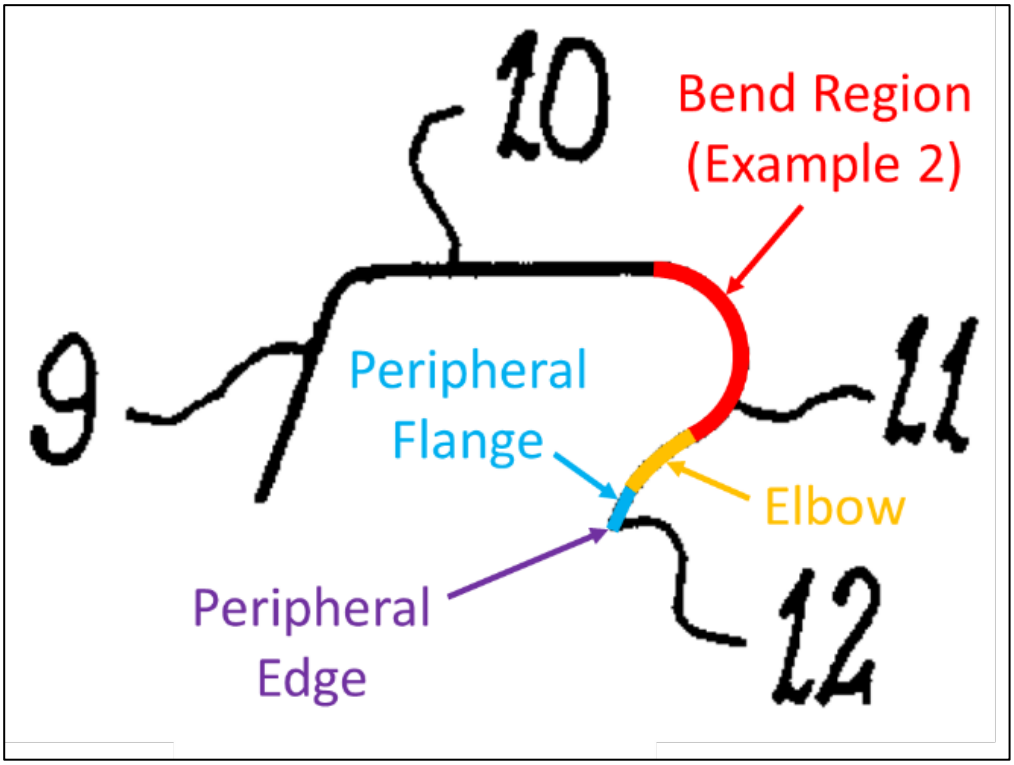


Ningbo Linhua Plastic Ex. 1003, p. 220

Portelli, Fig. 13 (annotations added).

251. In both examples above, Portelli's bend region has a smooth contour.

252. Additionally, the bend region and elbow feature in Patent Owner's Complaint in the related case can be compared to Portelli Example 2, where the "bend region" is a combination of the upper and lower sections of the bend region on the right side of Fig. 13, as shown below:



Portelli, Fig. 13 (annotations added).

253. Therefore, Portelli's tray teaches a "**bend region having a smooth contour** and interconnecting the extension (10)," as seen above.

254. The '222 Patent describes a **spacer** as item 140 in several Figures and portions of the specification, including the following:

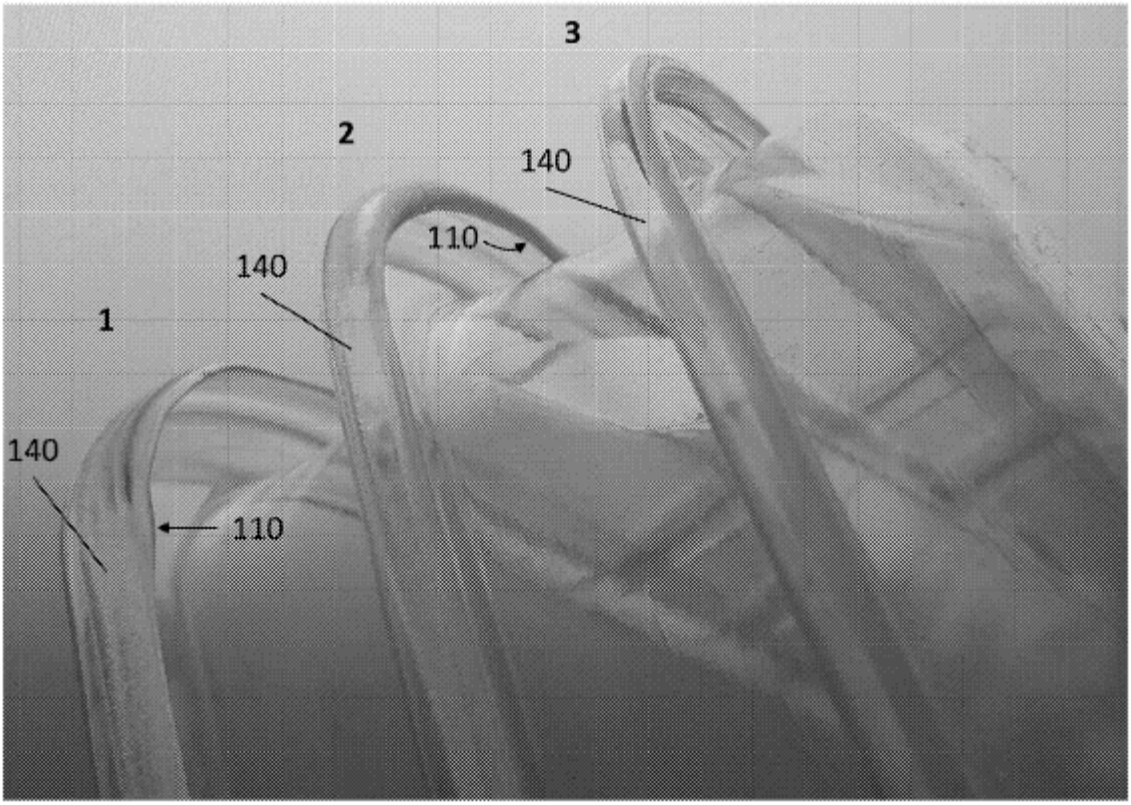


Fig. 6E

Ex. 1001 Fig. 6E, where the spacer is identified as item 140 in all 3 articles.

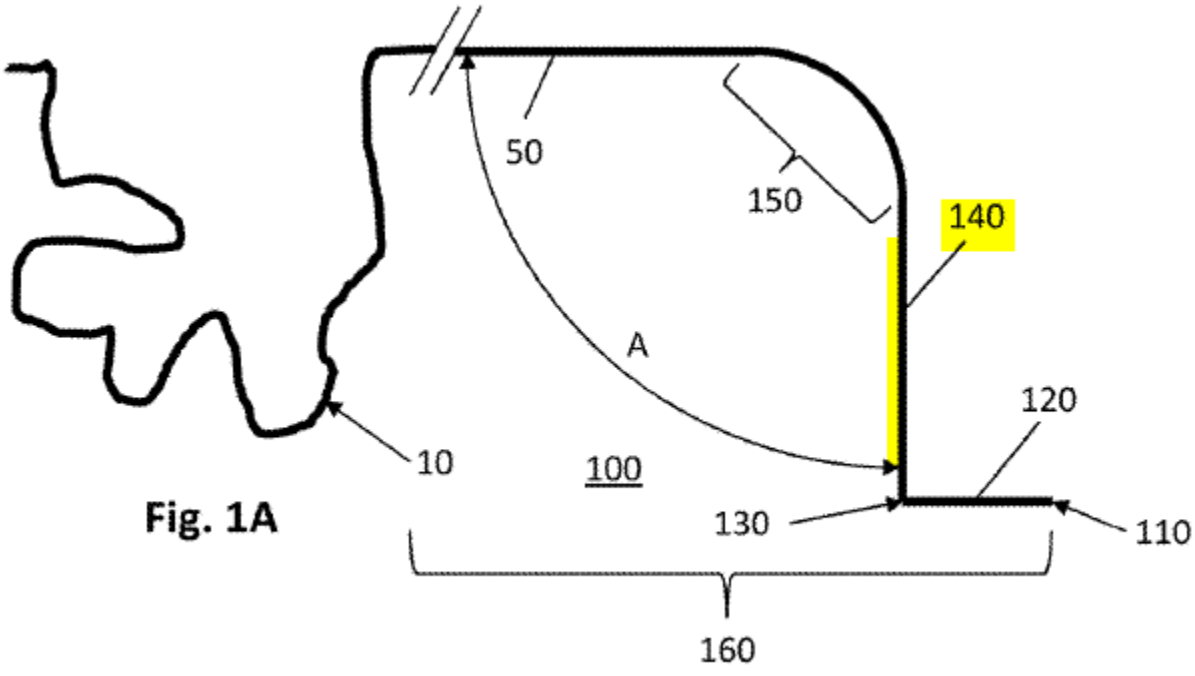
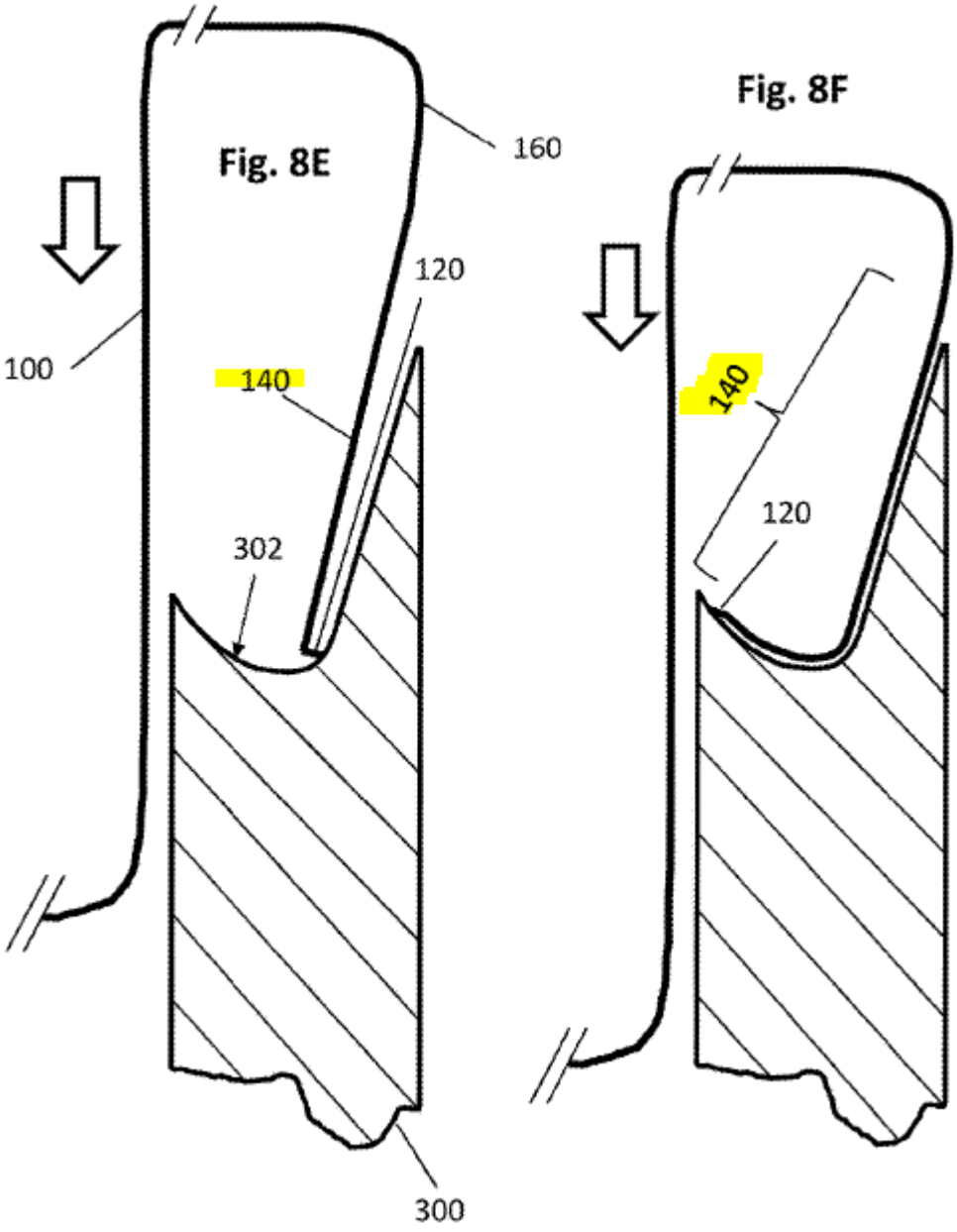


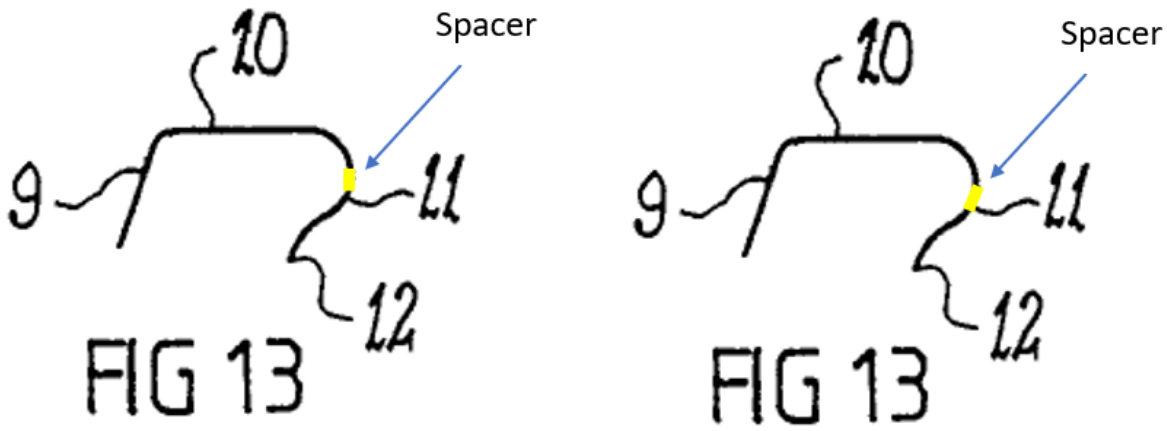
Fig. 1A

Ex. 1001 Fig. 1A, where the spacer identified as item 140 is annotated.



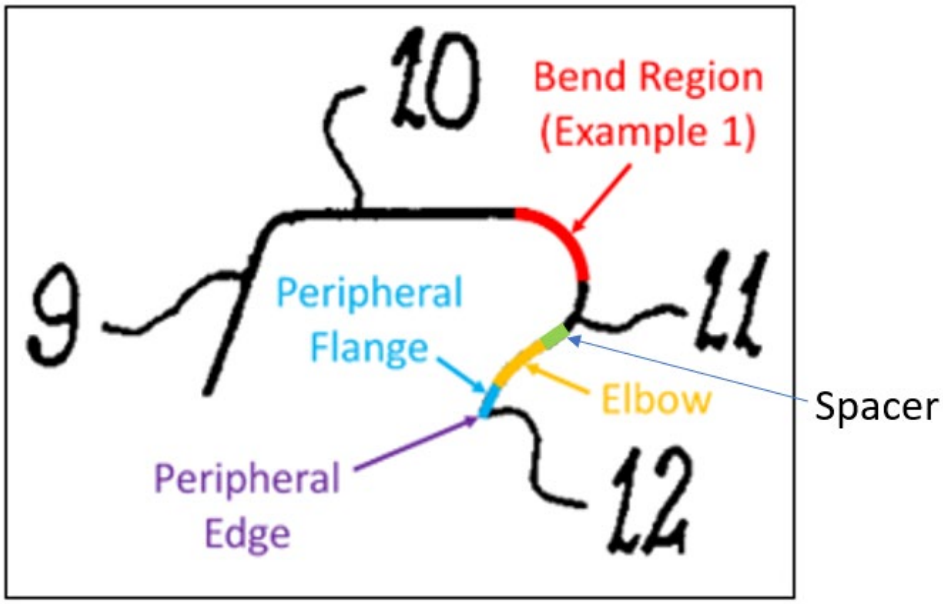
Ex. 1001 Figs. 8E and 8F, where the spacer is identified as item 140 is annotated.

255. Portelli likewise teaches a spacer that is connected with a peripheral flange which bears a peripheral edge of the thermoplastic.



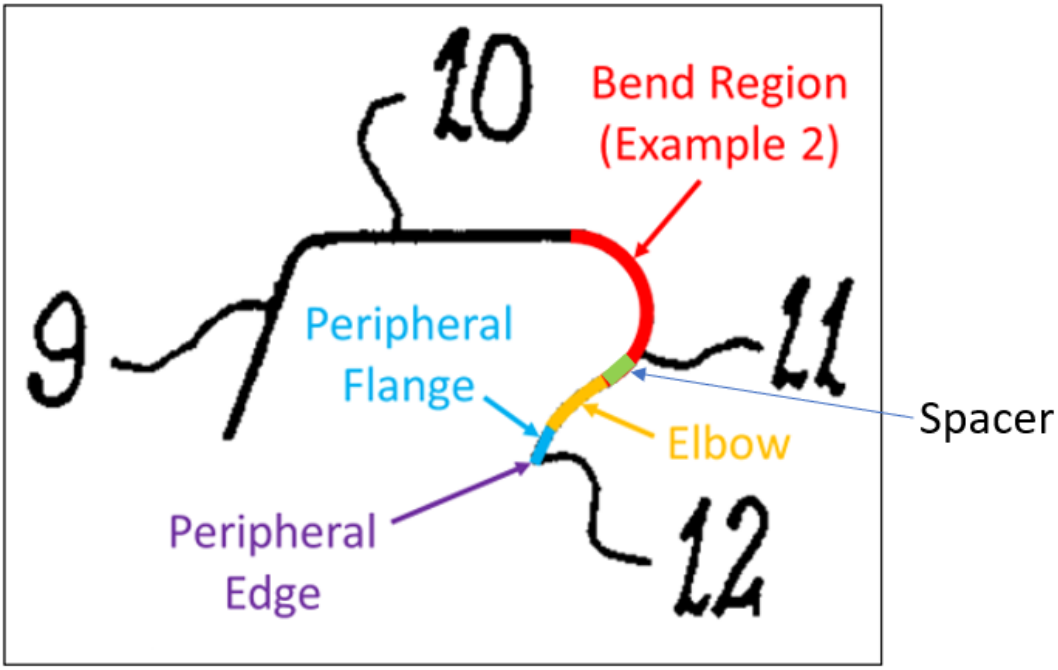
Portelli, Fig. 13 (annotations added), both images above.

256. Portelli's Fig. 13 also contains a spacer, as shown in the following two examples:



Portelli, Fig. 13 (excerpted and annotations added).

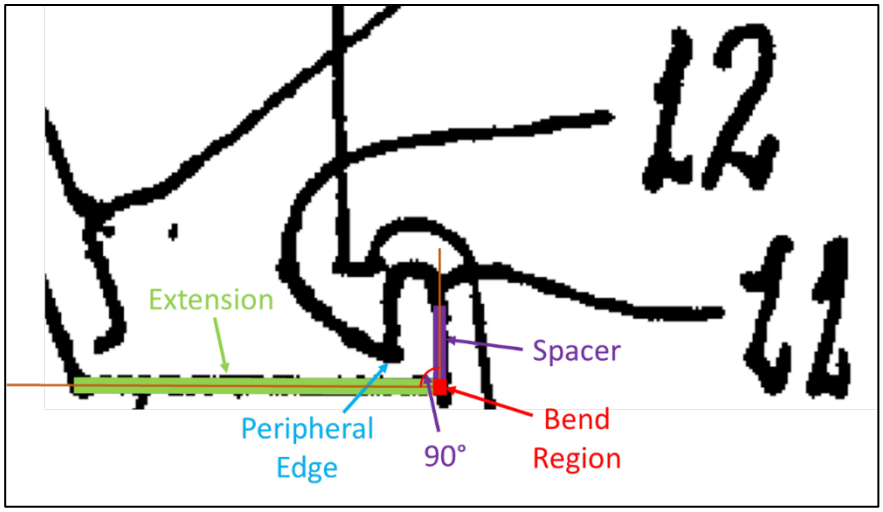
Ningbo Linhua Plastic Ex. 1003, p. 224



Portelli, Fig. 13 (excerpted and annotations added).

257. Even *if* the tray illustrated in Fig. 13 of Portelli did not have a bend region having a smooth contour and interconnecting the extension, **at an approximately right angle**, with a spacer that is connected with, **those limitations appear in Fig. 8 of Portelli**. Specifically, the vertical segment in the middle of the excerpt of Fig. 8 below comprises a spacer, and Portelli's Fig. 8 bend region interconnects the Extension and spacer at 90 degrees, as shown below:

Ningbo Linhua Plastic Ex. 1003, p. 225

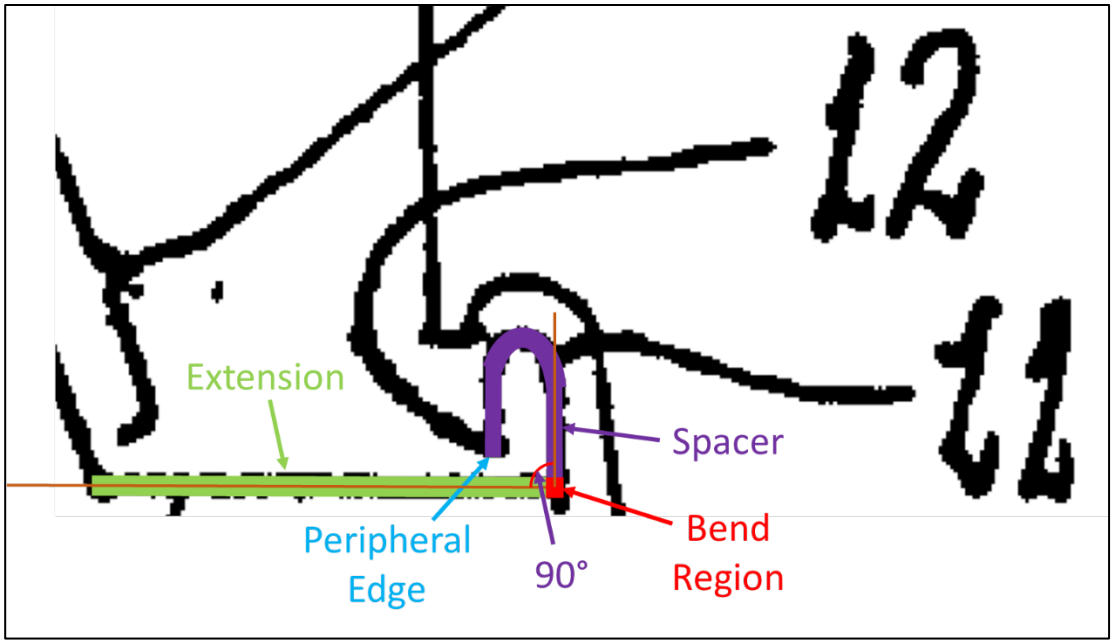


Portelli, Fig. 8 (excerpted and annotations added).

258. The peripheral edge, labeled in the above drawing excerpt, is borne at least in part by the spacer, since every portion of the tray between the spacer and the peripheral edge is borne by the spacer.

259. As another example, the spacer can 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. Again, the bend region interconnects the Extension and spacer at 90 degrees, as shown below:

Ningbo Linhua Plastic Ex. 1003, p. 226



Portelli, Fig. 8 (excerpted and annotations added).

260. Starting from the above-excerpted portions of Fig. 8, if one draws lines through and parallel to (a) the horizontal portion of the extension, and (b) the spacer, which comprises or begins with the vertical segment in the middle, the angle between those two lines is 90 degrees.

261. 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.

Ningbo Linhua Plastic Ex. 1003, p. 227

e. **Element 21d: "[a spacer that is connected with] 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;"**

262. As noted previously, the '222 Patent refers to article 100 with spacer 140, elbow 130, peripheral flange 120, and peripheral edge 110, as shown here in Figs. 1A and 1B.

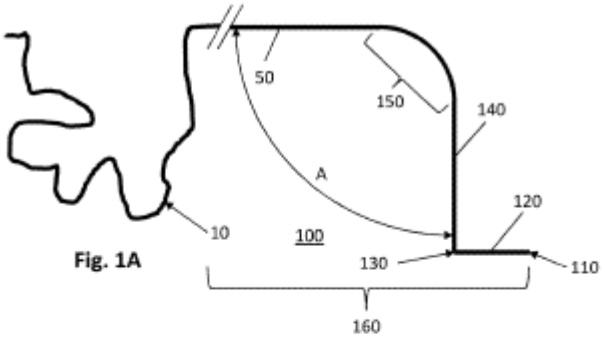


Fig. 1A

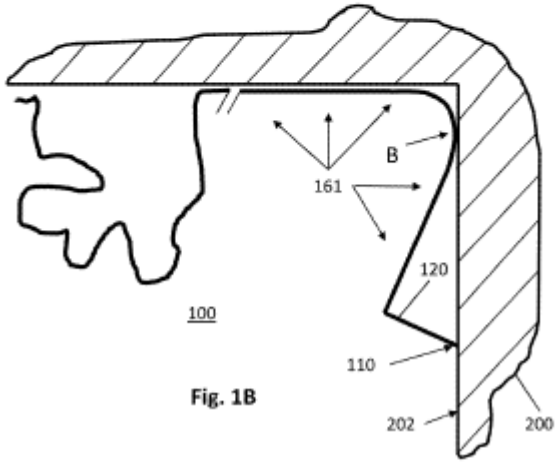
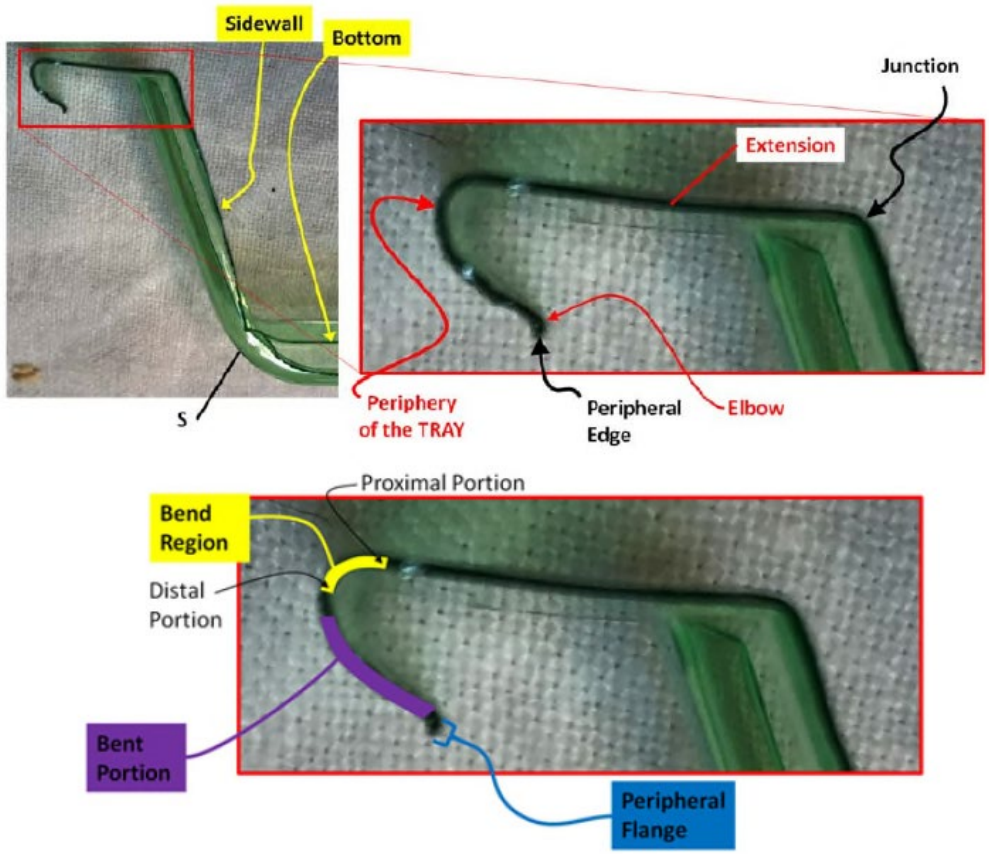


Fig. 1B

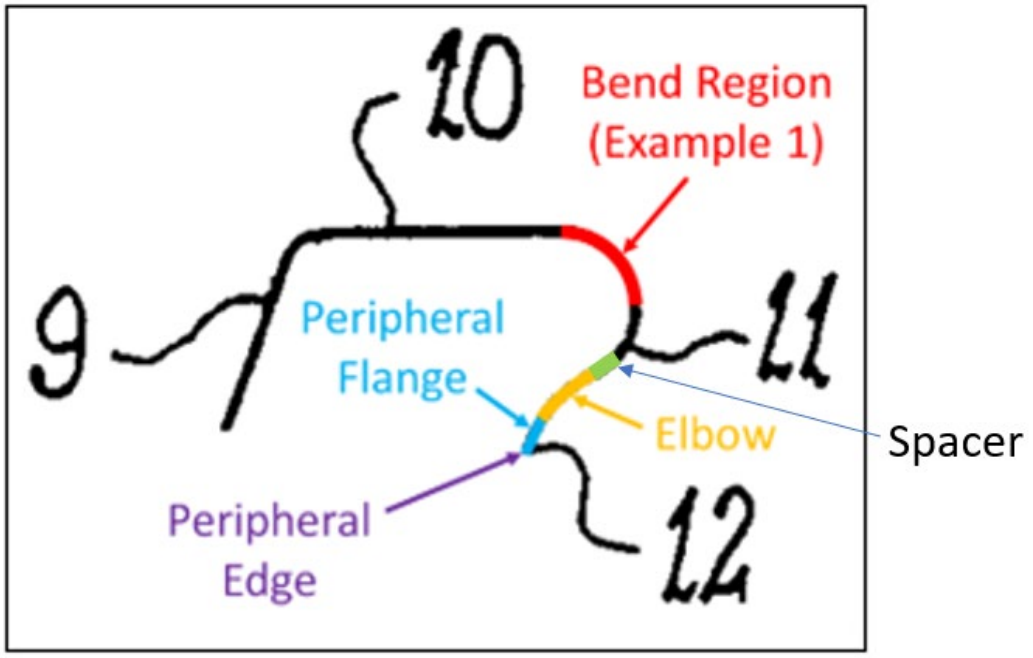
Ex. 1001, Figs. 1A, 1B

263. Furthermore, the Patent Owner applied the terms "peripheral flange," "peripheral edge," and "elbow" to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in litigation related to the '222 Patent:

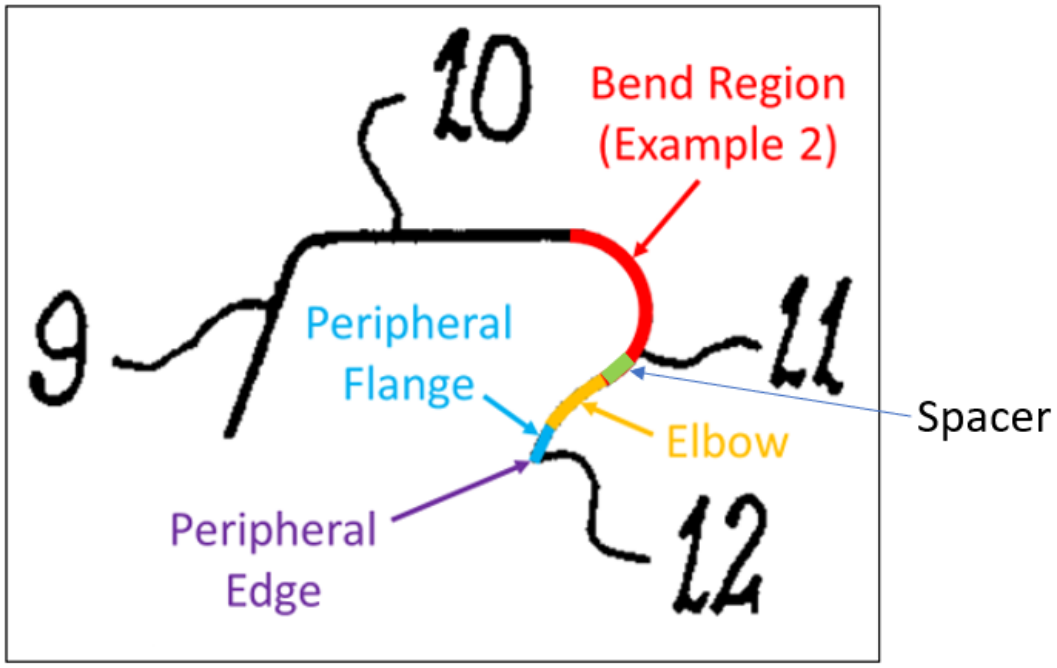


Ex. 1007, p. 8

264. As noted earlier, Portelli Fig 13 teaches a spacer, and said spacer is connected with a peripheral flange which bears a peripheral edge of the thermoplastic. Portelli's Fig. 13 spacer is shown in the following two examples:



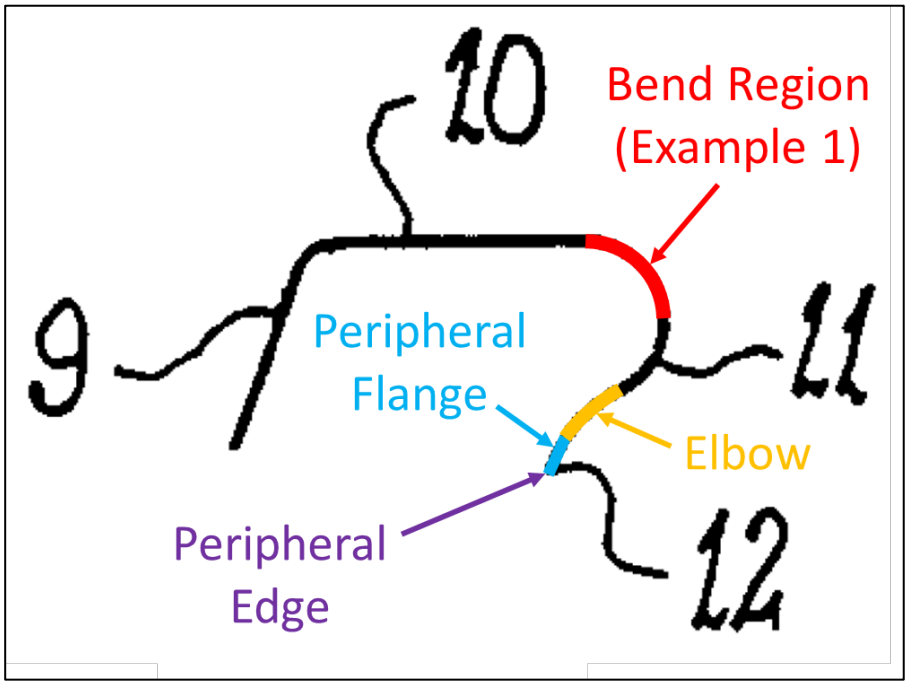
Portelli, Fig. 13 (excerpted and annotations added).

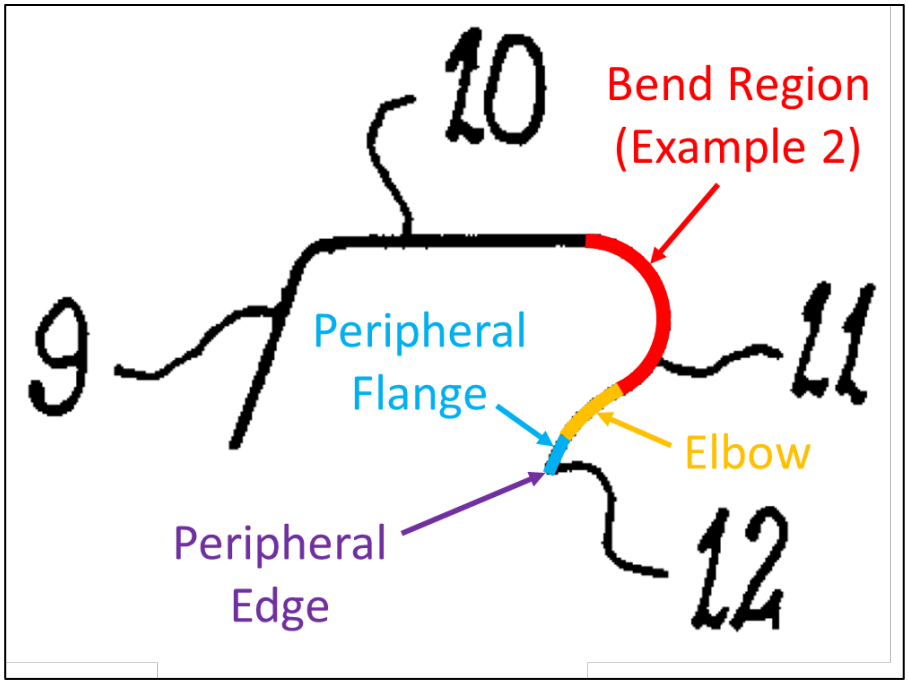


Portelli, Fig. 13 (excerpted and annotations added).

265. As discussed earlier, every element of Claim 1, including the recited spacer, is rendered obvious by the combination of the embodiments illustrated in Figs. 8 and 13 of Portelli, and teachings elsewhere in Portelli's specification and claims. Portelli also teaches the recited "[a spacer that is connected with] a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and periphoral (sic) flange being connected, at an angle other than 180 degrees, at an elbow.

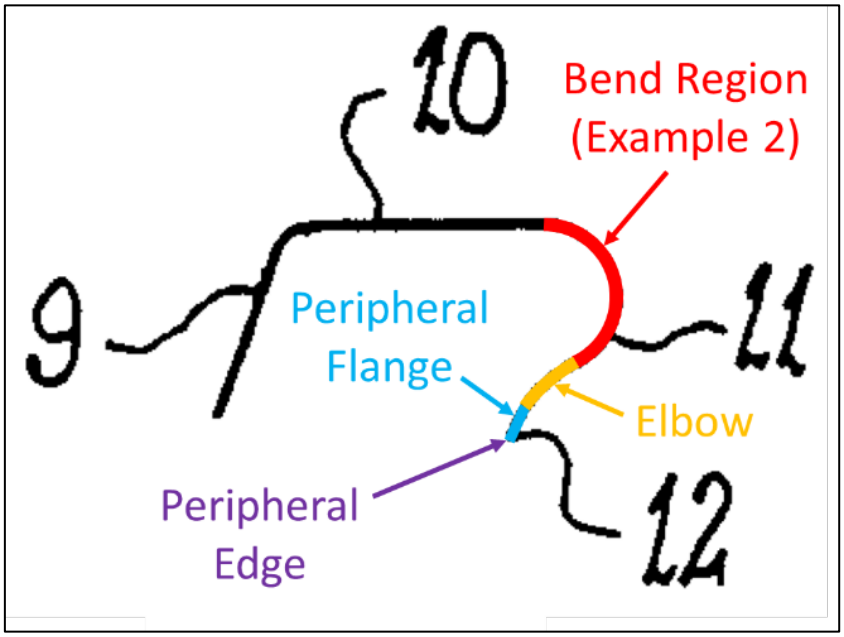
266. Portelli's Fig. 13 discloses an **elbow** connecting the bend region to the **peripheral flange**. It shows the elbow as the section below the bend region, and curved in the opposite direction, as highlighted in Fig. 13 below:





Portelli, Fig. 13 (annotations added) on Example 1 and Example 2.

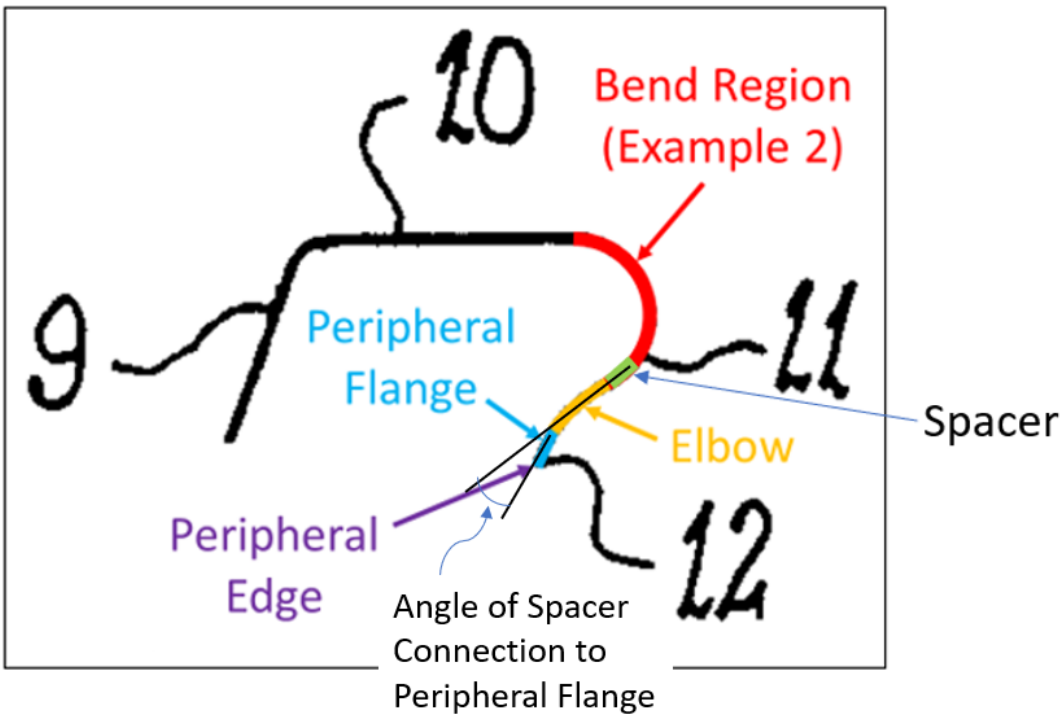
267. Additionally, Patent Owner's Complaint regarding Claim 9 can be compared to Portelli Example 2, where the "bend region" is a combination of the upper and lower sections of the bend region on the right side of Fig. 13, as shown below:



Ningbo Linhua Plastic Ex. 1003, p. 232

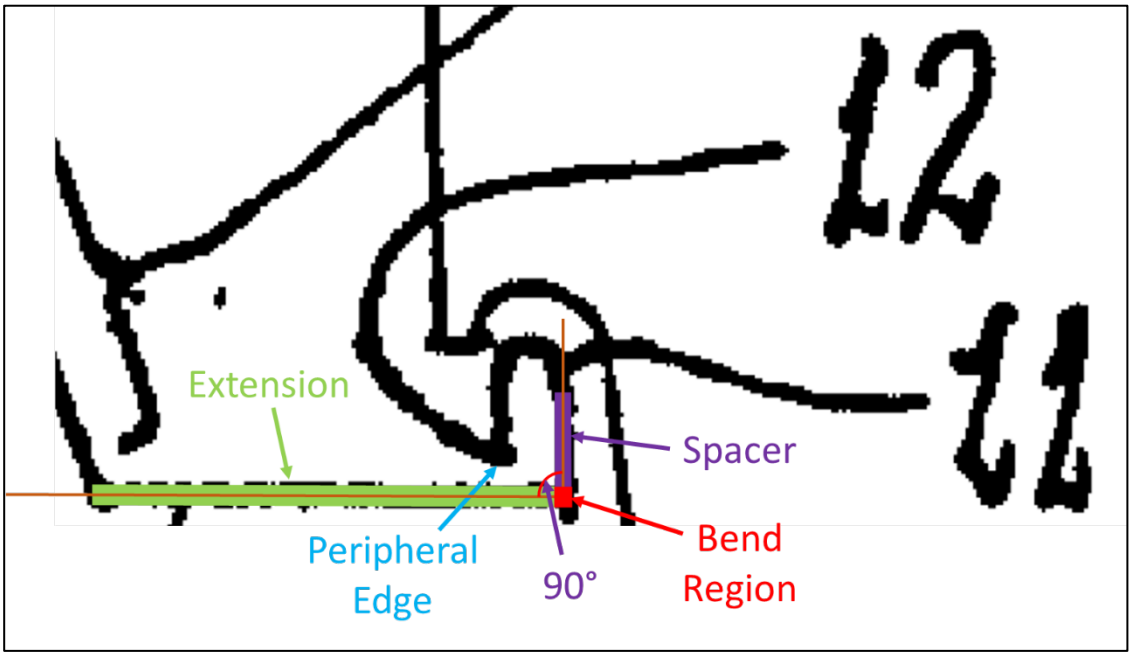
Portelli, Fig. 13 (annotations added).

268. Portelli's Fig. 13 teaches a peripheral flange connected to the bend region by an elbow, based on Patent Owner's own application of the "elbow" specification in a related litigation. Given the slight 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 Fig. 13 is in fact far less than 180 degrees, measuring only approximately 30 degrees, as shown below:



269. As noted earlier, even *if* the tray illustrated in Fig. 13 of Portelli did not have a spacer bearing a peripheral edge of the thermoformable sheet, the spacer being connected with a peripheral flange which bears a peripheral edge, appears in Fig. 8 of

Portelli. Specifically, the vertical segment in the middle of the excerpt of Fig. 8 below comprises a spacer:

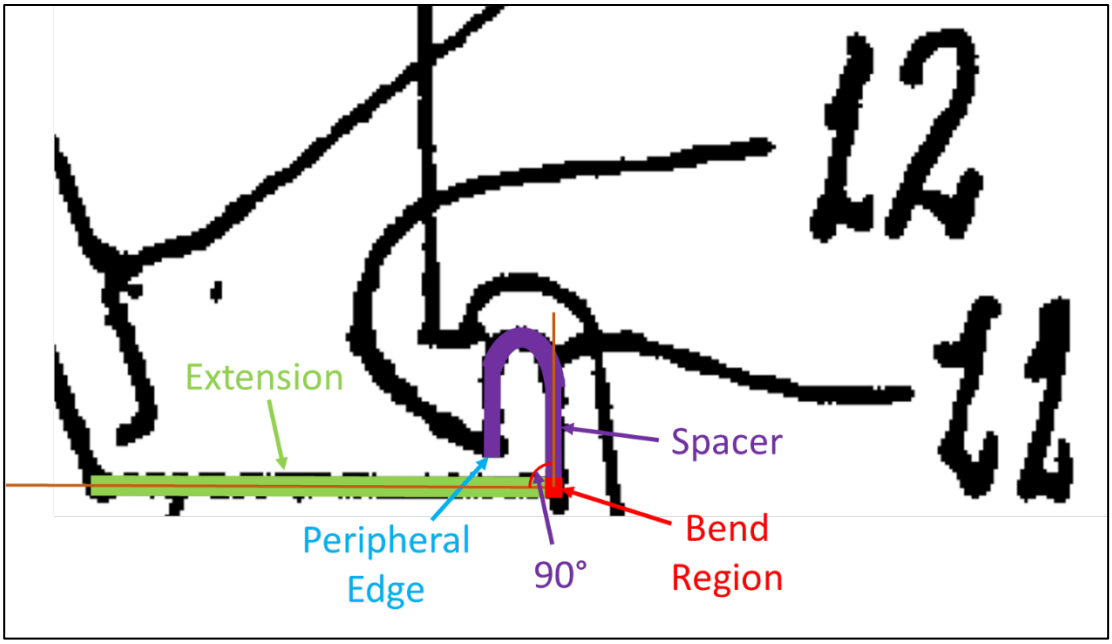


Portelli, Fig. 8 (excerpted and annotations added).

270. The peripheral edge, labeled in the above drawing excerpt, is borne at least in part by the spacer, since every portion of the tray between the spacer and the peripheral edge is borne by the spacer.

271. As another example, the spacer can 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:

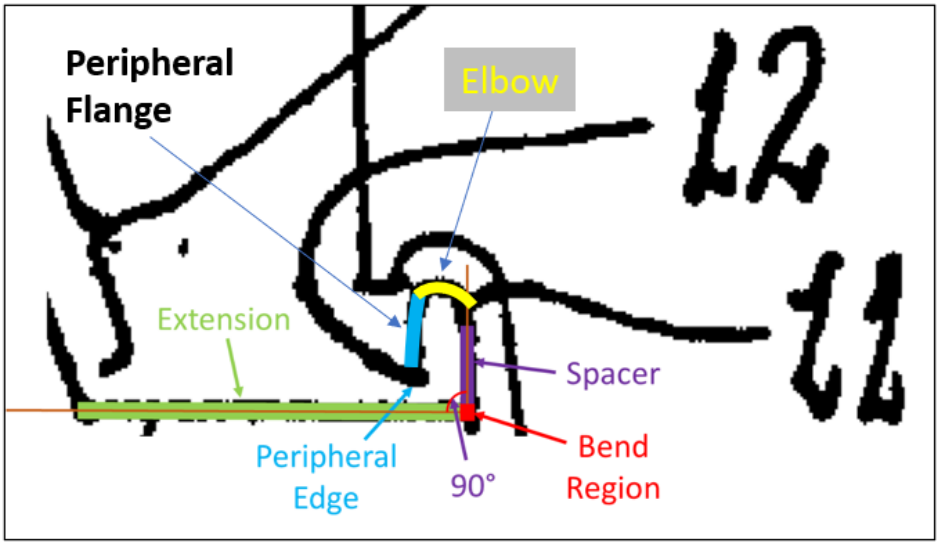
Ningbo Linhua Plastic Ex. 1003, p. 234



Portelli, Fig. 8 (excerpted and annotations added).

272. Thus, the spacer bears the peripheral edge.

273. Furthermore, Portelli 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, as shown below:



Ningbo Linhua Plastic Ex. 1003, p. 235

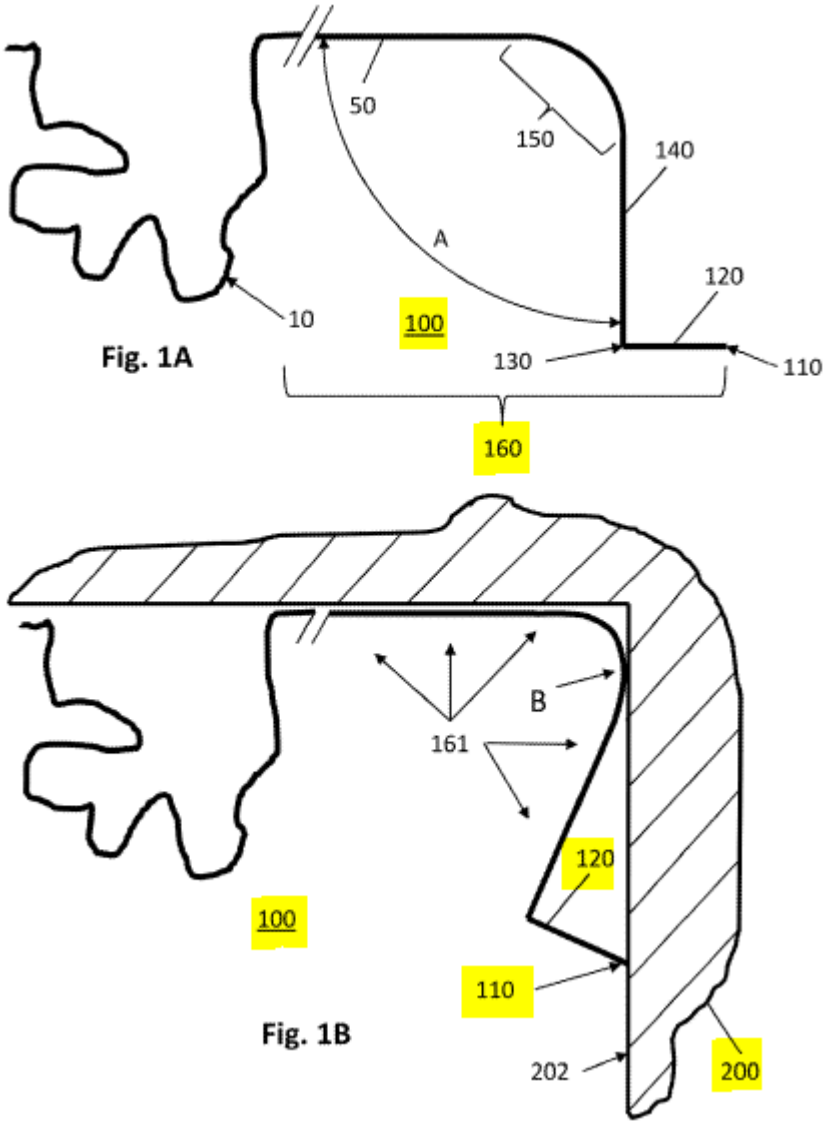
Portelli, Fig. 8 (excerpted and annotations added).

274. In sum, Portelli's Fig. 13 individually teaches a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peropheral (sic) flange being connected, at an angle other than 180 degrees, by an elbow. If it is determined that Portelli's Fig. 13 does not include a spacer, a POSITA would be well equipped to recognize and implement the spacer shown in Portelli's Fig. 8 into Portelli's Fig. 13, and conversely, would find it well within their capability to recognize and implement the peripheral flange and elbow of Poretelli's Fig. 13 into Portelli'sFig. 8. In all cases, the the resulting article would yield a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peropheral (sic) flange being connected, at an angle other than 180 degrees, by an elbow. Motivations for such combinations are detailed later, but include the shared problem of displacing the sharp peripheral edge away from the wrap path, and to yield a smooth periphery with added strength due to the curled flange.

f. **Element 21e: "*impinging a ram against the peripheral flange* to deflect the spacer towards 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,"**

275. The '222 Patent depicts in Figs. 1A a shaped thermoplastic article 100 with deflectable flange 160, spacer 140, and extension 50. In Fig. 1B, article 100 is inserted within an "upper body" (aka cavity), where "impingement of the peripheral

edge 110 of the peripheral flange 120"… "causes the deflectable flange 160 to defect (sic)." '222 Patent 6:13-36. See below:



Ex. 1001 Figs. 1A and 1B, annotated.

276. Patent '222 Fig. 1C "illustrates the outcome of inserting ram 300 in to 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 in induced within the bend region 150." *Id* 6:37-48. Fig. 1C is shown below:

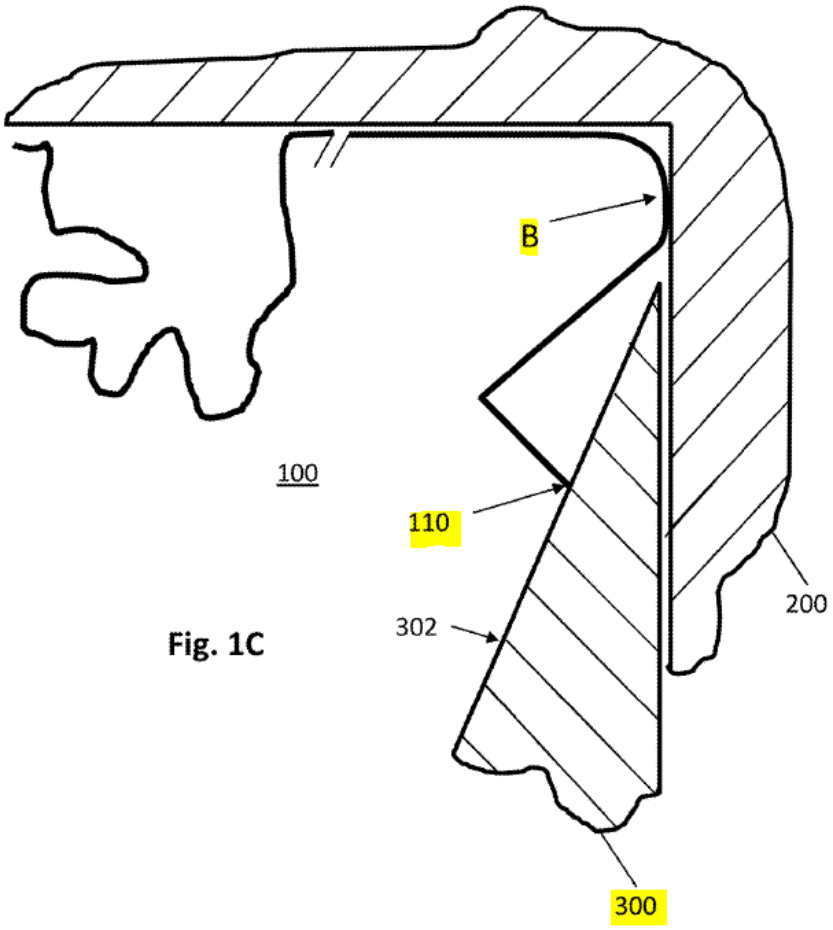


Fig. 1C

Ex. 1001 Figs. 1A and 1B, annotated.

277. Portelli's method and apparatus likewise teach impinging a ram against the peripheral flange to deflect the spacer towards the extension. Specifically, Portelli Figs 1 and 2 show *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:

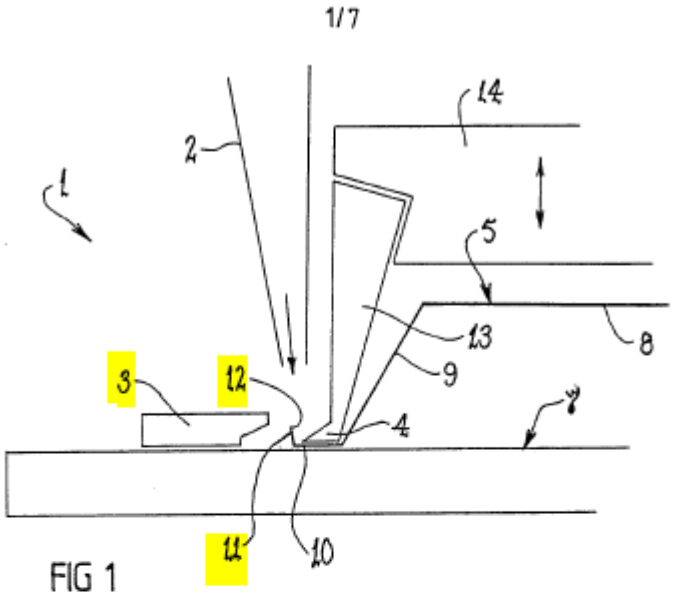


FIG 1

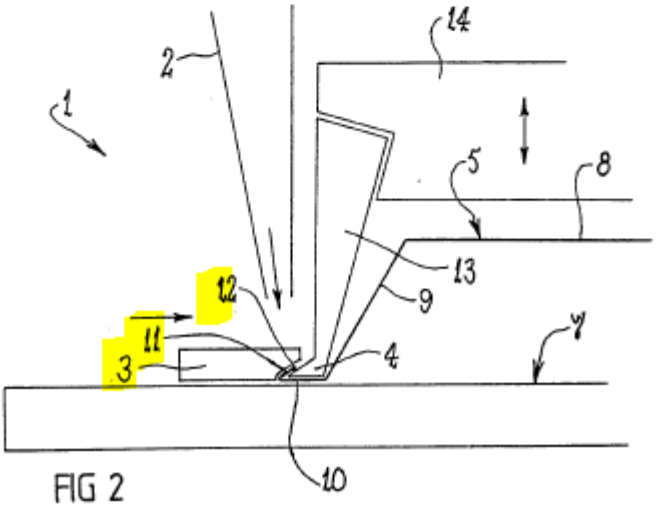
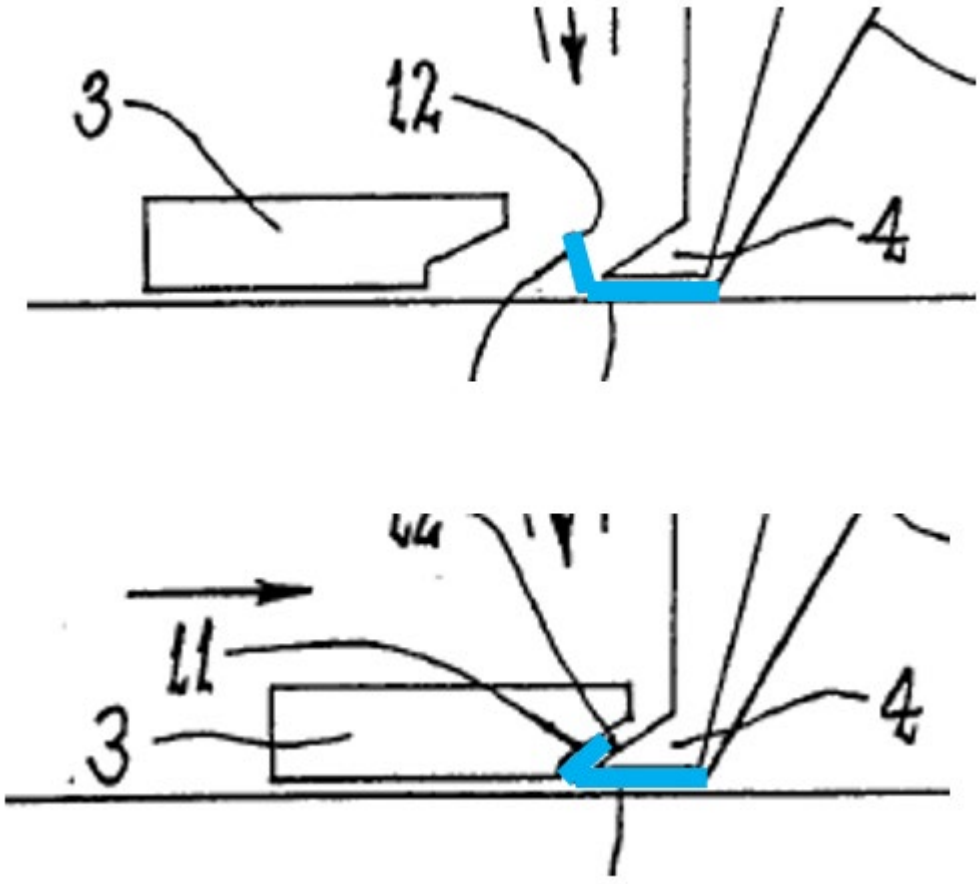


FIG 2

Portelli, Figs. 1 and 2 (annotations added).

Ningbo Linhua Plastic Ex. 1003, p. 239

278. Excerpts of Portelli Figs. 1 and 2 are shown here, annotated to 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 and 2 (excerpted and annotations added).

98. Portelli shows additional configurations of the ram used in his method and apparatus, as seen here in Figs. 3 and 4:

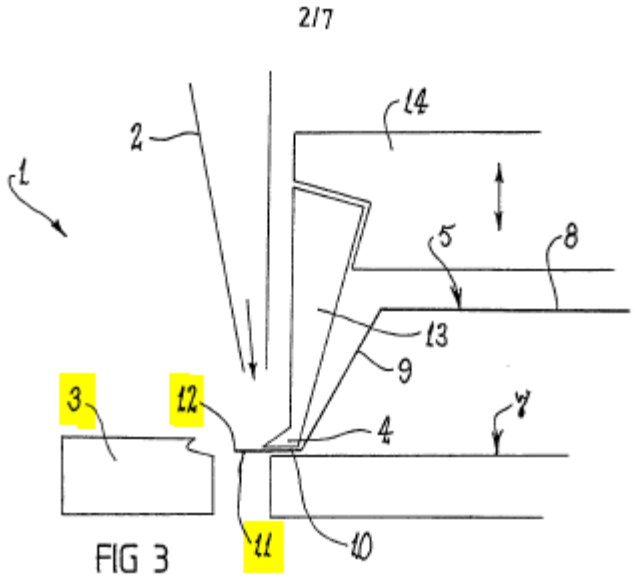


FIG 3

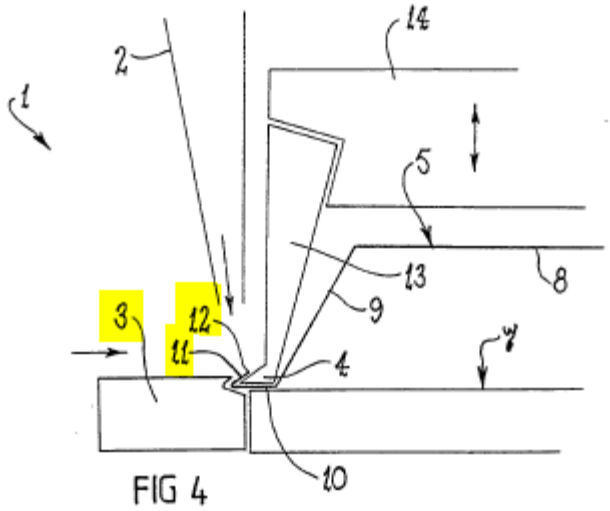


FIG 4

Portelli, Figs. 3 and 4 (annotations added).

279. Still further configurations for Portelli's *impinging a ram (25) against the peripheral flange* (11) to deflect the spacer towards the extension (10), whereby the

Ningbo Linhua Plastic Ex. 1003, p. 241

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:

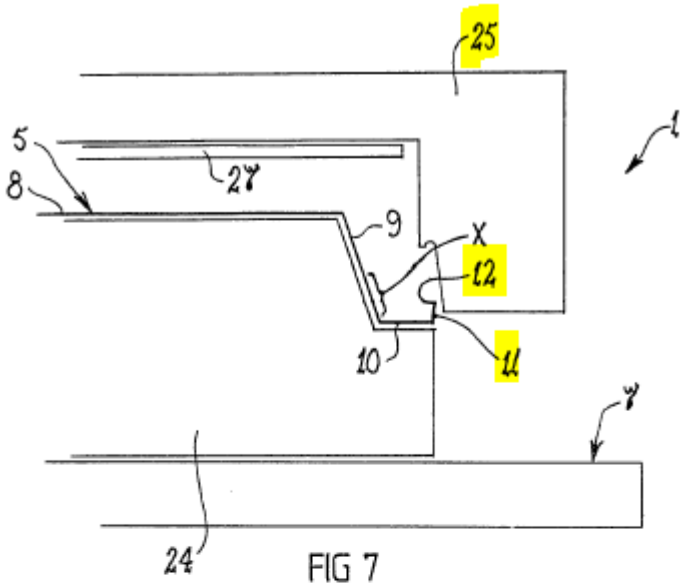


FIG 7

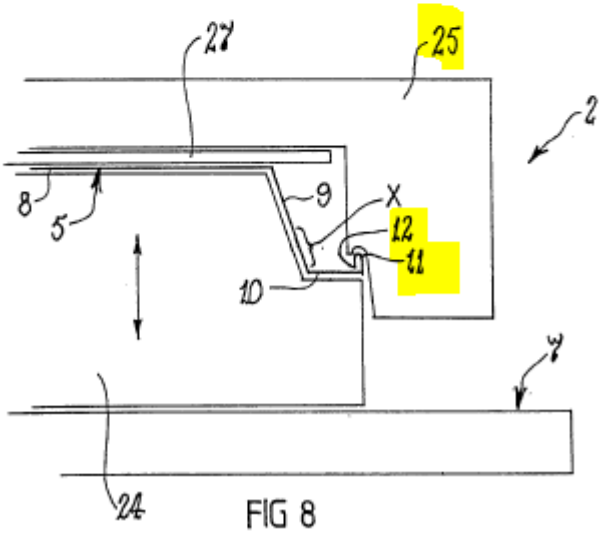
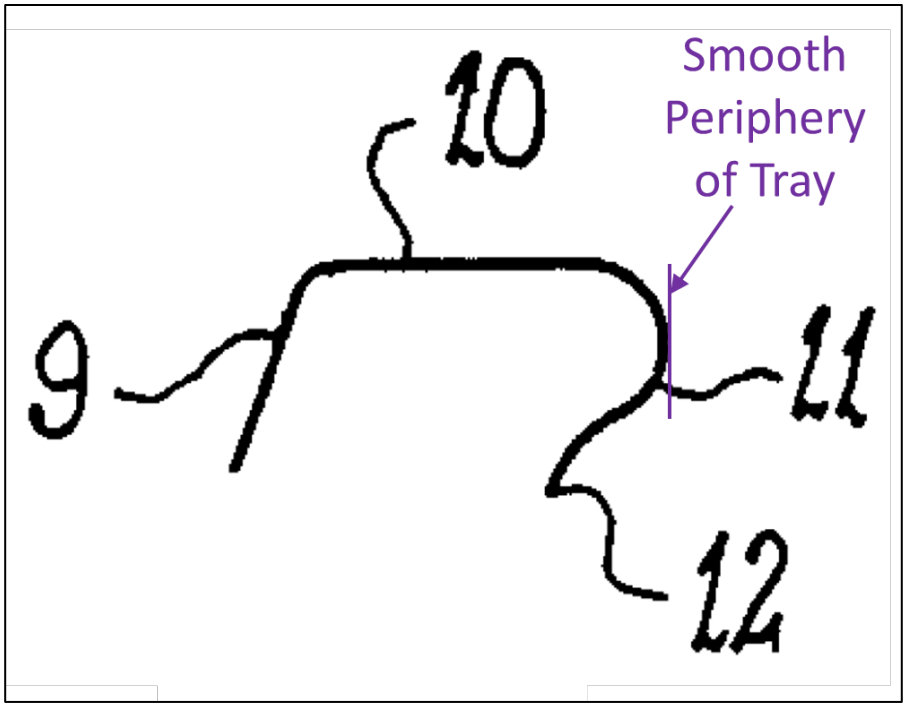


FIG 8

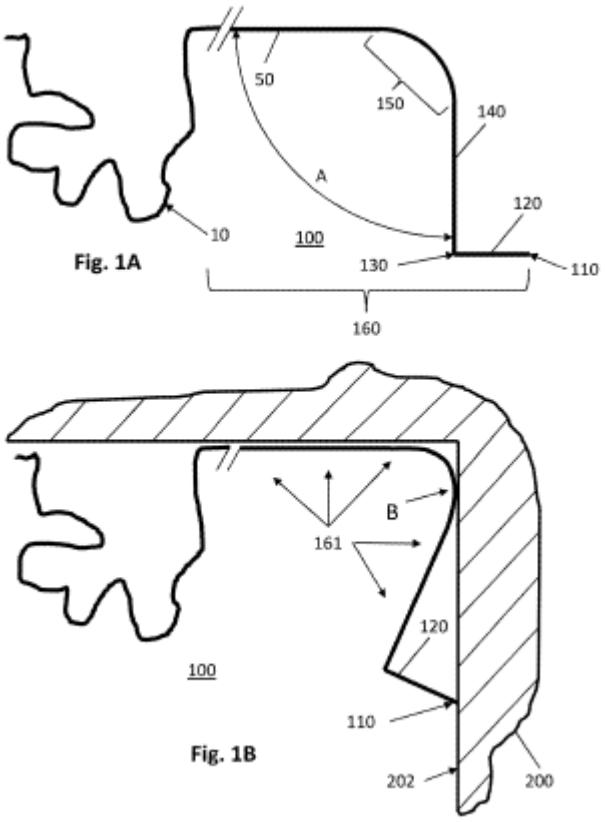
Portelli, Figs. 7 and 8 (annotations added).



Portelli, Fig. 13 (annotations added).

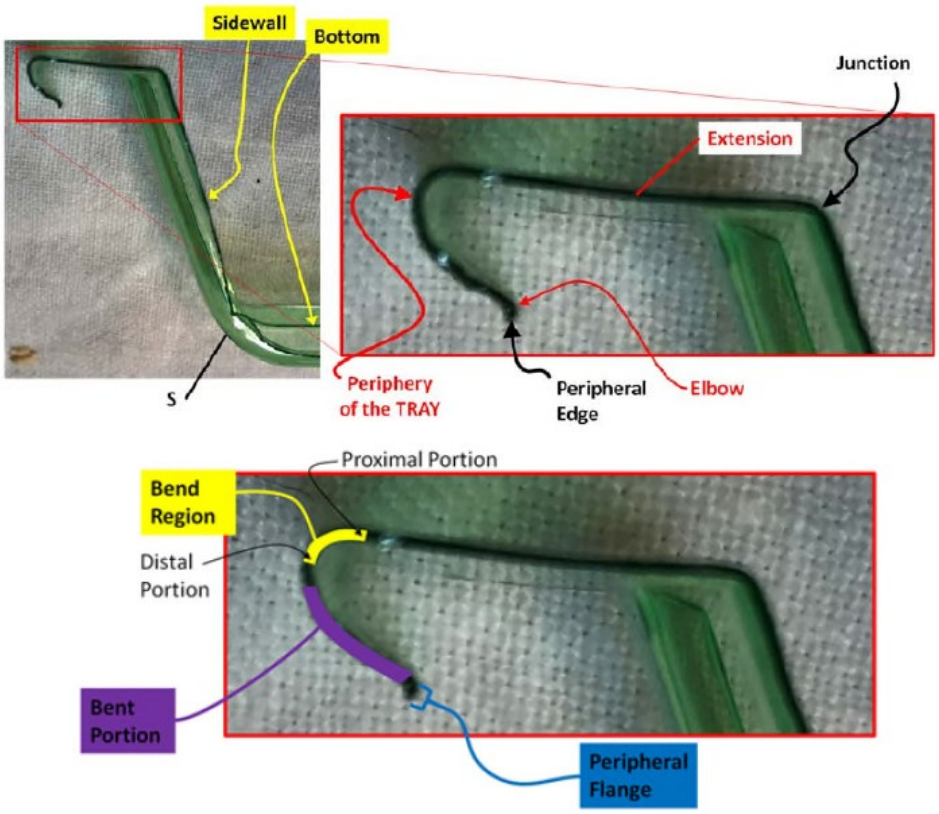
g. **Element 21f: "the bent portion being selected from the group consisting of the extension, the bend region, and the spacer,"**

280. As noted previously, the '222 Patent refers to article 100 with extension 50, spacer 140, and bend region 150, as shown here in Figs. 1A and 1B.

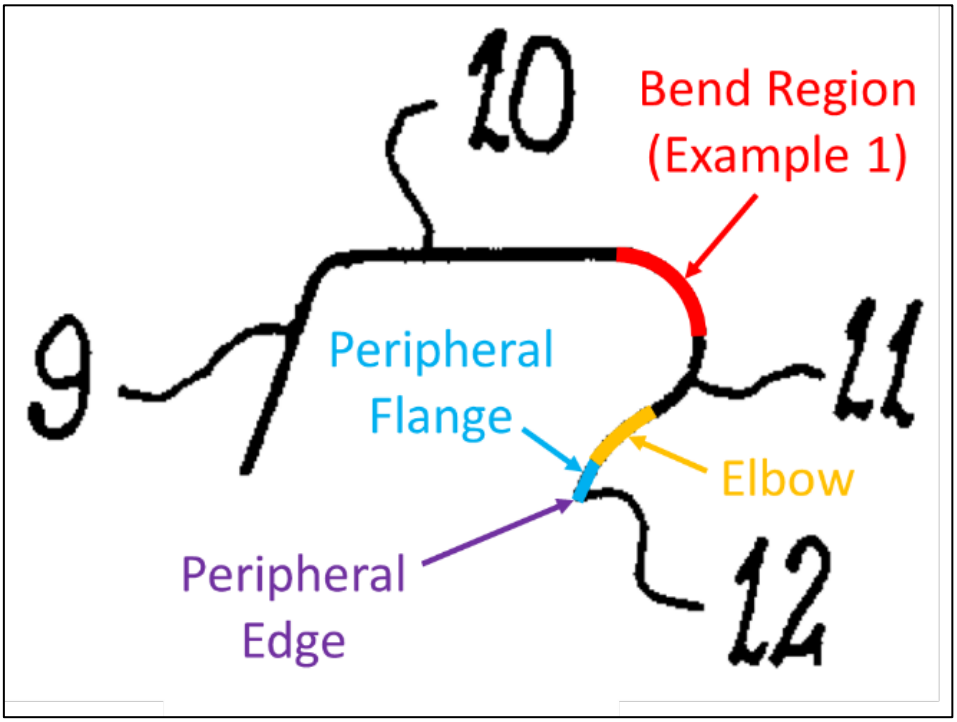


Ex. 1001, Figs. 1A, 1B

281. As previously noted, Patent Owner's First Amended Complaint in a related case referred to an "extension" and "bend region," which are practically identical to Portelli's same features:

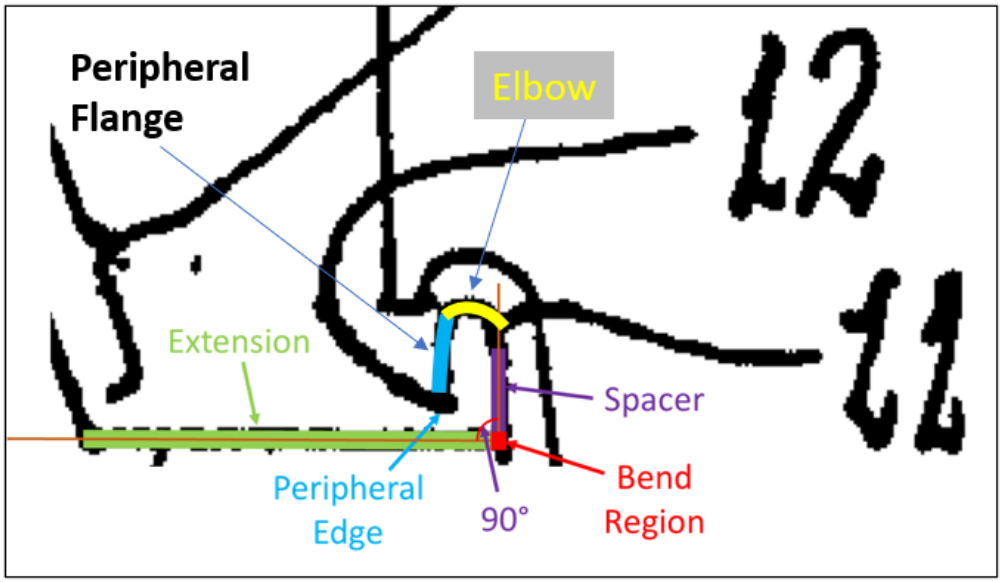

Sidewall
Bottom
Junction
Extension
Periphery
of the TRAY
Peripheral
Edge
Elbow
Proximal Portion
Bend
Region
Distal
Portion
Bent
Portion
Peripheral
Flange

Ex. 1007, p. 8

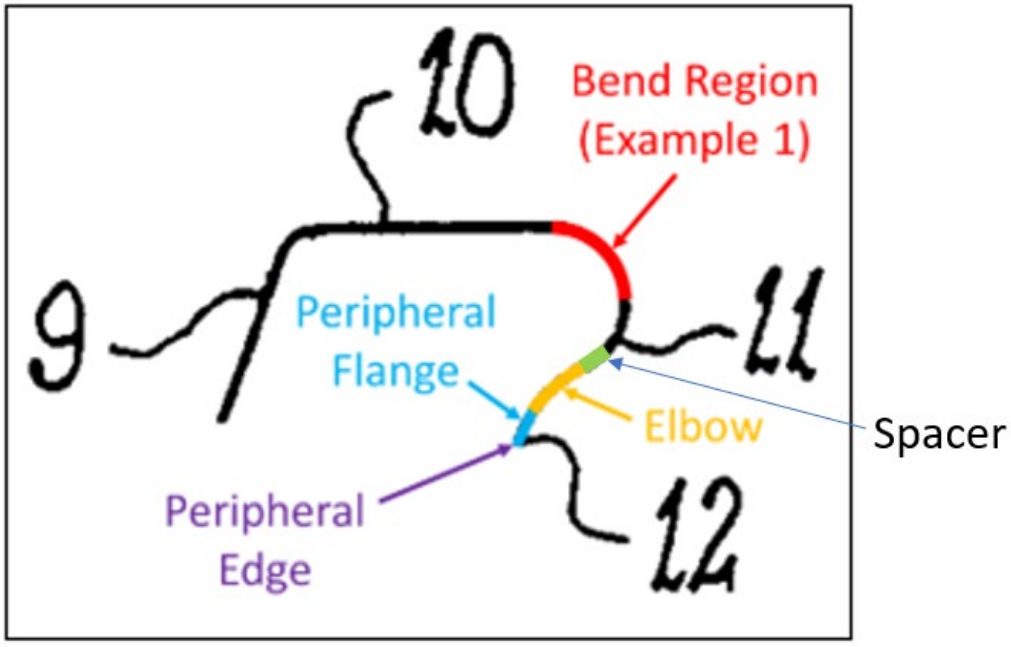

10
Bend Region
(Example 1)
9
11
Peripheral
Flange
Elbow
Peripheral
Edge
12

Portelli, Fig. 13 (annotations added).

282. As explained previously, Portelli discloses a spacer in both his Fig. 8 and Fig. 13, shown again here:

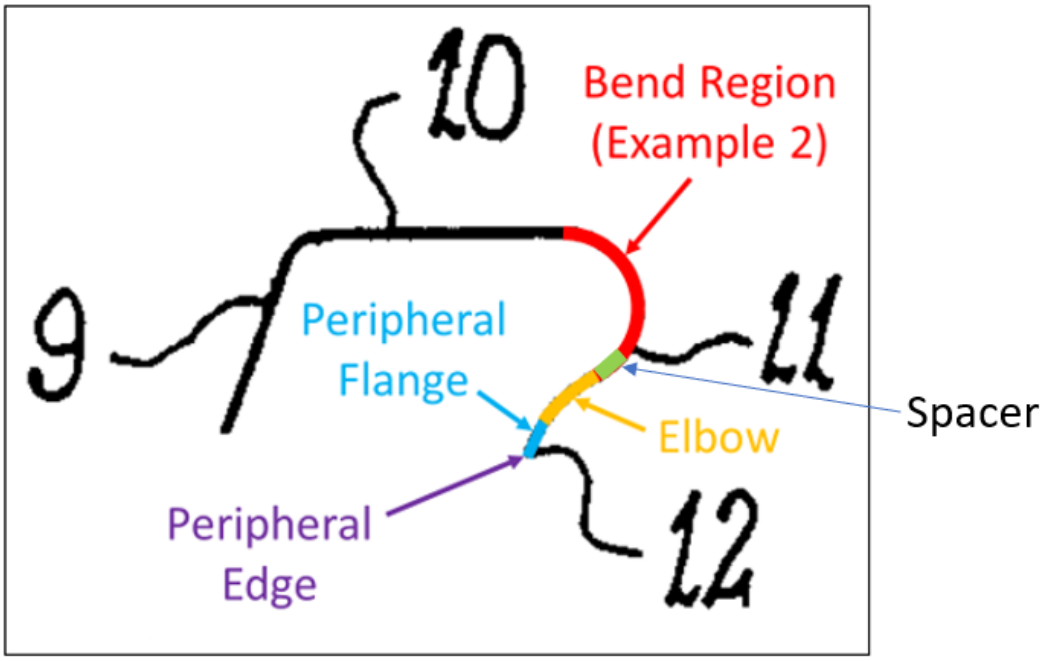


Portelli, Fig. 13 (excerpted and annotations added).



Ningbo Linhua Plastic Ex. 1003, p. 246

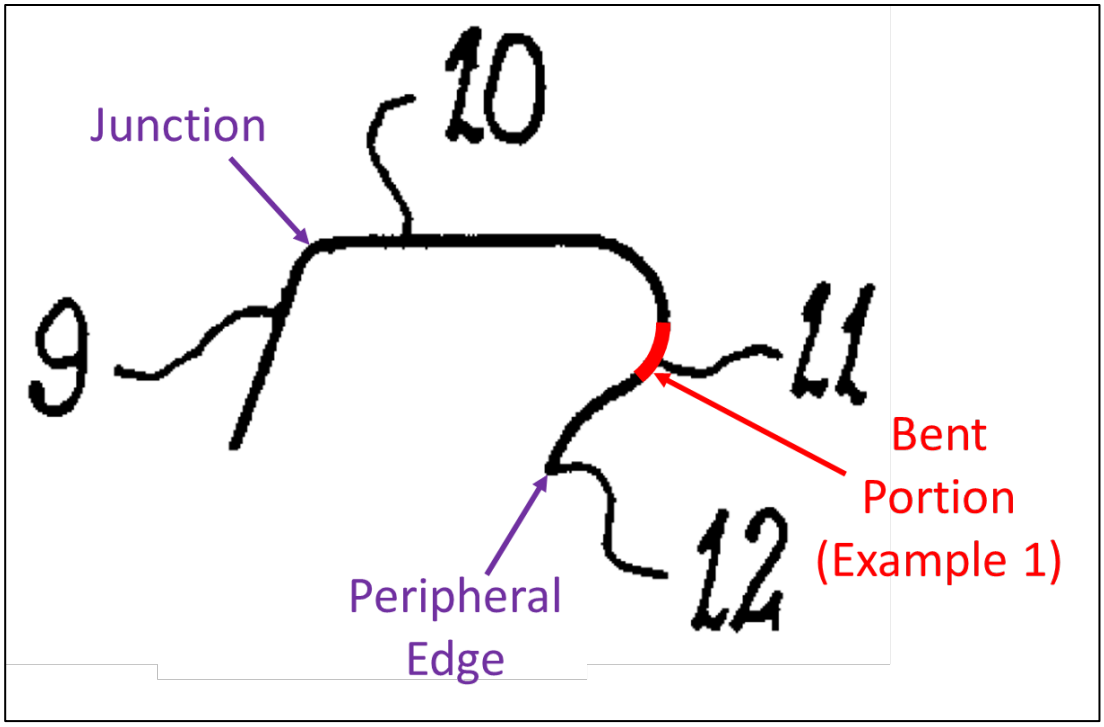
Portelli, Fig. 13 (excerpted and annotations added).



Portelli, Fig. 13 (excerpted and annotations added).

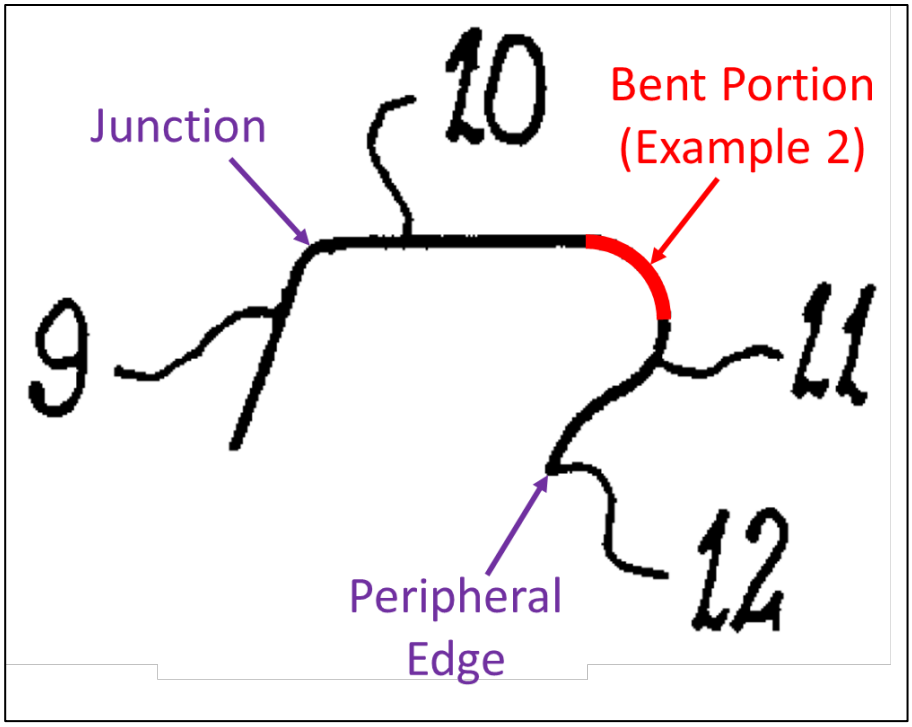
283. Portelli's Fig 13 disclose a peripheral edge 12 of the thermoformable sheet and a **bent portion** interposed between the peripheral edge and the junction between the body and the extension. Portelli illustrates the "bent portion" in several ways, including the lower portion of the curve highlighted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

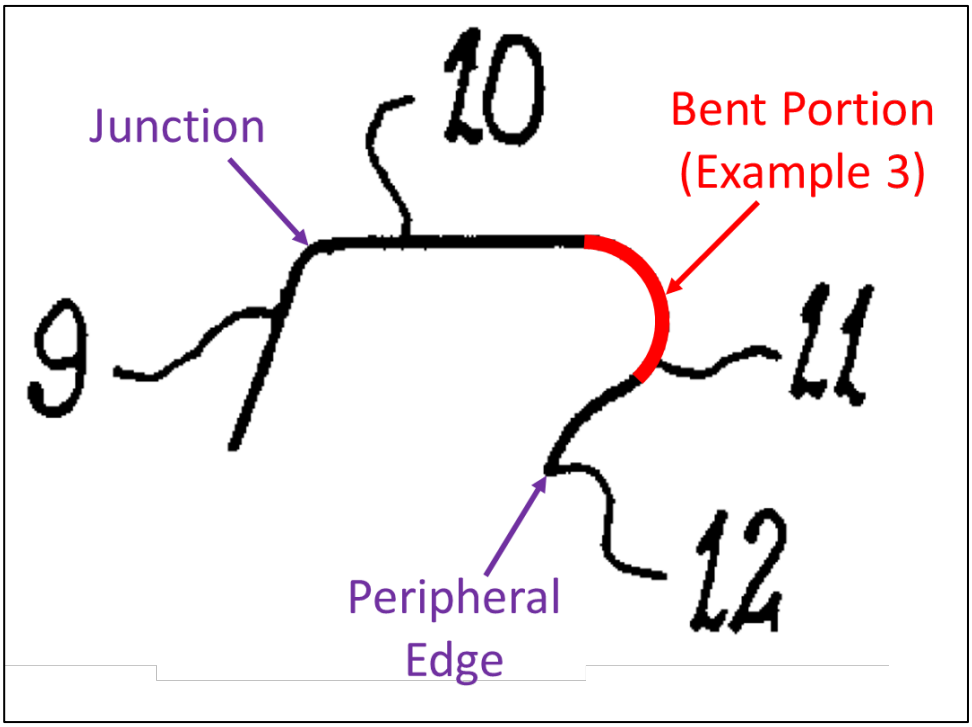
Ningbo Linhua Plastic Ex. 1003, p. 247



Portelli, Fig. 13 (annotations added).

284. Patent '222's "bent portion" specification is also disclosed by Portelli in the upper portion of the curve highlighted on the right side of Fig. 13 (Example 2), or by combining the upper and lower portions of that curve (Example 3):





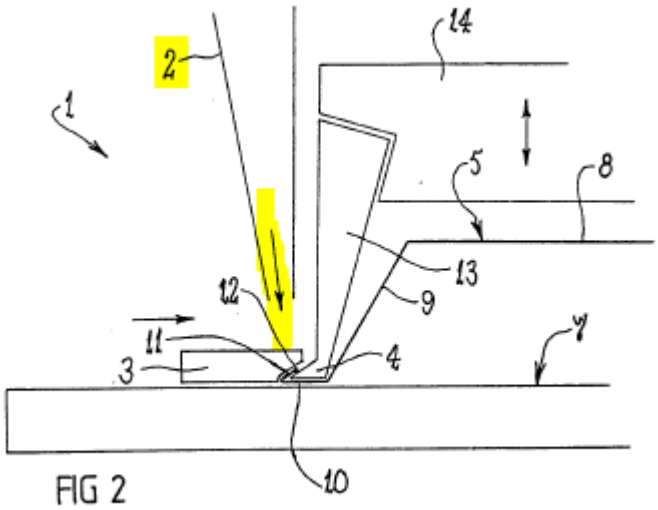
Portelli, Fig. 13 (annotations added).

Ningbo Linhua Plastic Ex. 1003, p. 249

h. **Element 21g: "*heating the bent portion* to at least the glass transition temperature of the thermoplastic;"**

285. Please see my reference to "bent portion" above with respect to Claim 21f.

286. Portelli shows heating of the bent portion of the thermoplastic article in several ways, including the methods depicted in the following Figures and descriptions. Portelli describes the apparatus in Fig 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 (annotated).

287. Portelli explains with respect to his Figs. 7 and 8, "the 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..." *Id* 12:24-29.

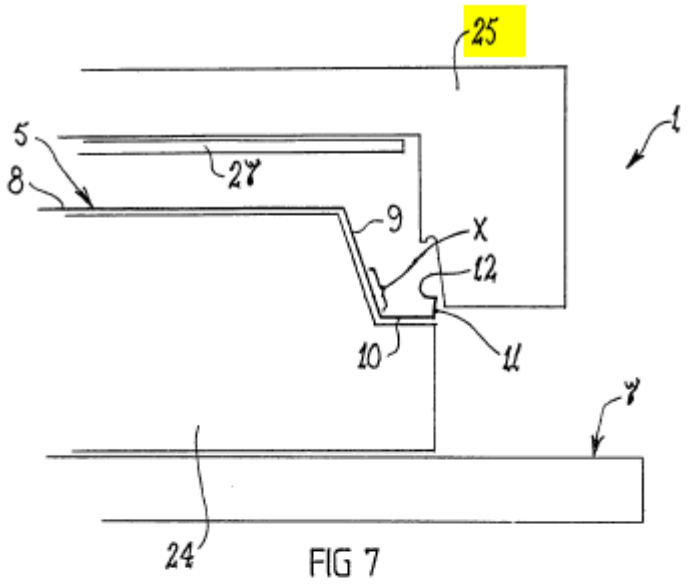


FIG 7

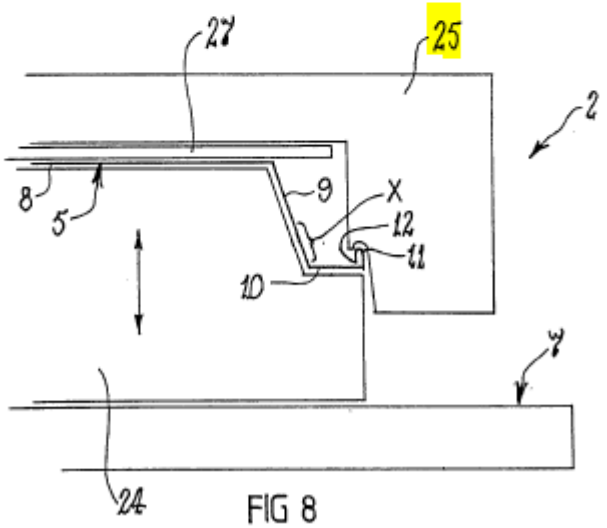
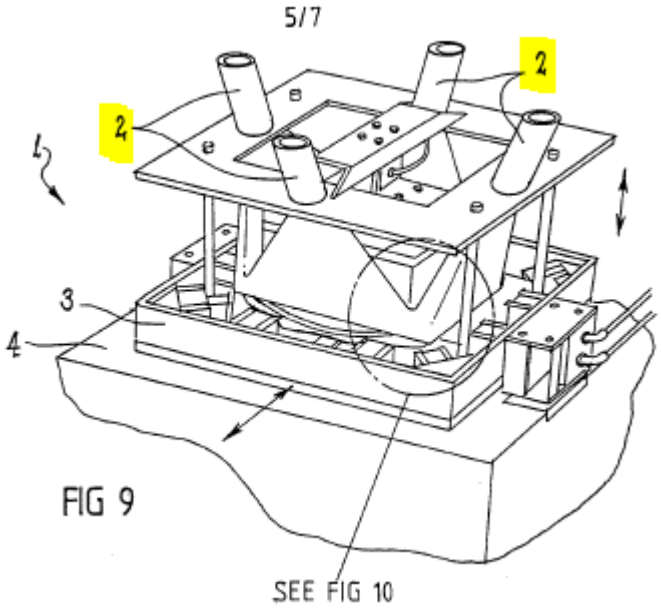


FIG 8

Portelli, Figs. 7 and 8 (annotated).

288. Still further, Portelli describes additional heating methods and apparatus in Fig. 9, explaining "There are four hot air ducts 2 directing air along the four edges

12 of the rectangular tray 5. Each of the ducts 2 fans outwardly from a round pipe cross-section at its upper length of the tray edge 12." Fig 9 is shown here:



Portelli, Fig. 10 (annotated).

289. Portelli explains that "heating means for heating the peripheral edge region of the tray to a temperature at which it is malleable;" Id 6:4-5. Portelli further explains "Preferably the die is configured so as to heat the peripheral edge region of the tray whin it initially engates the tray to a temperature at which the edge region is malleable, and thereafter to roll the peripheral edge region of the tray." Id. 6:17-19.

290. Portelli further discloses regarding his Fig. 1, "When the plastic material of the tray reaches the temperature at which it becomes malleable, 150 to 250 degrees C, the former 3 is brought into operative engagement with the peripheral edge region 11 deforming it. Id. 9:22-24. Portelli likewise teaches 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." 15:4-8. A POSITA would readily understand that Portelli's references to thermoplastics becoming "malleable" and "softening" and becoming "molten" are synonymous with the "glass transition temperature" referenced in the '222 Patent limitations.

i. **Element 21h: "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…"**

291. See my previous references to impinging the ram against the peripheral flange, such as with respect to Claim 21e. above, and references to "bent portion" in Claim 21f.

292. As explained previously, Portelli teaches several methods and apparatus configurations for impinging the ram against the peripheral flange and heating the bent portion to at least the glass transition temperature.

293. It is evident from the results described in Portelli's specifications, Figures and claims that the sharp peripheral edge is sufficiently displaced by Portelli's method, apparatus and flange geometry that "further impinging" is indeed taught and achieved. Portelli illustrates various degrees and increments of impinging

Ningbo Linhua Plastic Ex. 1003, p. 253

the ram against the peripheral flange, as a POSITA would understand that Portelli's ram is slidably movable, and thus can be selectively impinging the peripheral flange. Indeed, Portelli describes the ram configuration and movement in his Fig. 1, stating, "The former [ram] 3 is a solid block slidable along the support surface 7 towards and away from the anvil 4. The former may be driven by any suitable mechanical drive means. Such drive means are well known to persons skilled in the art and as such will not be described in any further detail here." Id. 9:4-7.

294. Accordingly, Figs. 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 some distance to travel and re-engage with the article.

Ningbo Linhua Plastic Ex. 1003, p. 254

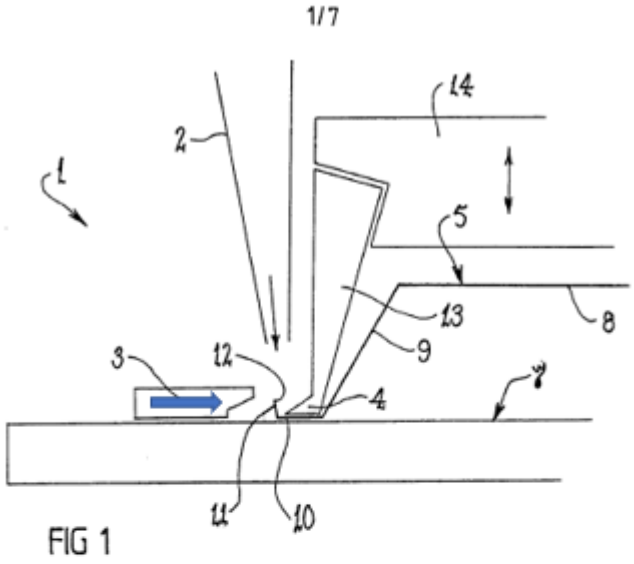


FIG 1

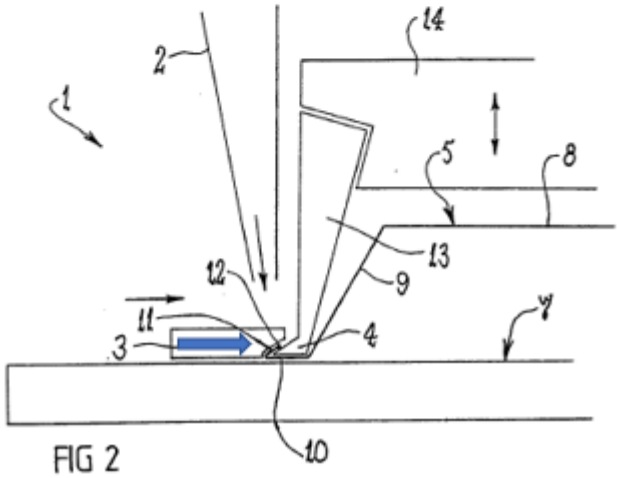
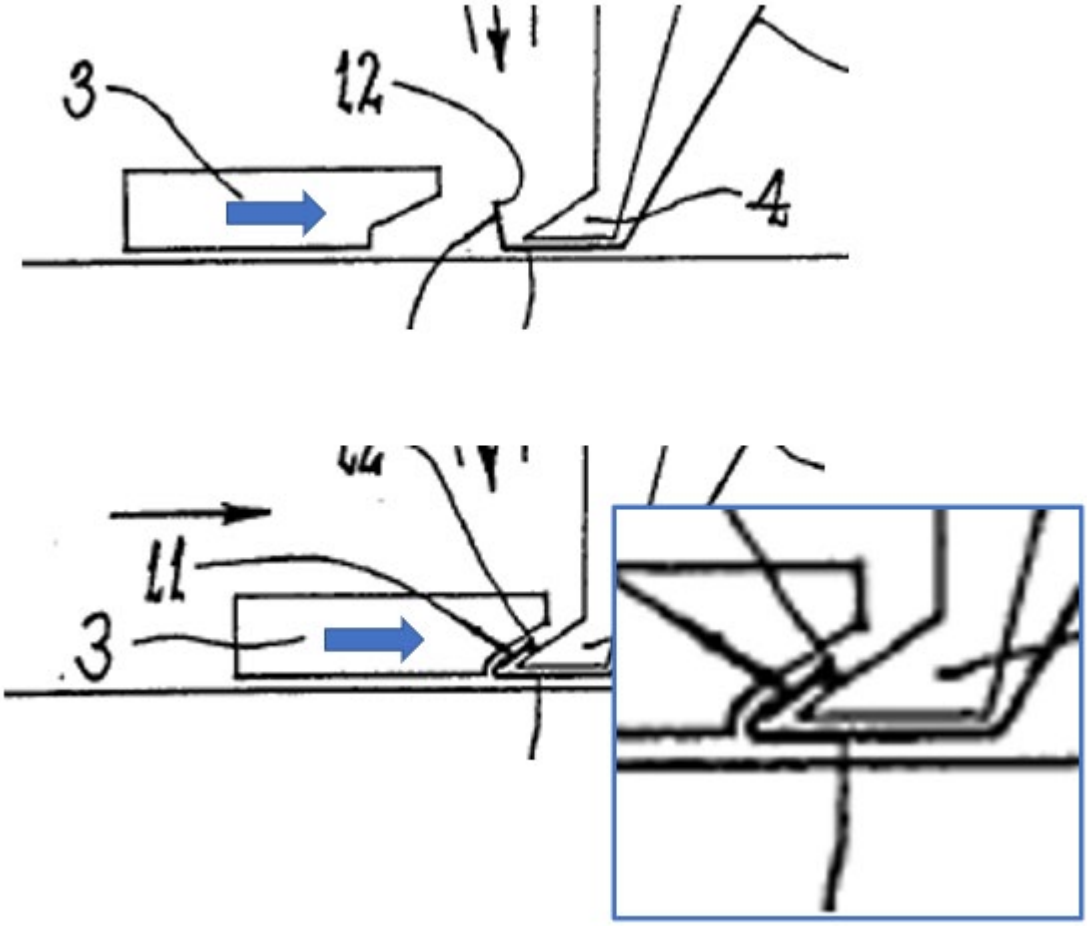


FIG 2

Portelli, Figs. 1 and 2 (annotated). See also Figs. 3-6.

295. A closer inspection of Portelli's Figs. 1 and 2 show this in further detail:



Portelli, Figs. 1 and 2 (excerpted and annotated).

296. Portelli similarly demonstrates in Figs. 7 and 8 the ram moving towards the peripheral flange in increments, with Fig. 7's ram still some distance from the peripheral flange, and Fig. 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.

Ningbo Linhua Plastic Ex. 1003, p. 256

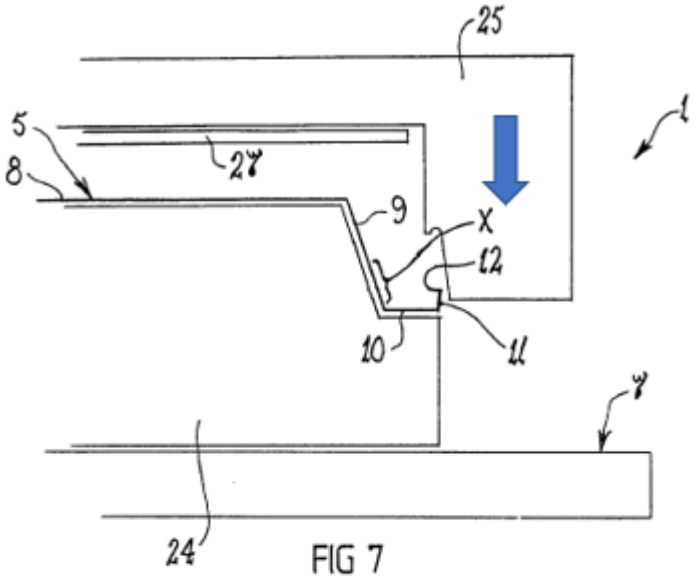


FIG 7

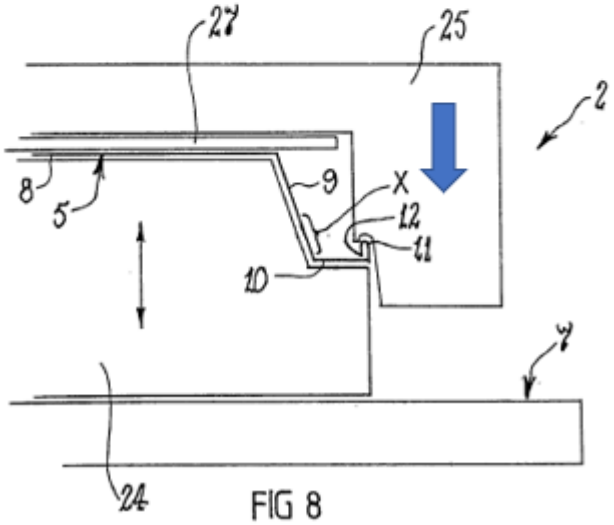
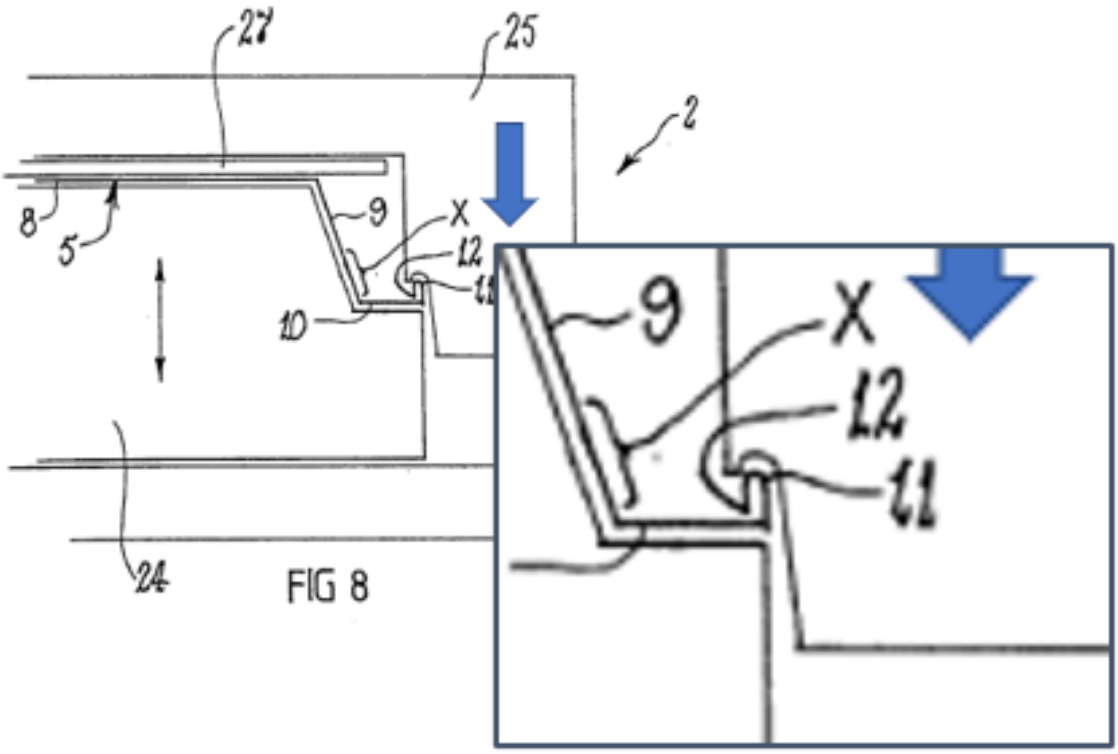


FIG 8

Portelli, Figs. 7 and 8 (annotated).

297. A closer view of Fig 8 shows this in further detail:

Ningbo Linhua Plastic Ex. 1003, p. 257



Portelli, Fig. 8 (excerpted and annotated).

298. Portelli provides even further disclosures on the "further impinging" aspects of his method and apparatus, 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. 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.

299. A POSITA would therefore understand from Portelli's teachings that

impinging the ram against the peripheral flange and heating the bent portion to at least the glass transition temperature are disclosed by Portelli in order to achieve the flange displacement and smooth periphery described and shown in his method, apparatus, and tray profile geometries.

j. **Element 21i: "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."**

300. Please refer to my previous references to the and "ram impingement" and "bent portion" with respect to Claims 21e. and 21f., respectively.

301. Portelli's method and apparatus teachings repeatedly describe cooling of the article's bent portion after displacing the sharp peripheral edge. For example, he states "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." Id. 3:6-8. Portelli further describes a method of cooling to include "…the cooling includes actively cooling the peripheral edge region of the tray using cooling water." Id. 4:10-12. Still further, Portelli discloses that "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. Again, Portelli describes a cooling feature, stating, "Cooling means (not shown) in the form of water cooling are also provided." Id. 8:25-

26. Cooling is again described by Portelli for his Fig. 2 apparatus, stating "The hot air blast is then interrupted and the peripheral edge region 11 of the tray 5 is cooled so that it sets in the deformed configuration." Id. 9:27-29. Further disclosure is found in his statement "The cycle time for the entire operation would be of the order of three to five seconds. Of this the cooling time would be a half to three quarters of a second." Id 10:6-8. In describing his 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 therby acting to cool the former 3 which in turn cools the region 11." Id. 10:21-24. Fig. 10 is shown below for reference:

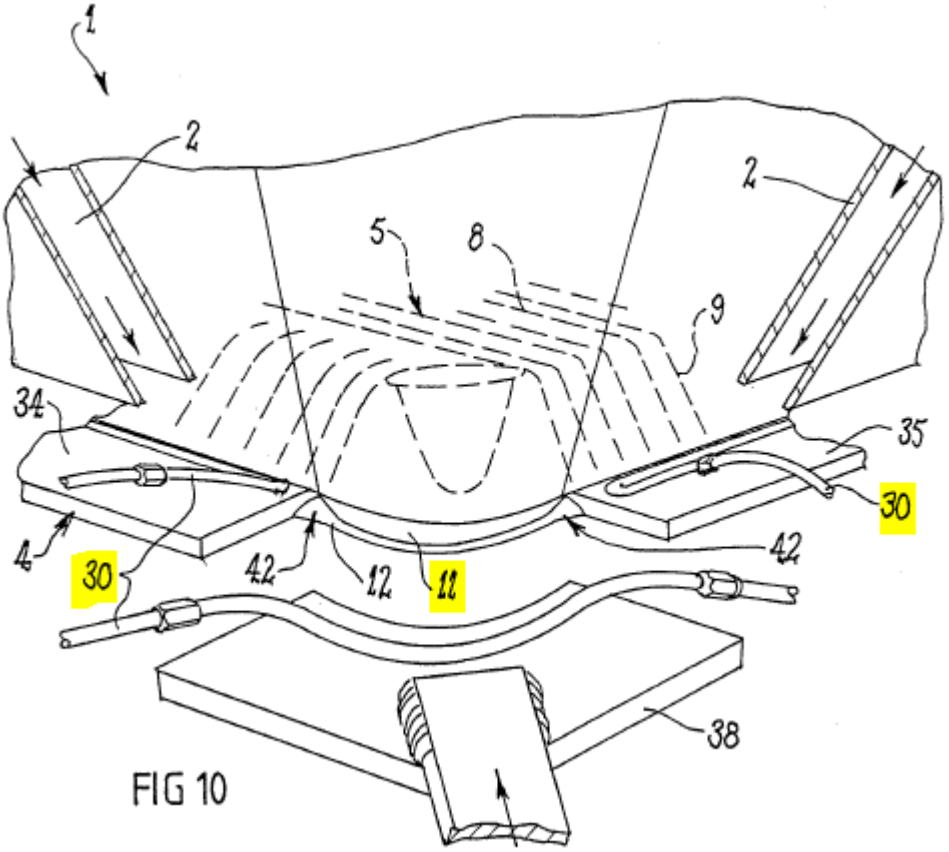
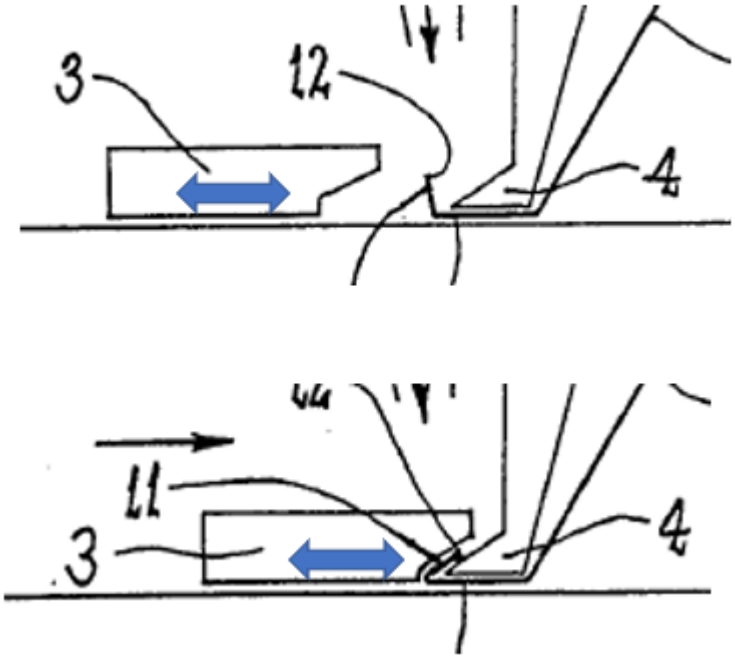


FIG 10

Portelli, Fig. 10 (annotated).

302. Portelli also teaches disengaging the ram from the deflectable flange. He states "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. As previously noted, Portelli describes the ram configuration and movement in his Fig. 1, stating, "The former [ram] 3 is a solid block slidable along the support surface 7 ***towards and away*** from the anvil 4. The former may be driven by any suitable mechanical drive means. Such drive means are well known to persons skilled in the art and as such will not be described in any further detail here." Id. 9:4-7. Portelli's Figs. 1 and 2 depict the slidable ram (3) which can move to engage and disengage the deflectable flange (11):



Ningbo Linhua Plastic Ex. 1003, p. 261

Portelli, Fig. 1 and 2 (excerpted and annotated).

303. Likewise, Portelli's Figs. 7 and 8 show the slidable ram (25) which can move to engage and disengage the deflectable flange (11):

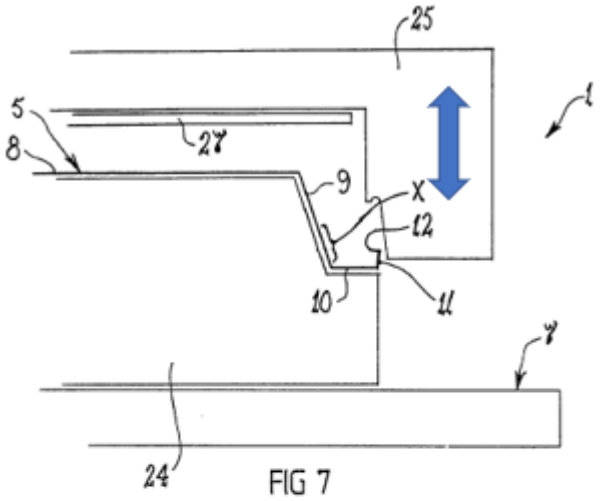


FIG 7

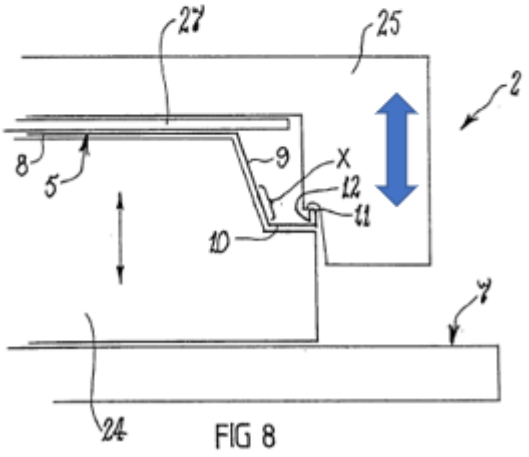


FIG 8

Portelli, Fig. 7 and 8 (excerpted and annotated).

304. Portelli further 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." Id. 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." 11:8-14. (emphasis added).

305. These and other Portelli teachings disclose the limitations "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."

306. In sum, Portelli teachings render obvious the '222 patent Claims 1-21, considering Portelli's teachings regarding method, apparatus, and materials, the skill and knowledge of a POSITA, and the Patent Owner's own interpretation of Claims 1-21 elements indicated above.

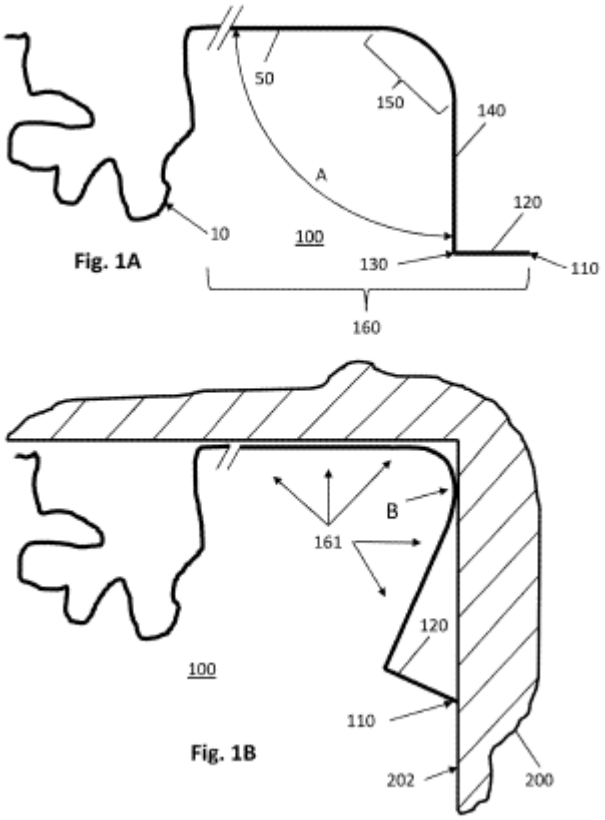
Ningbo Linhua Plastic Ex. 1003, p. 263

B. Ground 2: Claims 1-6, 11-18, and 20-21 are Rendered Obvious Under § 103 by Meadors

1. Claim 1

a. Comparison to Patent Owner's Application of Claim Elements in '222 Patent and Related Litigation

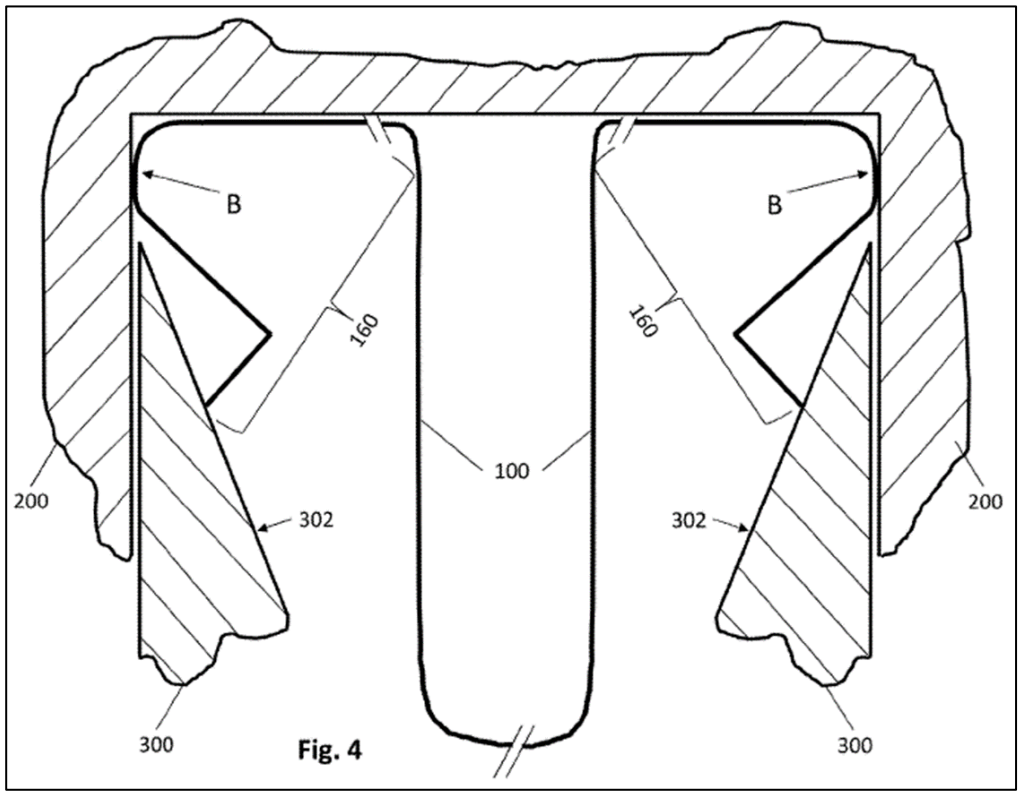
307. As noted previously, the '222 Patent refers to article 100 with body 10, extension 50, deflectable flange 160, spacer 140, bend region 150, elbow 130, peripheral flange 120, and peripheral edge 110, as shown here in Figs. 1A and 1B.



Ex. 1001, Figs. 1A, 1B

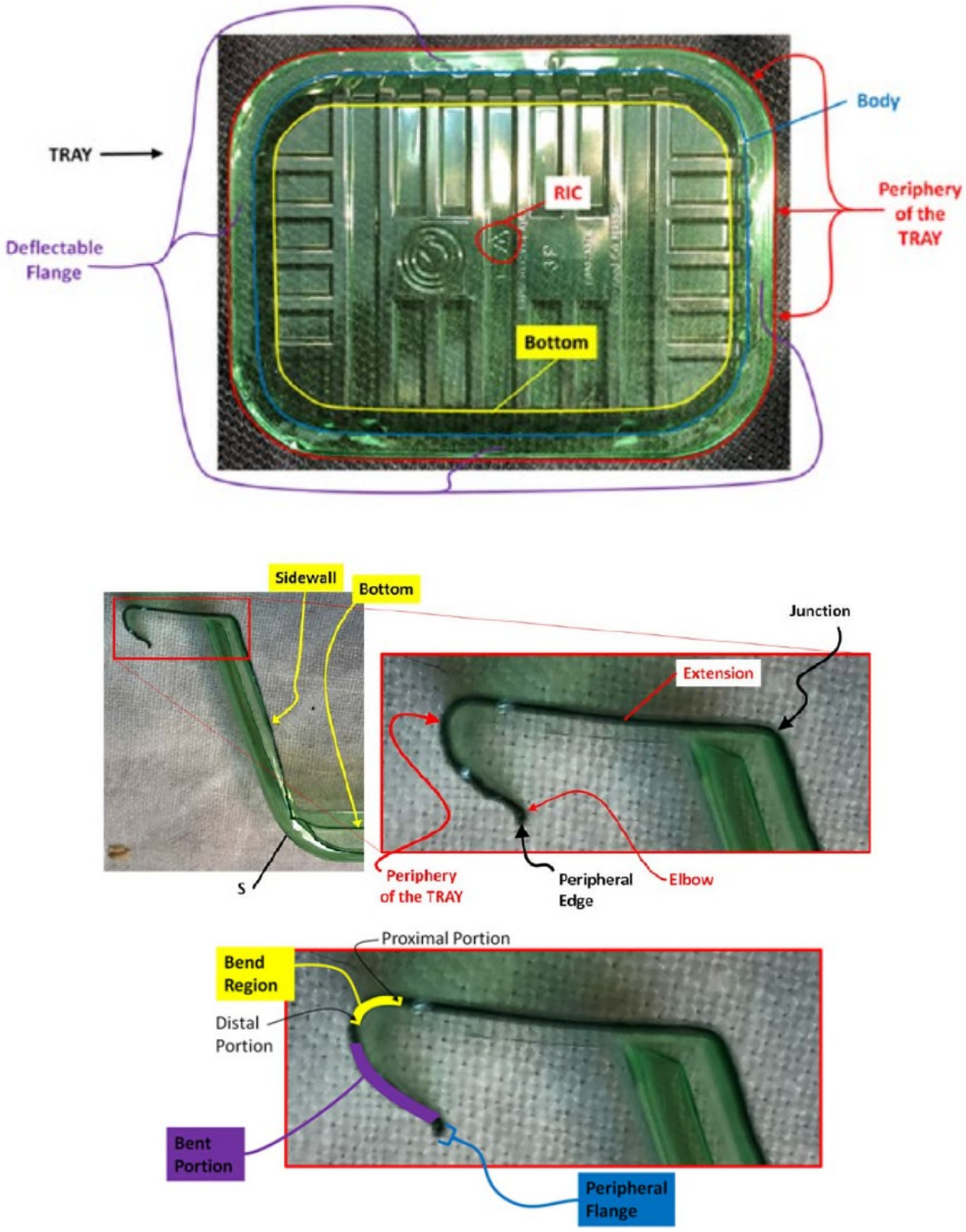
Ningbo Linhua Plastic Ex. 1003, p. 264

308. The preamble of Claim 1 includes a reference to an article having a body with a periphery. The "periphery" of the tray described and illustrated in the '222 Patent is the outermost perimeter of the tray, as described with reference to Fig. 4 of the '222 Patent, which also shows a ram 300:



Ex. 1001, Fig. 4, 7:48-49 ("the periphery of the article 100 … occurs at the positions indicated by B in this figure").

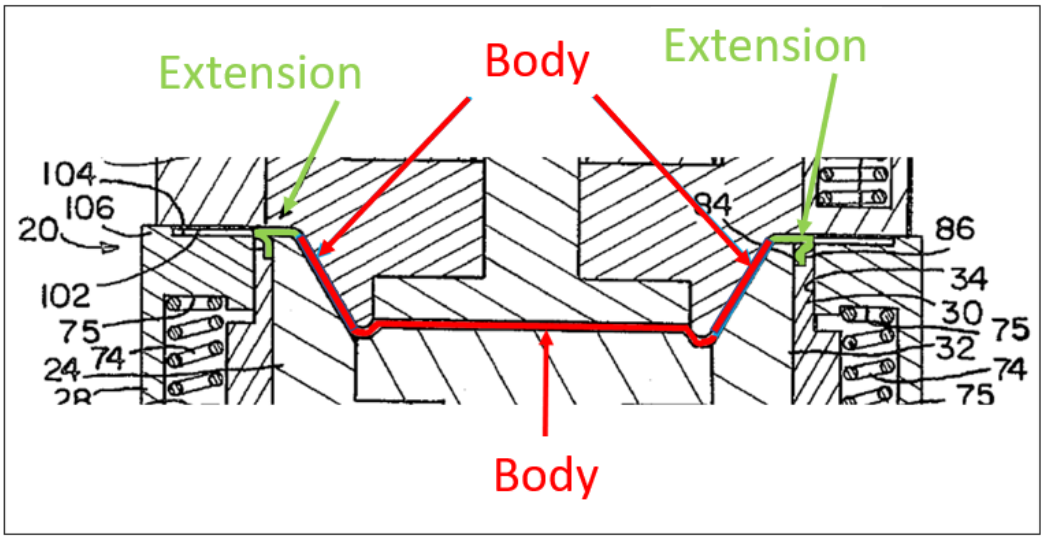
309. Furthermore, the Patent Owner applied the terms "periphery," "deflectable flange," "extension," "bend region," "peripheral flange," "elbow," "peripheral edge," "extension," "bent portion" and other features to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint dated 9/13/22 in litigation related to the '222 Patent:



Ex. 1007, p. 8

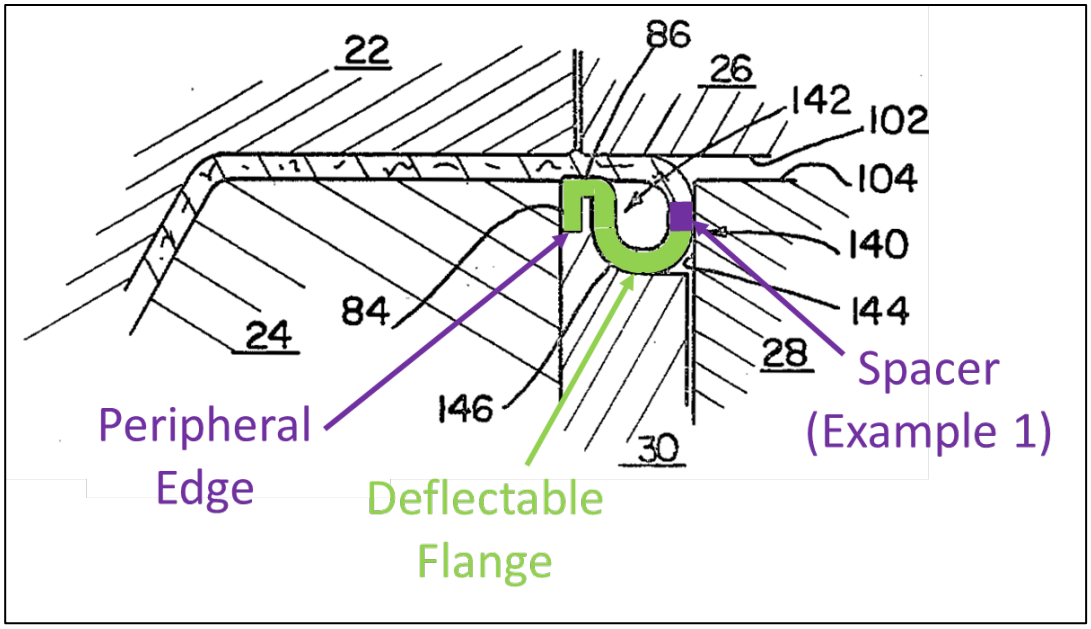
Ningbo Linhua Plastic Ex. 1003, p. 266

310. However, these same features are taught by the prior art of Meadors, including an extension, body, and ram 30:

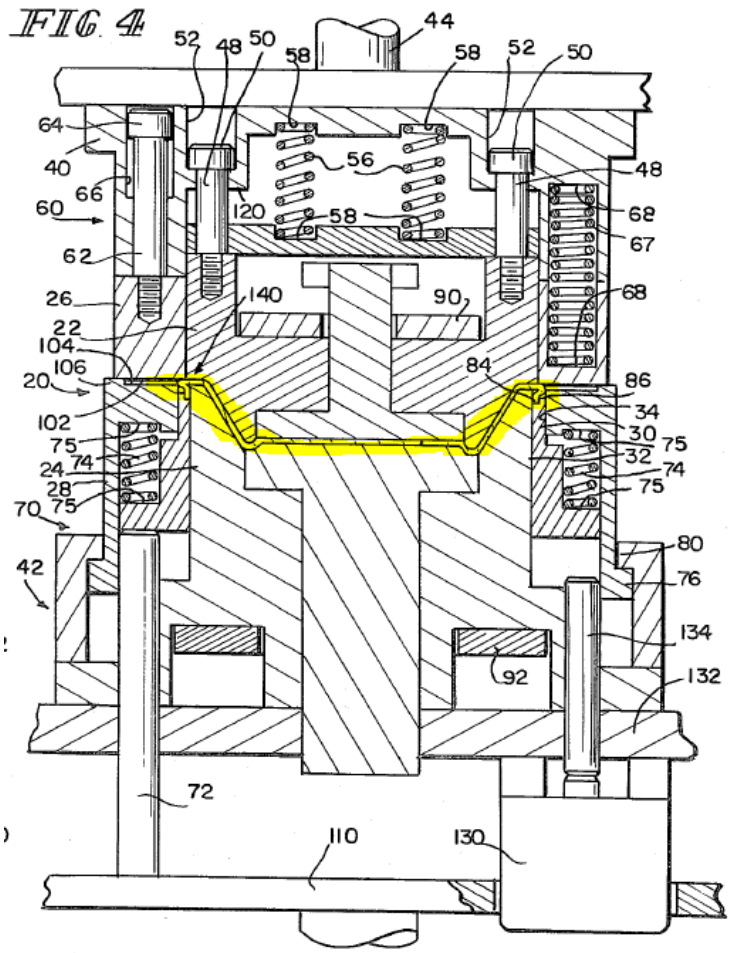


Meadors, Fig. 4 (excerpted, annotations added).

311. The extension of Meadors's tray includes the curved, rolled-over shape on the right side of Fig. 8, which is shown to be located at the peripheral portion of the body of the thermoplastic article. Fig. 8 includes an extension, spacer, deflectable flange, peripheral flange, peripheral edge and ram 30:

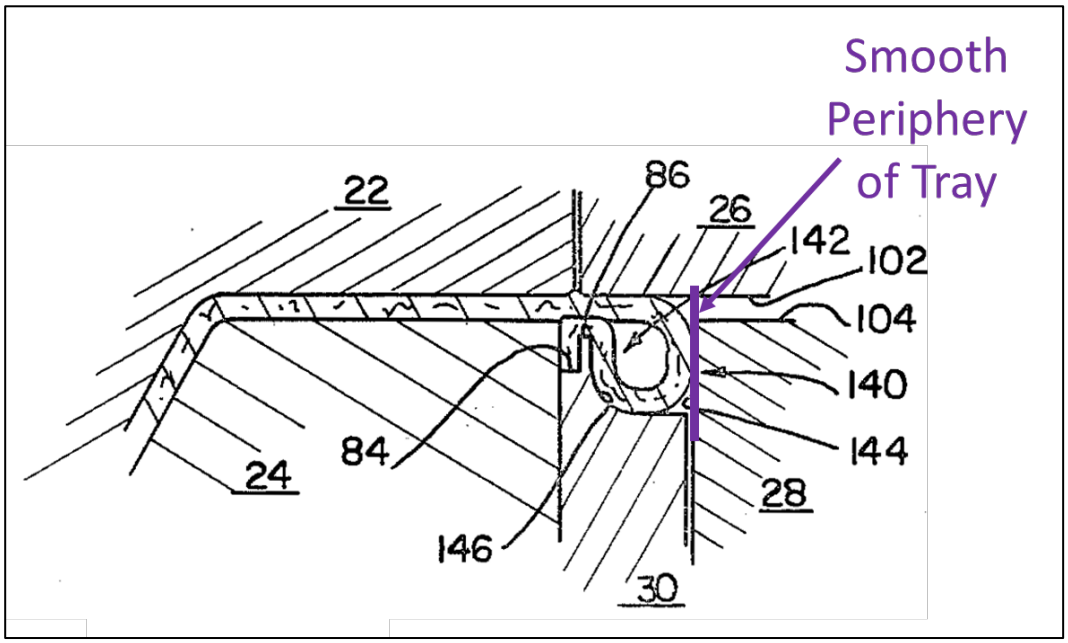


Meadors, Fig. 8 (annotations added).



Meadors, Fig. 4 (annotations added), showing apparatus and thermoplastic article (yellow).

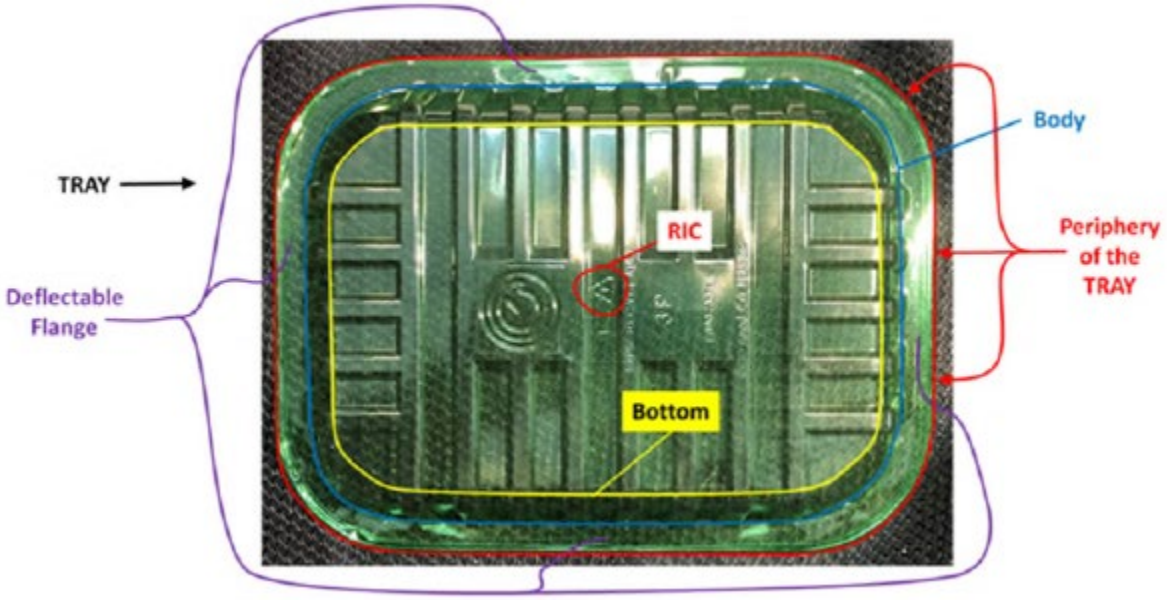
312. Meadors Fig. 8 shows a smooth periphery of the article produced with his method, since the rolled-over shape at the outer perimeter of Meadors's tray—seen at the right side of Fig. 8—is continuous and smooth:



Meadors, Fig. 8 (annotations added).

b. **Preamble: "A method of making a shaped article having a body with a smooth periphery, the method comprising"**

313. The Patent Owner applied the terms "body" and "periphery" to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in litigation related to the '222 Patent:



Ex. 1007, p. 8

314. The Claim 1 preamble is taught by Meadors, which discloses a method of making a shaped article having a body with a smooth periphery. For example, Meadors' container can be a rounded rectangular tray with a concave compartment, or body. Specifically, 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 ….") 6:24-26 (emphasis added), Figs. 1-4, 8. Likewise, Meadors describes the

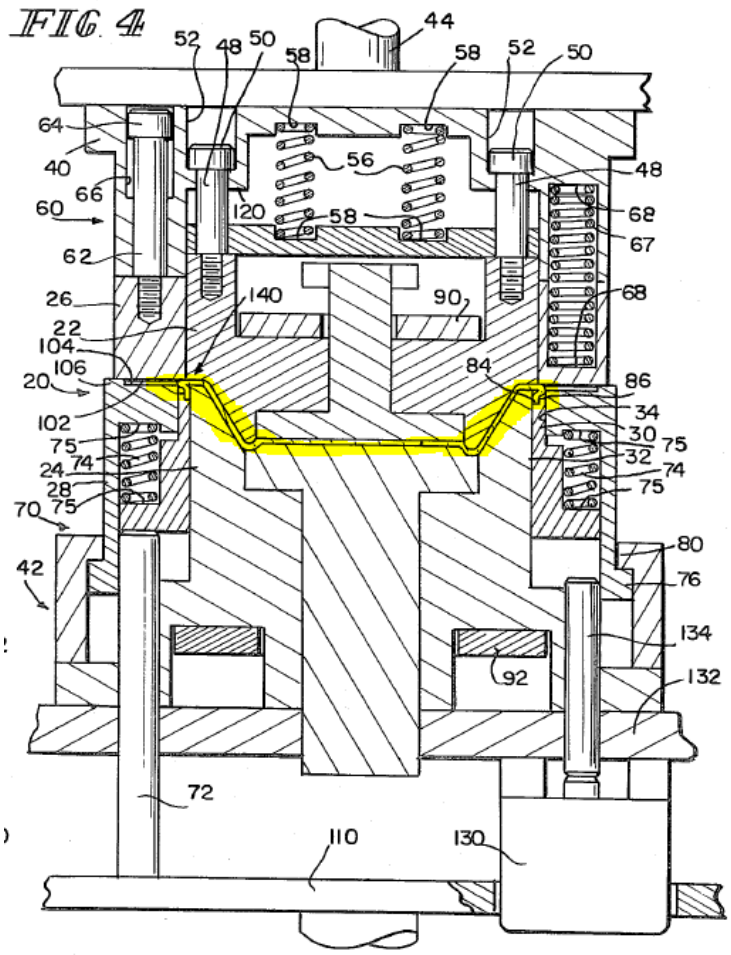
use of a "perimetrally extending ring 30" to form a "bead or rim 140" on the edge of **a container—e.g., a tray**—formed from a blank 100 which can be rectangular. See, e.g., Meadors, 2:68 (tray-forming mechanism includes a "***perimetrally extending ring 30***"), 3:40-43 ("Blank 100 typically is in the form of a disc-like round, ***rectangular***, elliptical, etc., flat sheet."). Meadors further teaches a smooth periphery including "As the vertically ***upward travel of ring 30*** continues, ***the flange 122 is squashed, or crushed, into a double-thickness bead or rim 140***." 4:36-39.

315. Meadors' use of the term "ring" and its associated apparatus component is not new to the art of rolling the peripheral edge of a thermoplastic article, and ejecting that formed article from a thermoplastic sheet. The prior art of the textbook titled "Technology of Thermoforming" by James. L. 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

Ningbo Linhua Plastic Ex. 1003, p. 271

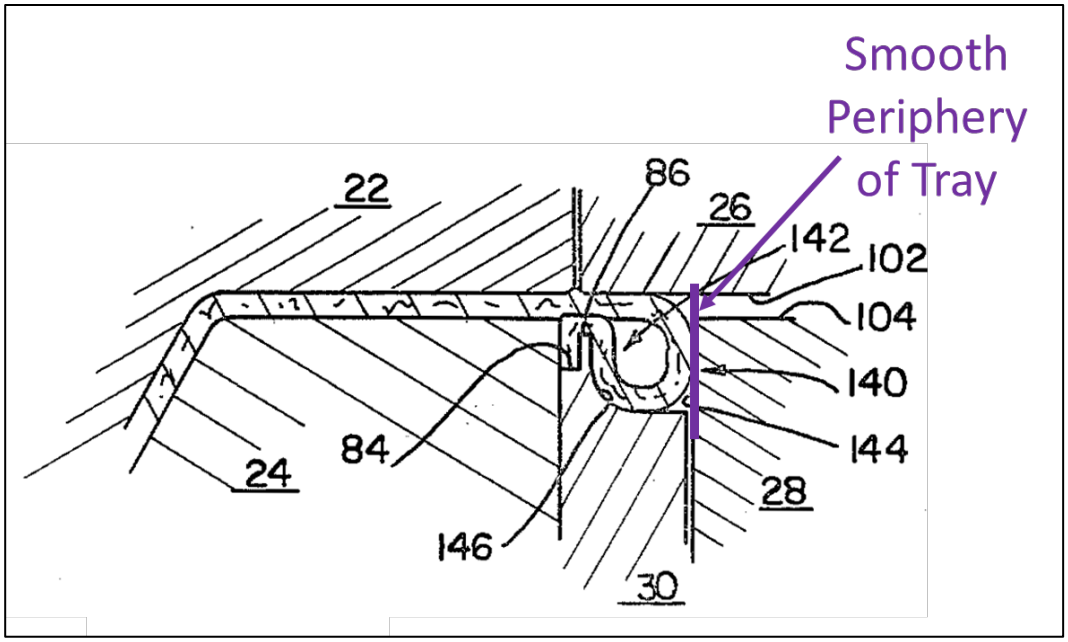
clamp retracts, leaving the part on the ejection **ring**. The trim moves once the part and **ring** assembly have cleared the trim plane." *Id* p. 449-451.

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



Meadors, Fig. 4 (excerpted, annotations added).

317. Meadors Fig. 8 shows a smooth periphery of the article produced with his method, since the rolled-over shape at the outer perimeter of Meadors's tray—seen at the right side of Fig. 8—is continuous and smooth:



Meadors, Fig. 8 (annotations added).

c. **Element 1a: "forming a thermoplastic into a shape comprising the body and a deflectable flange at a peripheral portion of the body"**

318. As noted previously, the '222 Patent refers to a thermoplastic article with body 10 and deflectable flange 160, as shown here in Figs. 1A and 1B.

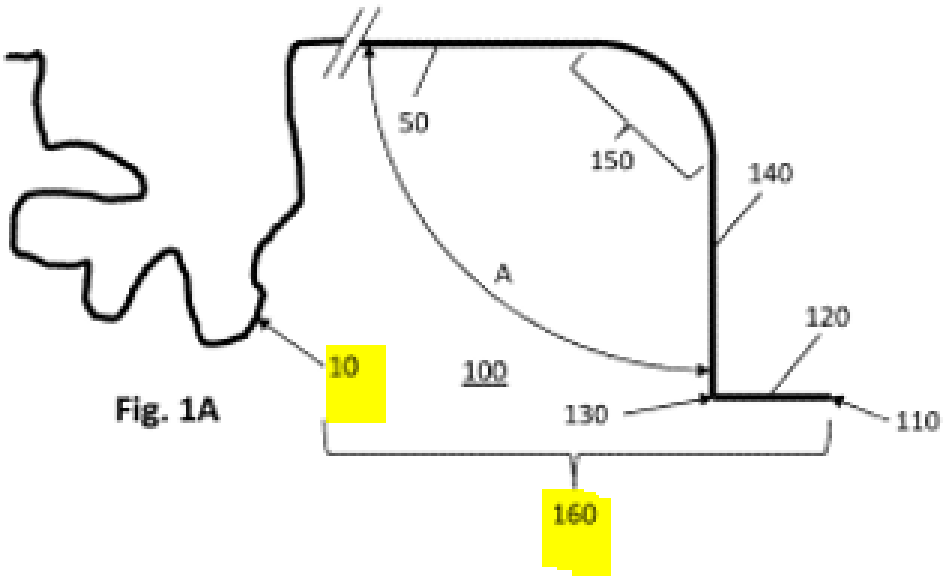
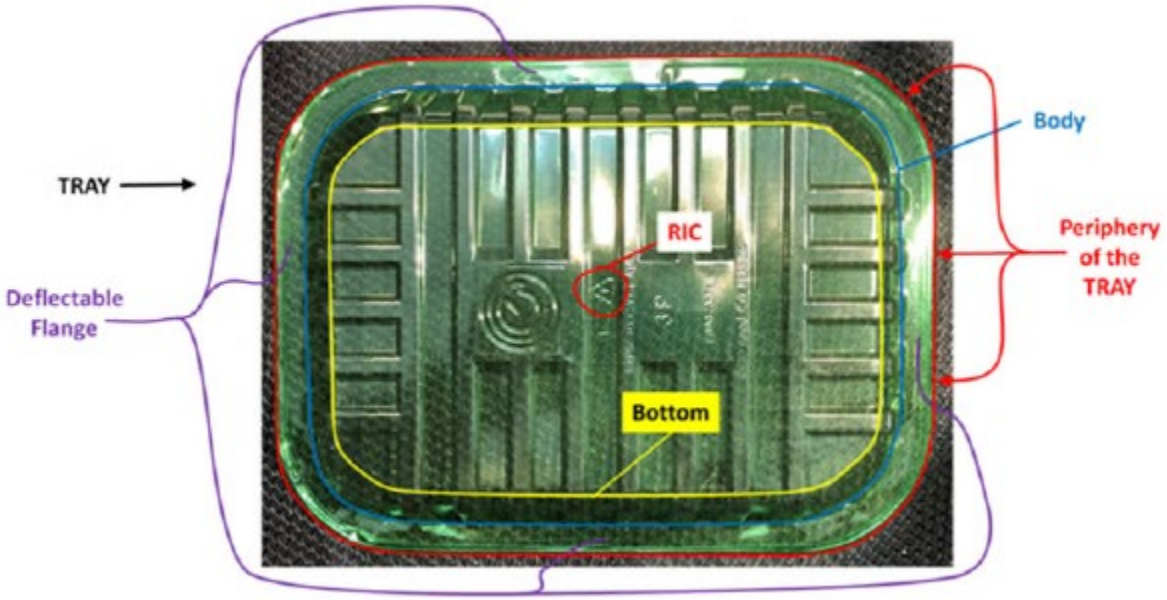


Fig. 1A

Ex. 1001, Fig. 1A

319. The Patent Owner also applied the terms "body" and "deflectable flange" to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in litigation related to the '222 Patent:



Ex. 1007, p. 8

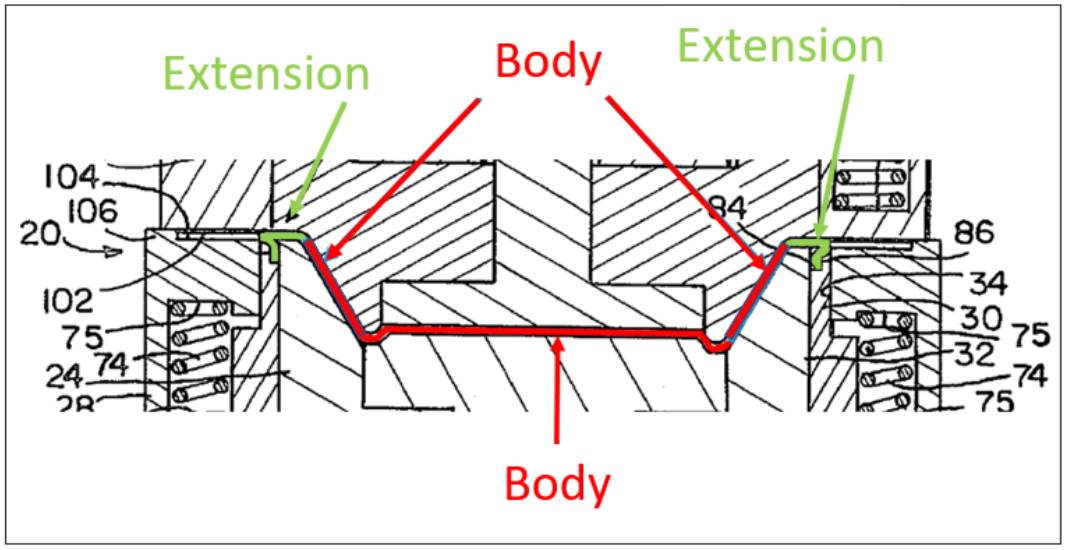
320. Meadors describes using thermoplastic materials for his article, as it is made entirely of plastic (or, for some embodiments, paper). Meadors, Abstract ("container or lid constructed from ***paper stock***"), 1:5-9 ("This invention relates to methods of, and apparatus for, forming a multiple-thickness bead in a sheet or blank of a flexible material, such as ***thermoplastic material or paper stock***, as the sheet or blank is being formed into an article such as a container or lid for a container"), 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.") (emphasis added). He 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.

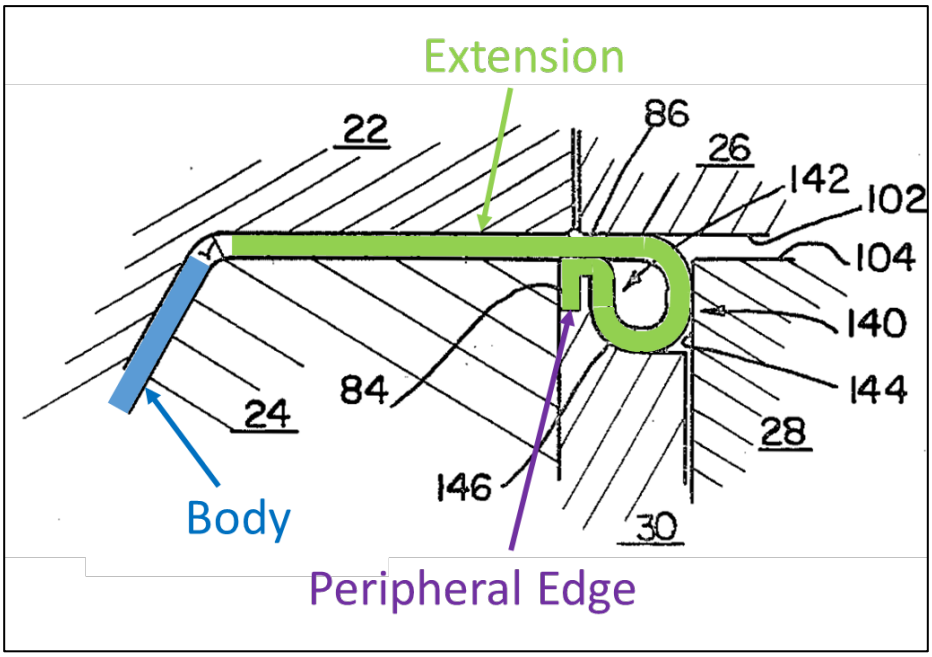
321. Meadors's container can be a rounded rectangular tray with a body and a deflectable flange at a peripheral portion of the body. For example, Meadors describes the use of a "perimetrally extending ring 30" to form a "bead or rim 140" on the edge of a container—e.g., a tray—formed from a blank 100 which can be rectangular. See, e.g., Meadors, 2:68 (tray-forming mechanism includes a "***perimetrally extending ring 30***"), 3:40-43 ("Blank 100 typically is in the form of a disc-like round, ***rectangular***, elliptical, etc., flat sheet."), 4:36-39 ("As the vertically ***upward travel of ring 30*** continues, ***the flange 122 is squashed, or crushed, into a double-thickness bead or rim 140***."), 6:24-26 ("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 ….") (emphasis added), Figs. 1-4, 8.

322. 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 at a peripheral portion of the body:

Ningbo Linhua Plastic Ex. 1003, p. 275

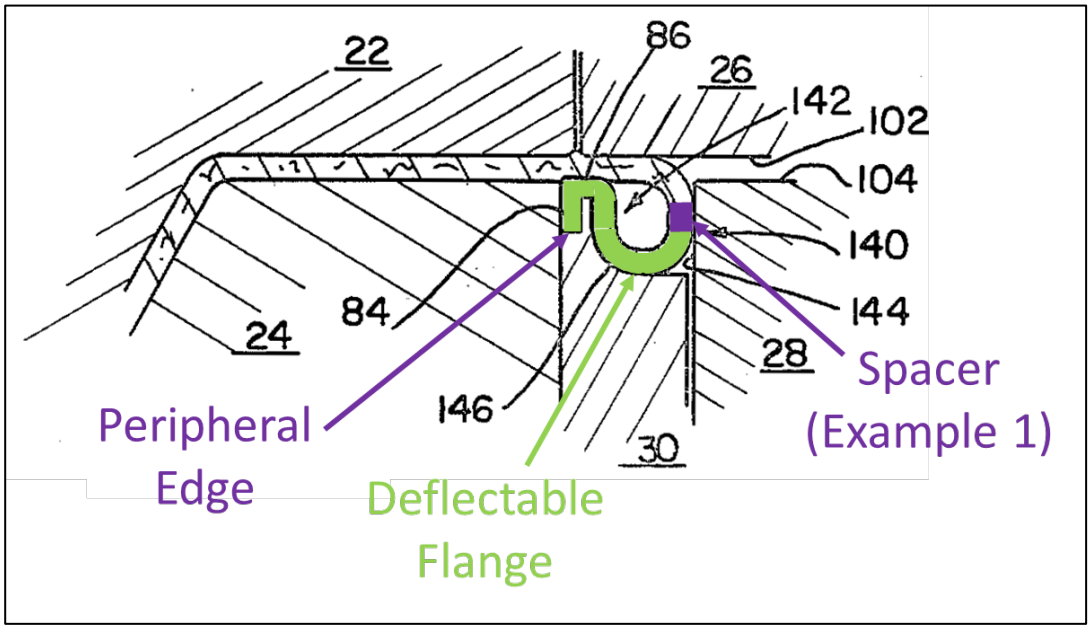


Meadors, Fig. 4 (excerpted, annotations added).



Meadors, Fig. 8 (annotations added); *see also id.* Figs. 1, 2 (illustrating forming of thermoform "blank" with extension

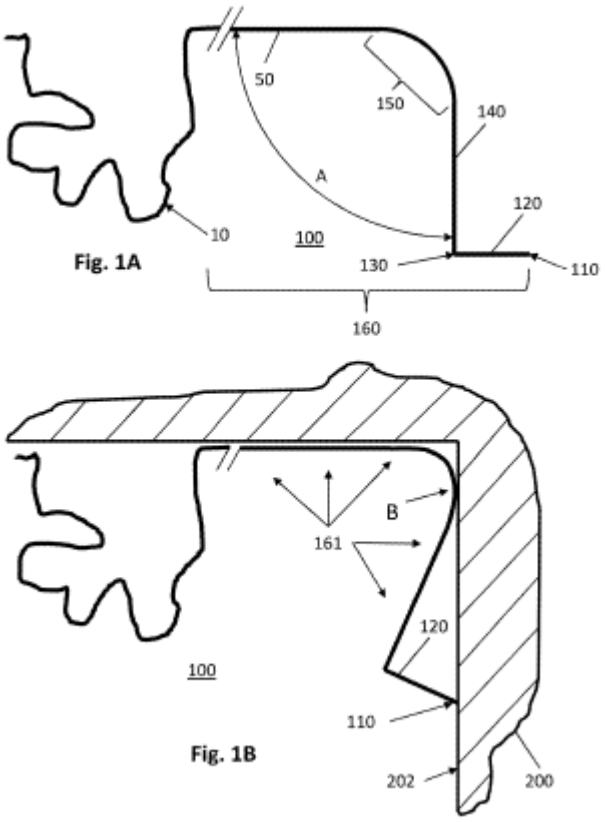
323. The extension of Meadors's tray includes the curved, rolled-over shape on the right side of Fig. 8. The deflectable flange is shown to be located at the peripheral portion of the body of the thermoplastic article:



Meadors, Fig. 8 (annotations added).

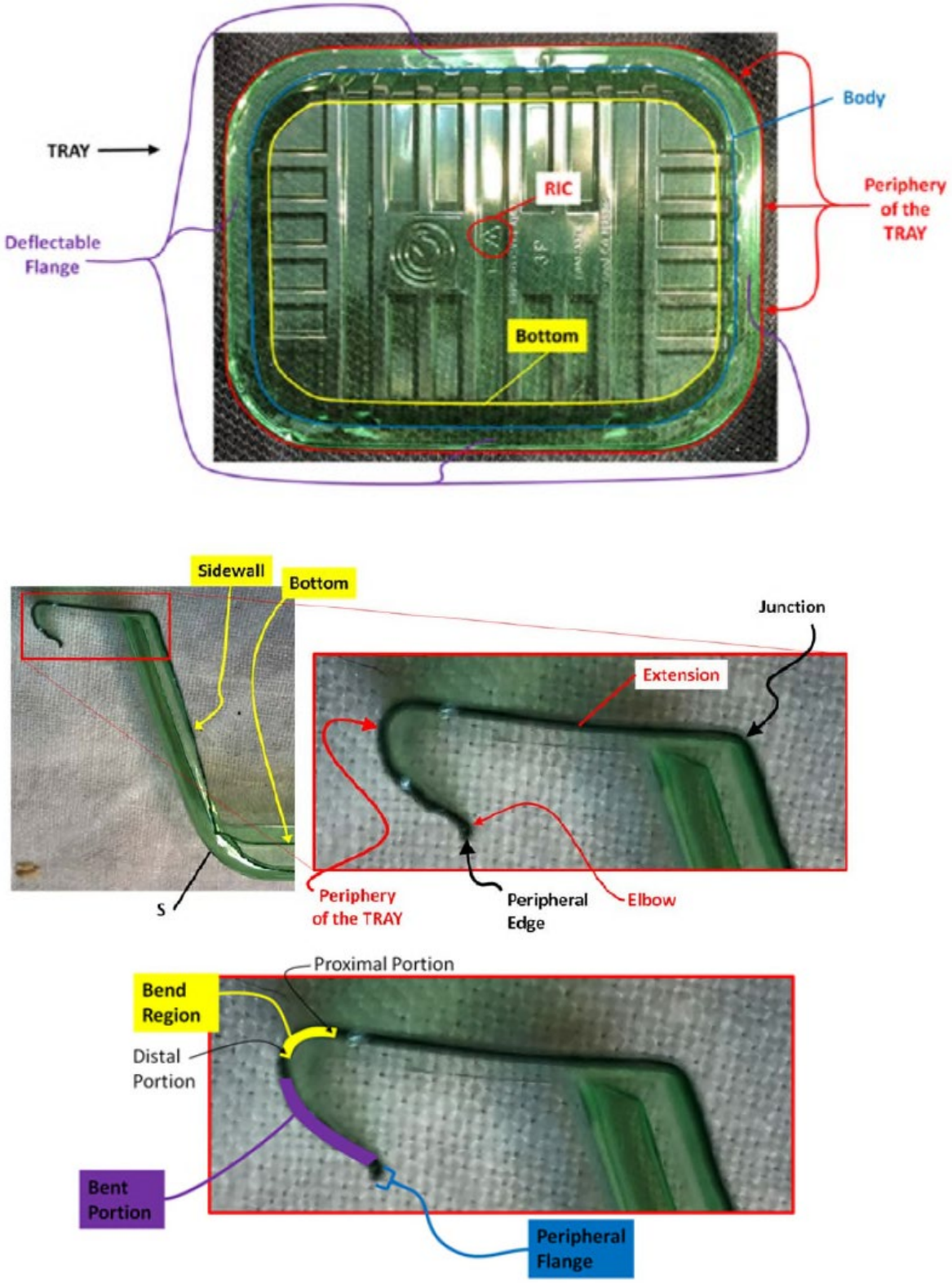
d. **Element 1b: "the deflectable flange comprising an extension that extends peripherally away from the body and connects thereto"**

324. As noted previously, the '222 Patent refers to body 10, extension 50, and deflectable flange 160, as shown here in Figs. 1A and 1B.



Ex. 1001, Figs. 1A, 1B

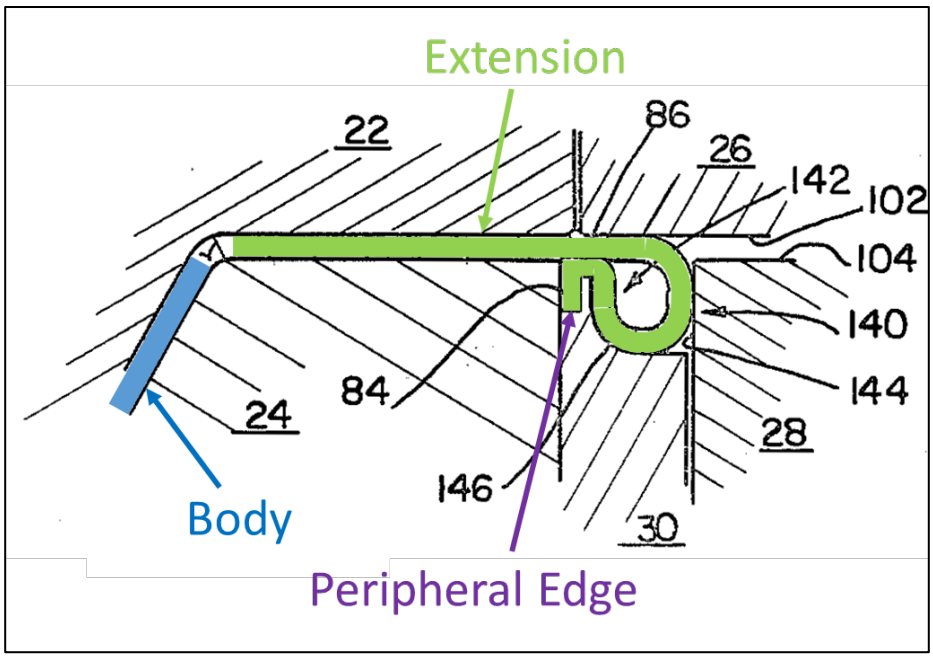
325. Also, the Patent Owner applied the terms "body," "deflectable flange," and "extension," to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in related litigation:



Ex. 1007, p. 8

Ningbo Linhua Plastic Ex. 1003, p. 279

326. Meadors's tray likewise has an extension extending peripherally away from the body and connected to 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; the rolled-over shape that continues from the horizontal portion and bends down, left, and up; and the inflected portion that continues from the rolled-over shape and bends left and down, ending in the peripheral edge:

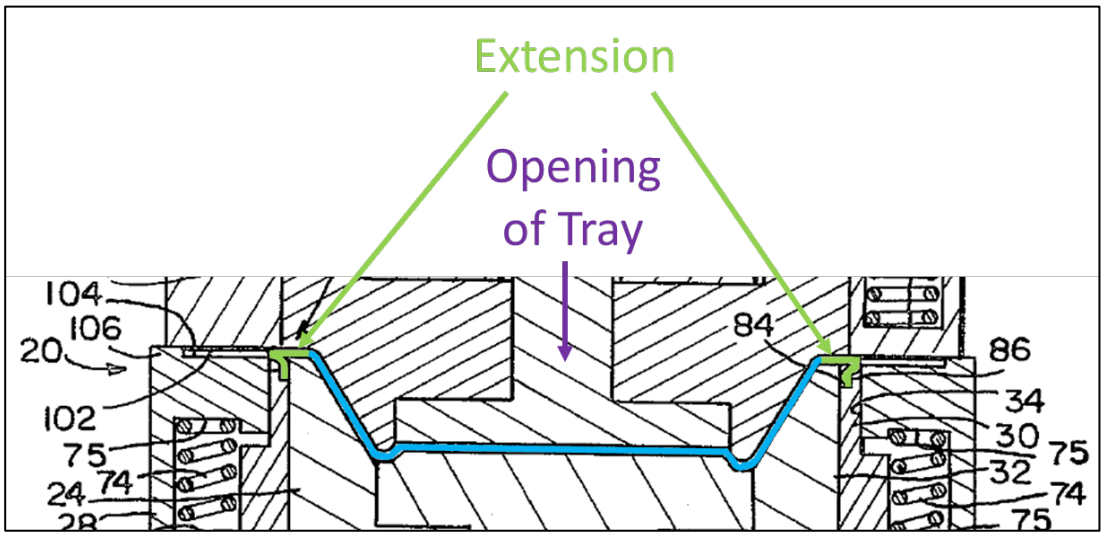


Meadors, Fig. 8 (annotations added); *see also id.* Figs. 1, 2 (illustrating forming of thermoform "blank" with extension; extension is referred to as the "perimetral portion 108" or "perimetral region 108" of "blank 100"), 3:53 ("perimetral portion 108 of blank 100"), 4:4-18 (describing initial forming step in which "perimetral region 108 of blank 100" is restrained by pressure from draw pads 26 and 28).

327. Meadors describes his apparatus as, "The apparatus of the present invention includes opposed first and second cooperating dies for holding a central

region of the blank, a ring, and opposed first and second draw pads movable axially with respect to the first and second dies. The draw pads cooperatively capture **the perimetral edge of the blank surrounding the central region** and a distal end axially spaced from the proximal end." Id. 2:14-24. Emphasis added. Meadors reference to the "perimetral edge of the blank surrounding the central region" constitutes "an extension that extends peripherally away from the body and connects thereto," i.e. surrounding his thermoplastic article.

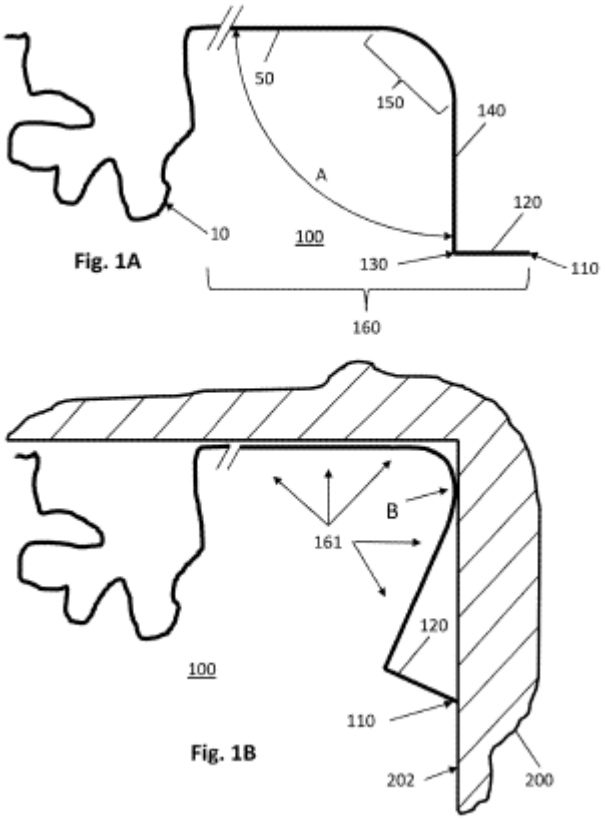
328. Furthermore, A POSITA would interpret the cross-sectional side view of Meadors's tray in Fig. 4 as indicating the deflectable flange of the tray comprising the extension which extends peripherally away from the body and connects thereto:



Meadors, Fig. 4 (excerpted, annotations added).

e. **Element 1c: "a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer that is connected with…"**

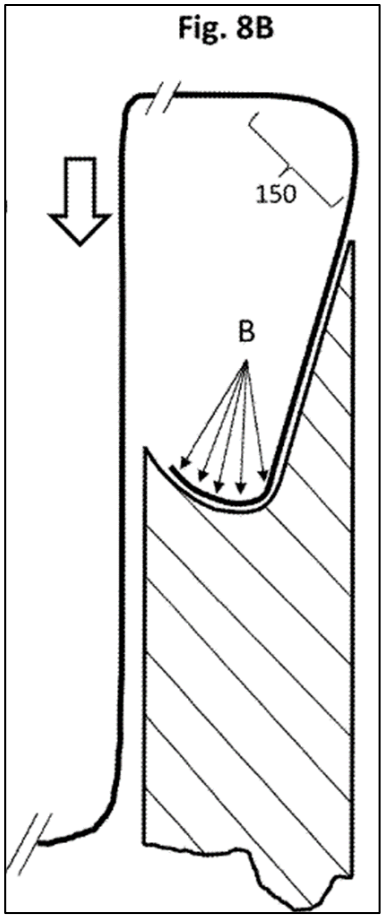
329. As noted previously, the '222 Patent refers to bend region 150, extension 50, and spacer 140, as shown here in Figs. 1A and 1B.



Ex. 1001, Figs. 1A, 1B

330. Fig. 8B of the '222 Patent illustrates the "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:

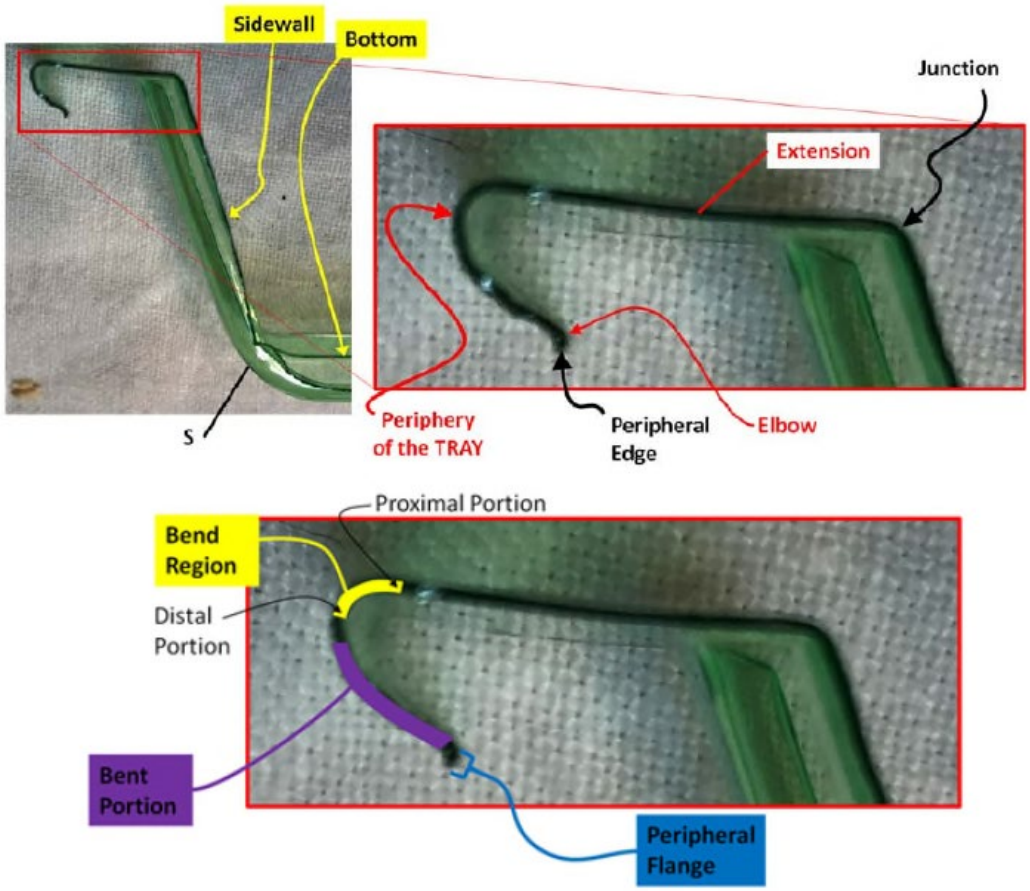
Ningbo Linhua Plastic Ex. 1003, p. 282



See Ex. 1001, 26:63-27:26, Fig. 8B.

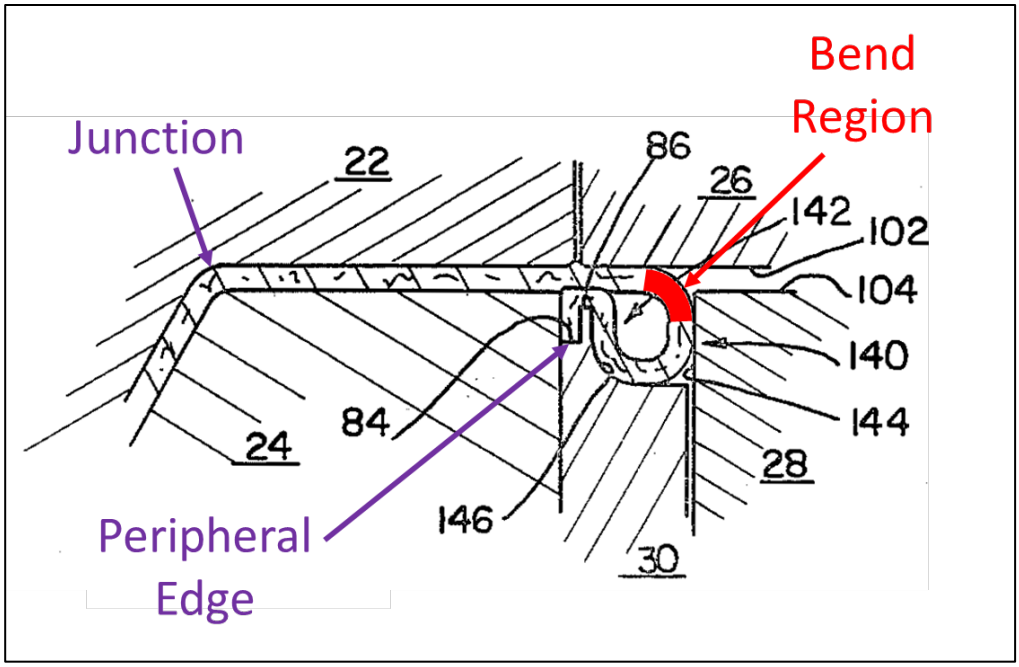
331. The Patent Owner applied the terms "extension" and "bend region," to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in related litigation:

Ningbo Linhua Plastic Ex. 1003, p. 283



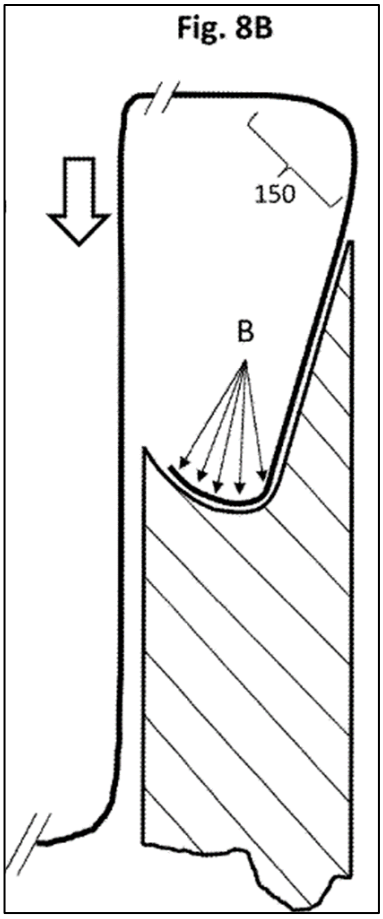
Ex. 1007, p. 8

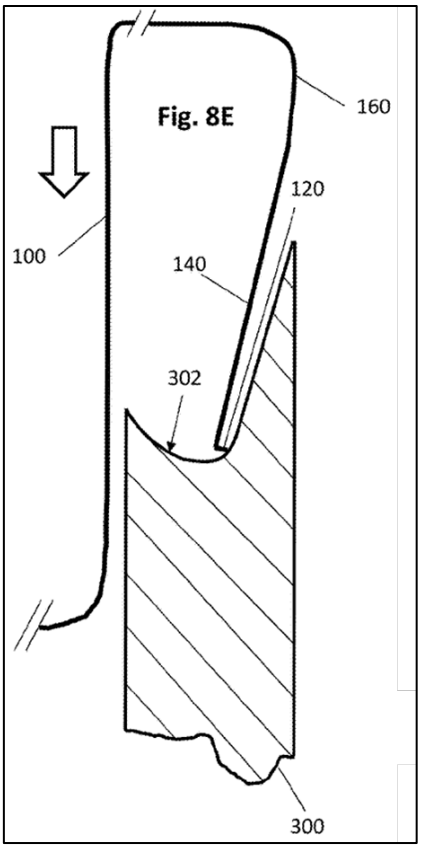
332. Similarly, the extension in Meadors's tray includes a bend region, which is the first curved portion of the deflectable flange, starting at the end of the straight segment that adjoins the body of the tray at the junction between the body and the extension. Meadors bend region has a smooth contour and interconnects the extension. For example, the upper right portion of the rolled-over, curved shape on the right side of Fig. 8 comprises a bend region:



Meadors, Fig. 8 (annotations added).

333. Further, Fig. 8E of the '222 Patent illustrates the "spacer 140" as comprising the straight segment immediately below the curved bend region in the upper right of the drawing. As discussed in the previous section, the bend region is labeled 150 in Fig. 8B; it is present but unlabeled in Fig. 8E ("160" denotes the whole deflectable flange, Ex. 1001, 9:16-18):

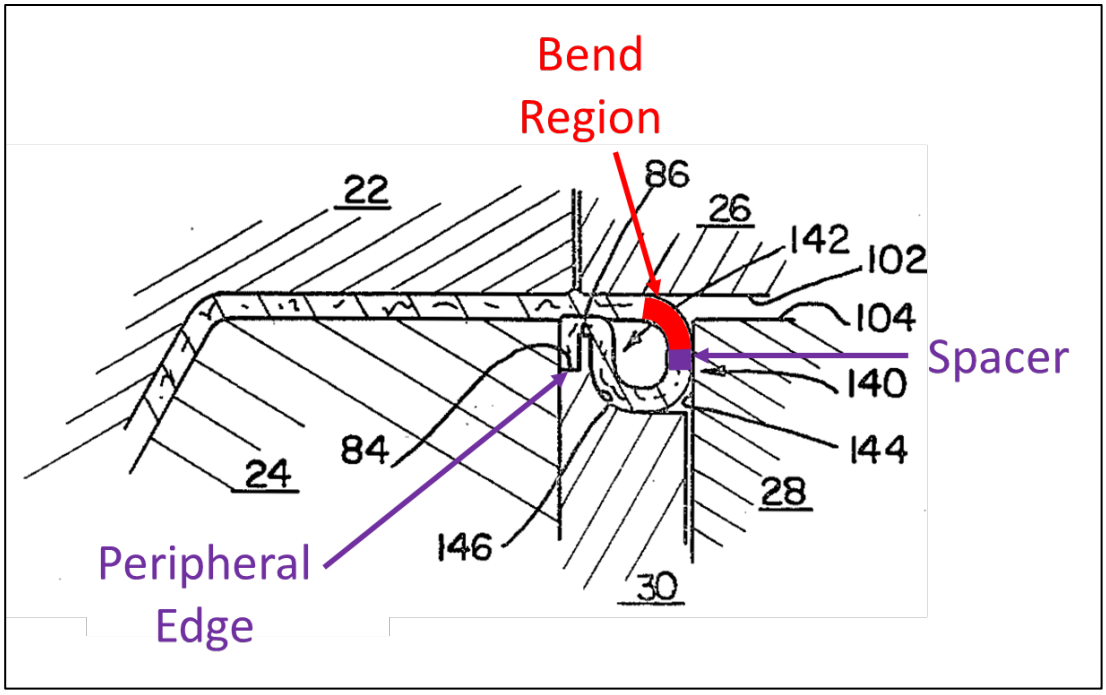




Ex. 1001, 18:32-56, 27:1-28, Figs. 8B, 8E.

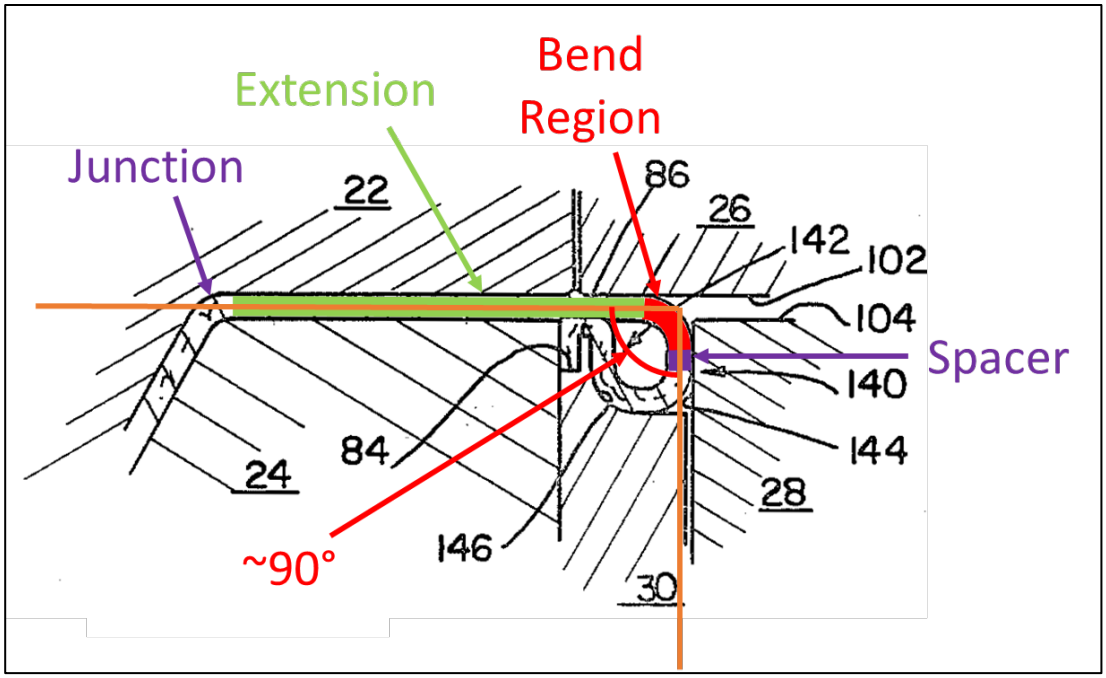
334. Similarly, the extension in Meadors's tray includes a spacer interposed between the peripheral edge and the bend region. For example, the straight, vertical portion of the rolled-over shape on the right side of Fig. 8 comprises a spacer:

Ningbo Linhua Plastic Ex. 1003, p. 286



Meadors, Fig. 8 (annotations added).

335. I measured the angle between Meadors' extension and spacer elements by scanning and importing Meador's Fig 8 digitized file into QCAD 2D CAD version 3.26.1 software, selecting figure elements related to the extension, bend region and spacer, and drawing lines through and parallel to (a) the tray at its horizontal extension, and (b) the vertical spacer. Using the software's angle measurement tool, I measured the angle between the two lines representing planes and determined the angle to be 90 degrees:

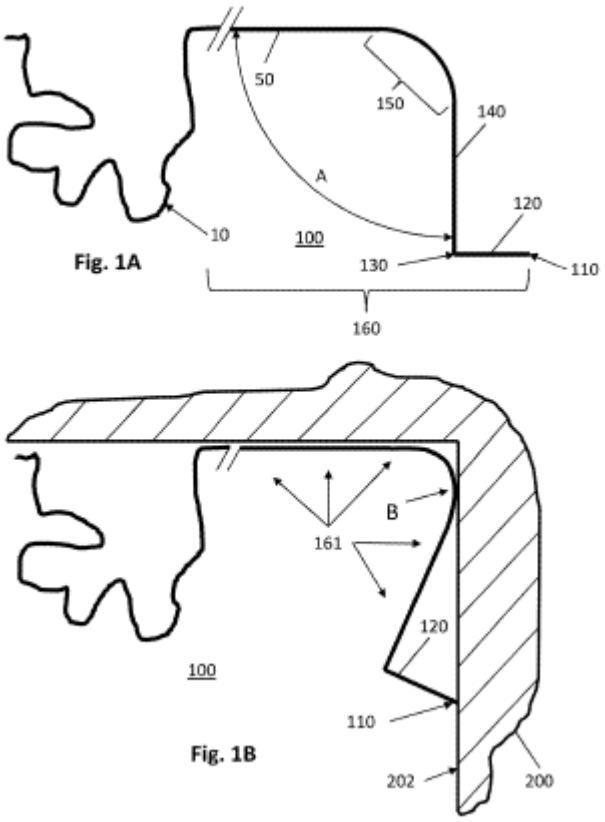


Meadors, Fig. 8 (annotations added).

336. Therefore, Meadors' teaches a bend region having a smooth contour and interconnecting the extension, at an approximately right angle (i.e. 90 degrees), with a spacer.

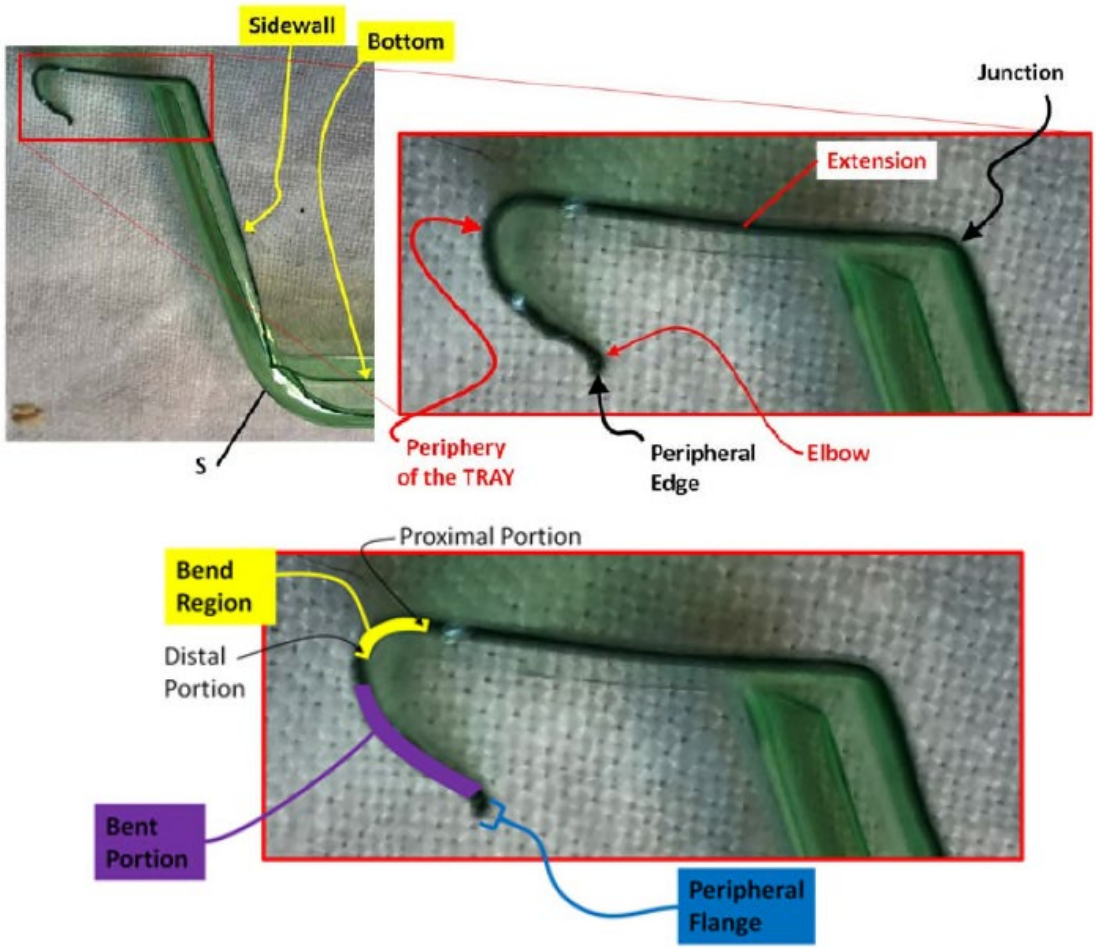
f. **Element 1d: "[a spacer that is connected with] a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peropheral (sic) flange being connected, at an angle other than 180 degrees, at an elbow;"**

337. As noted previously, the '222 Patent refers to a spacer 140, peripheral flange 120, elbow 130, and peripheral edge 110, as shown here in Figs. 1A and 1B.



Ex. 1001, Figs. 1A, 1B

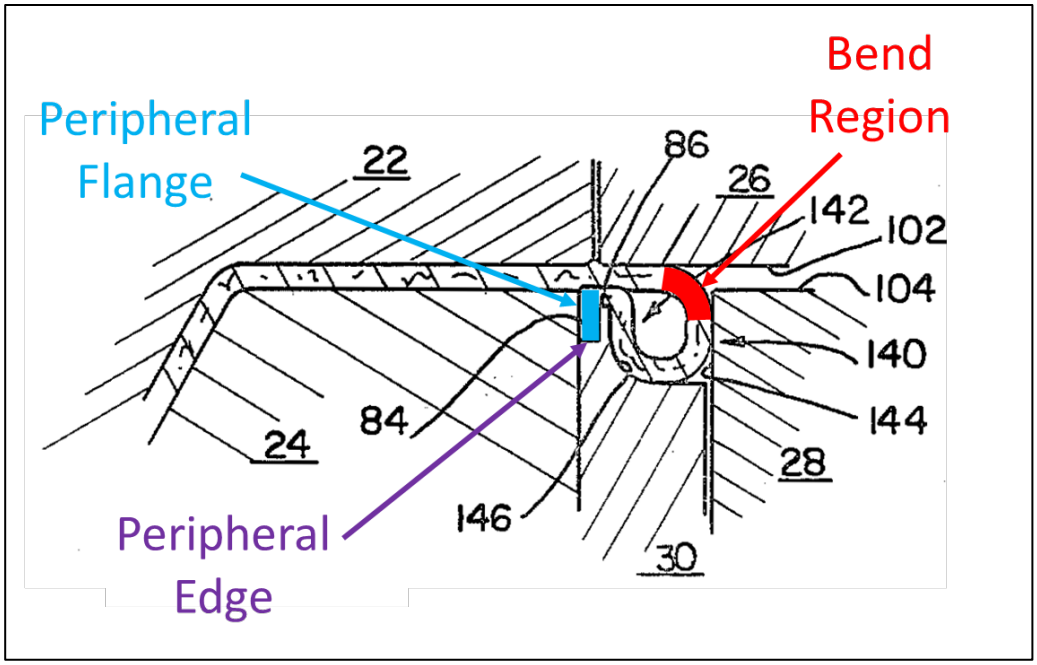
338. Also, the Patent Owner applied the terms "elbow," "peripheral flange" and "peripheral edge" to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in related litigation:



Ex. 1007, p. 8

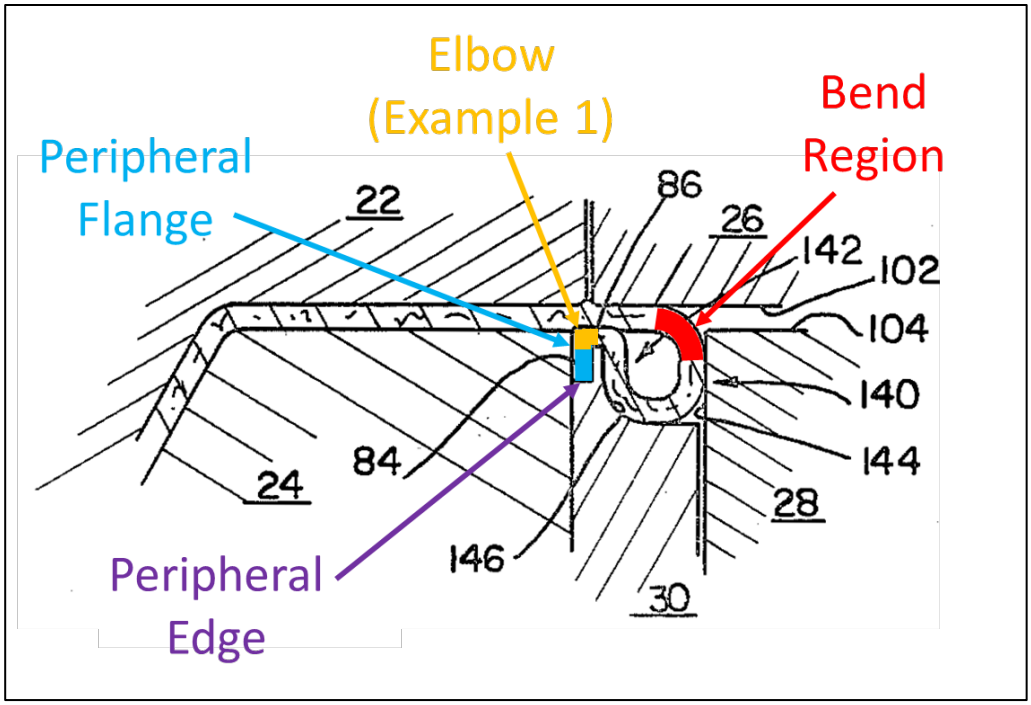
339. Meadors's tray likewise includes a spacer that is connected with a peripheral flange which bears a peripheral edge of the thermoplastic. The "peripheral flange" limitation is met by the vertical segment slightly to the right of center in Fig. 8, where the extension ends at the peripheral edge of the thermoplastic:

Ningbo Linhua Plastic Ex. 1003, p. 290



Meadors, Fig. 8 (annotations added).

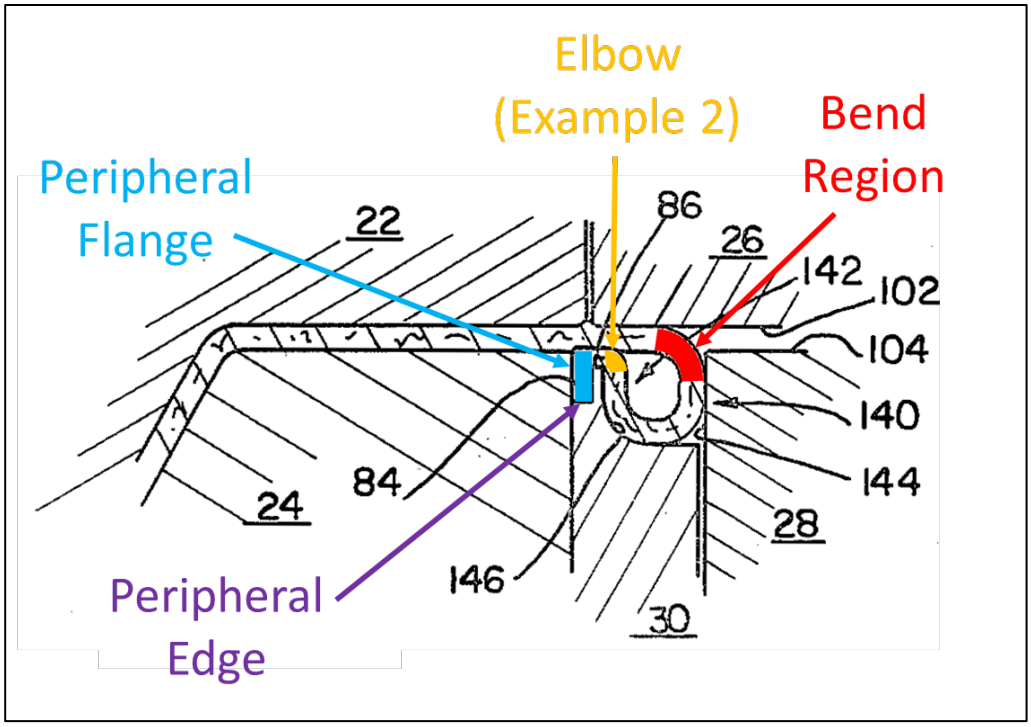
340. The peripheral flange of Meadors's tray is connected to the bend region by an elbow. For example, the sharp bend immediately adjacent to the peripheral flange is an "elbow":

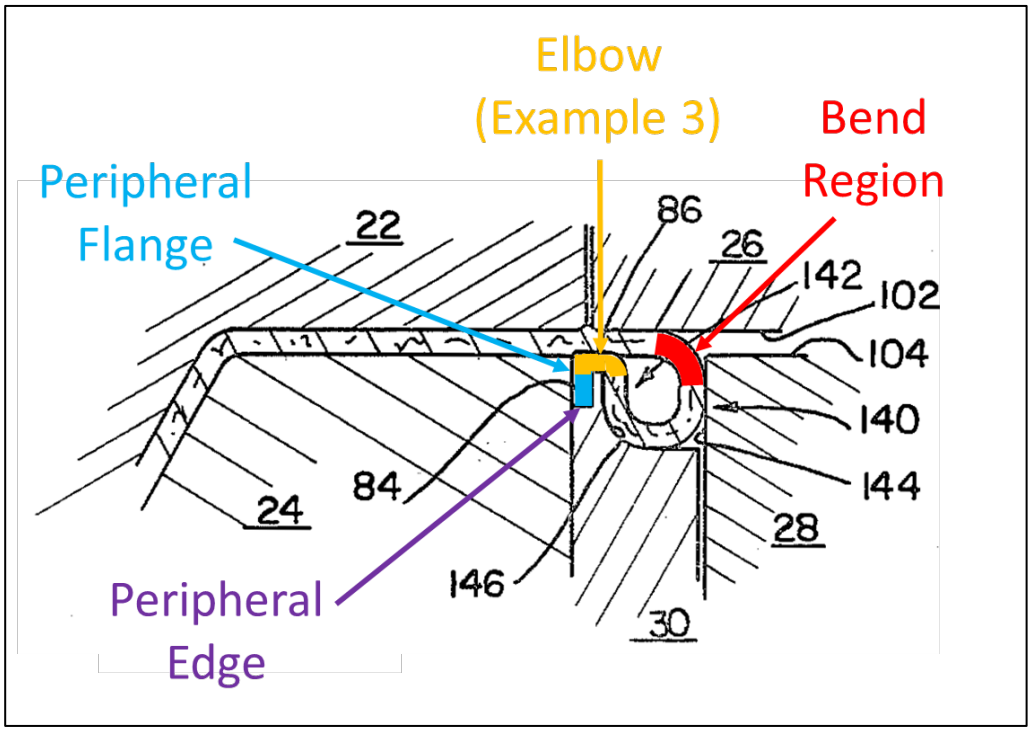


Meadors, Fig. 8 (annotations added).

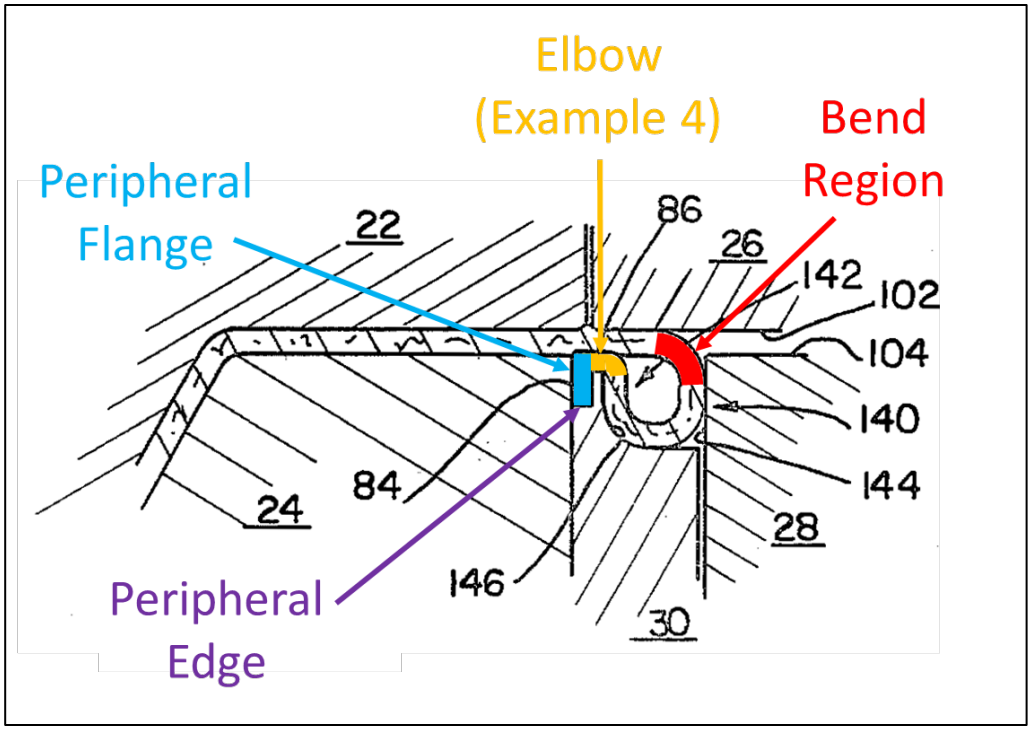
341. Furthermore, the "elbow" limitation can also be met by the bend slightly farther to the right of the peripheral flange, by a combination of the two bends, or by a combination of the bend further to the right and the straight segment immediately to its left:

Ningbo Linhua Plastic Ex. 1003, p. 292



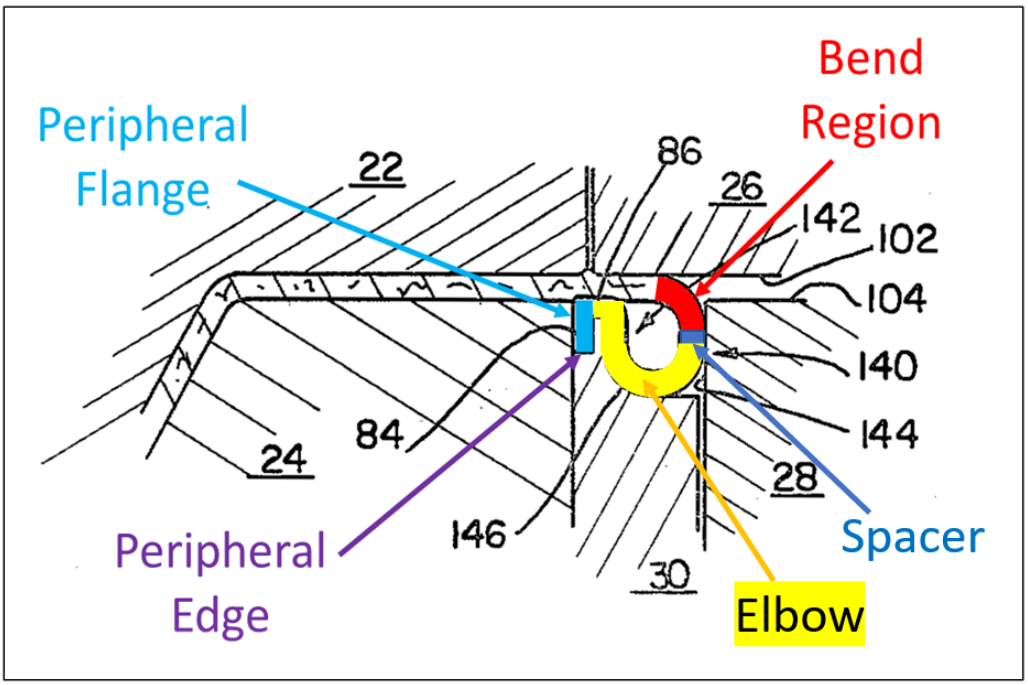


Ningbo Linhua Plastic Ex. 1003, p. 293



Meadors, Fig. 8 (annotations added), 3 examples above.

342. Yet another example of an elbow taught by Meadors is shown here:

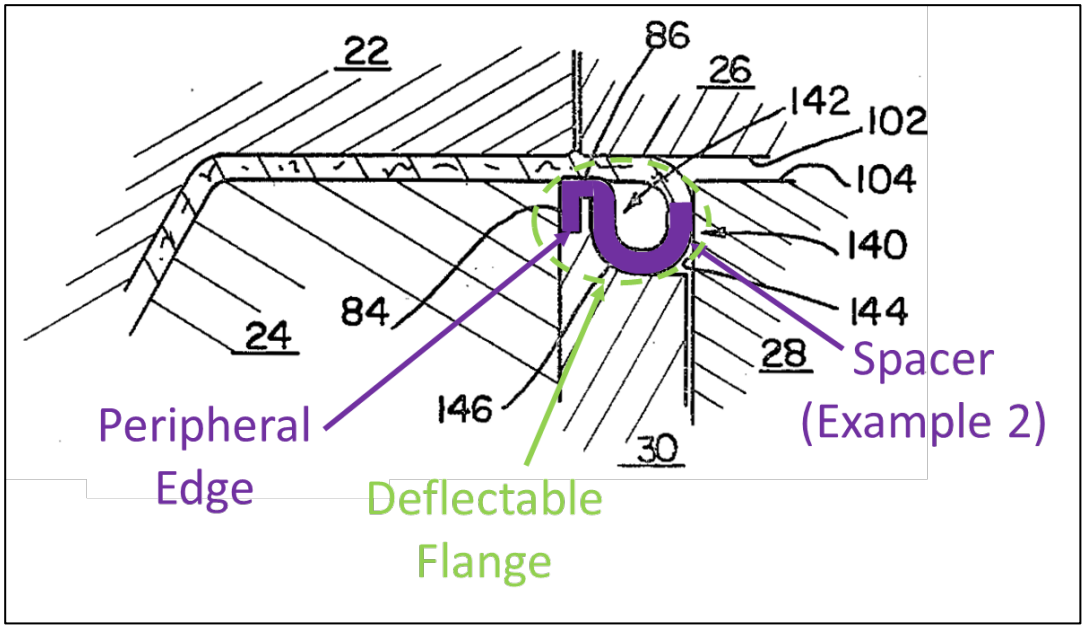


Ningbo Linhua Plastic Ex. 1003, p. 294

Meadors, Fig. 8 (annotations added).

343. In this example immediately above, Meadors teaches a spacer that is connected with a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peripheral flange being connected at an elbow.

344. As another example, the **spacer** can additionally include the remainder of the extension from that straight segment to the peripheral edge:

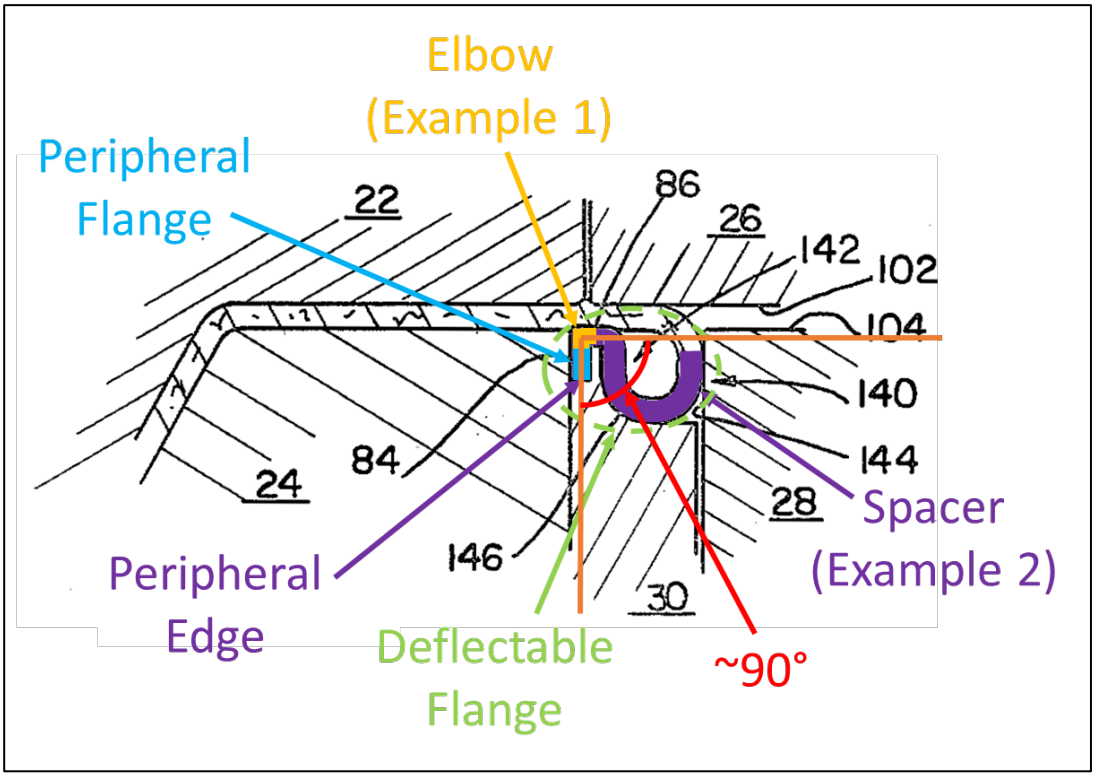


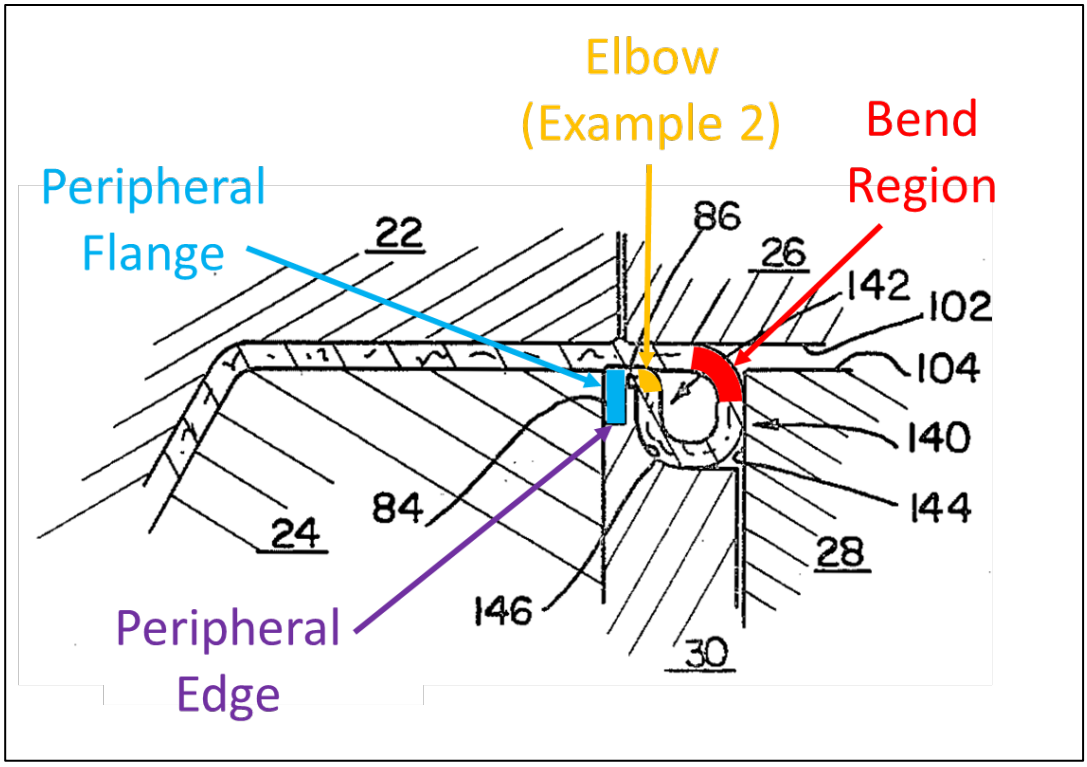
Meadors, Fig. 8 (annotations added).

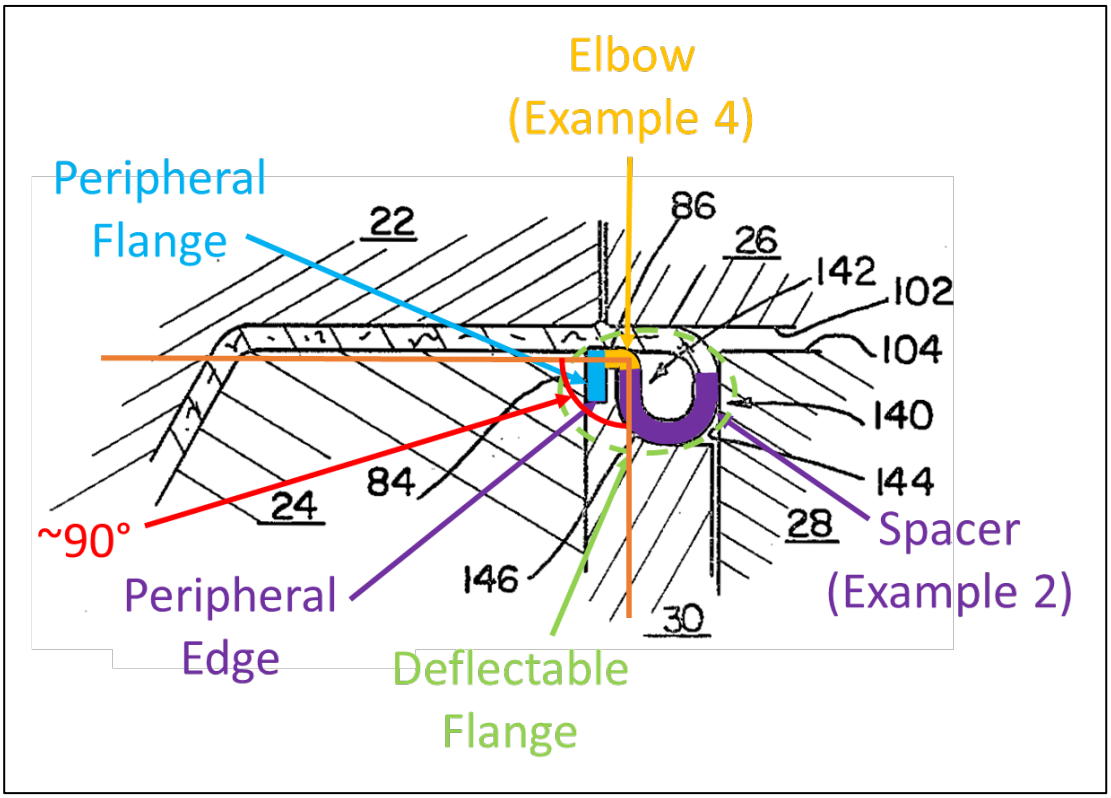
345. In the Spacer Example 2 above, the peripheral flange and the elbow are inclusive of the spacer. In other words, the spacer in Meadors's tray can comprise the straight segment at the far right of the extension plus the remainder of the extension from that straight segment to the peripheral edge. If so, the spacer includes, among other things: (a) a peripheral flange at the peripheral edge of the deflectable flange—

Ningbo Linhua Plastic Ex. 1003, p. 295

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—Example 1 below—the corner slightly to the right of the peripheral flange—Example 2 below—or the horizontal segment directly touching the peripheral flange plus the corner directly to the right of that segment—Example 4 below:







Meadors, Fig. 8 (annotations added).

346. In each example directly above, 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.

g. **Element 1e: "impinging a ram against the peripheral flange to deflect the spacer towards 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,"**

347. As noted above regarding Element 1d., the '222 Patent describes an extension, peripheral flange, and spacer, which are likewise taught by Meadors. Also, Patent '222 Fig. 1C "illustrates the outcome of inserting ram 300 in to 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 in induced within the bend region 150." *Id* 6:37-48. Fig. 1C is shown below:

Ningbo Linhua Plastic Ex. 1003, p. 298

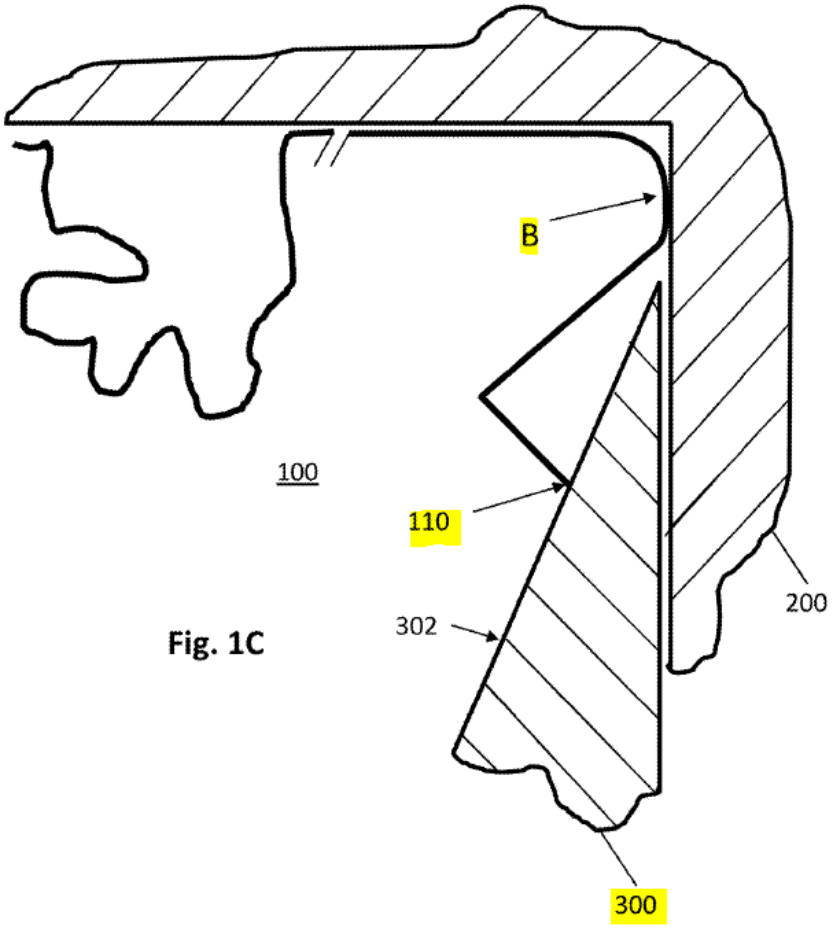
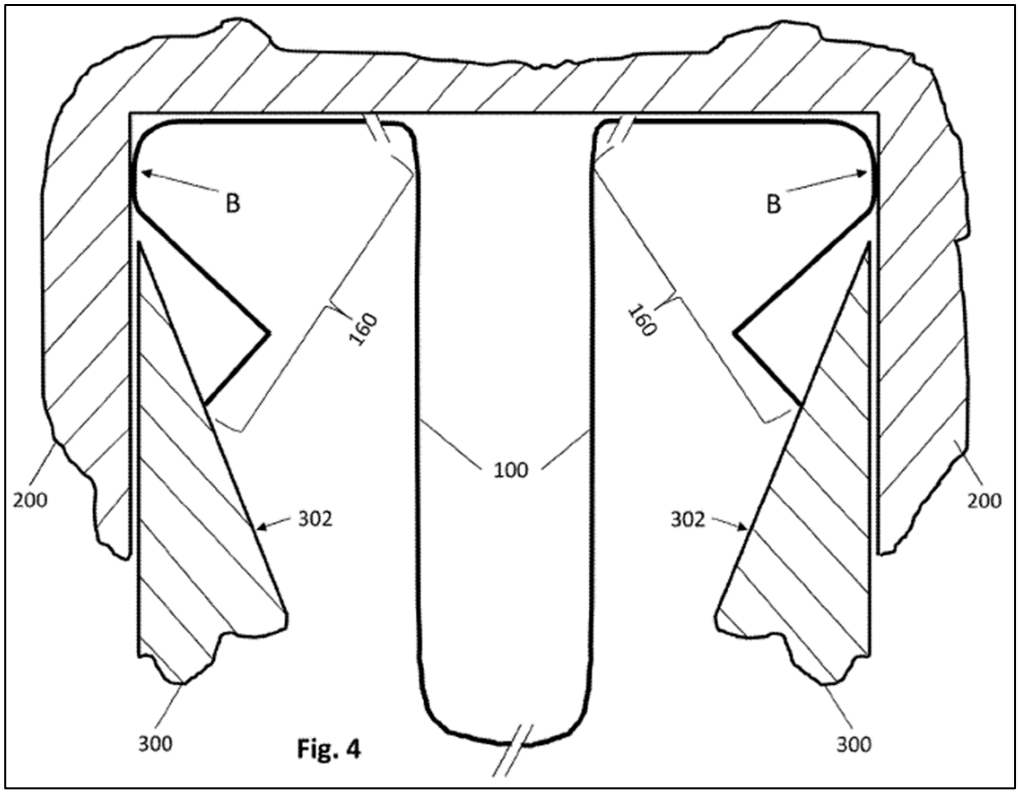


Fig. 1C

Ex. 1001 Fig. 1C, annotated.

348. The preamble of Claim 1 includes a reference to ram 300 impinging against the peripheral flange 160 to deflect the spacer 140 (not marked here) towards the extension 50 (not marked here):

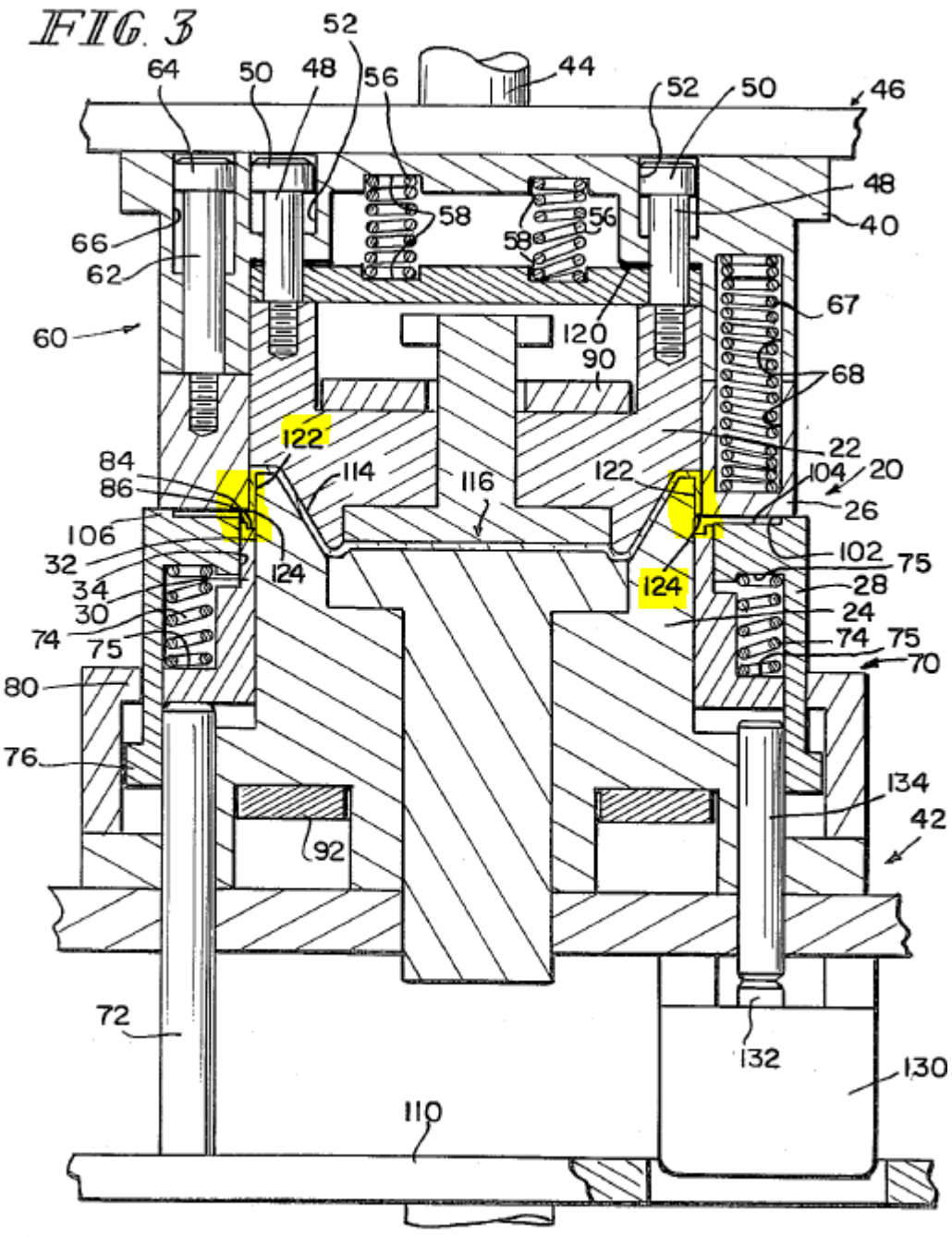
Ningbo Linhua Plastic Ex. 1003, p. 299



Ex. 1001, Fig. 4.

349. Meadors teaches impinging a ram against the peripheral flange to deflect the spacer towards the extension. For example, Meadors describes his Fig. 2 as "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 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 is

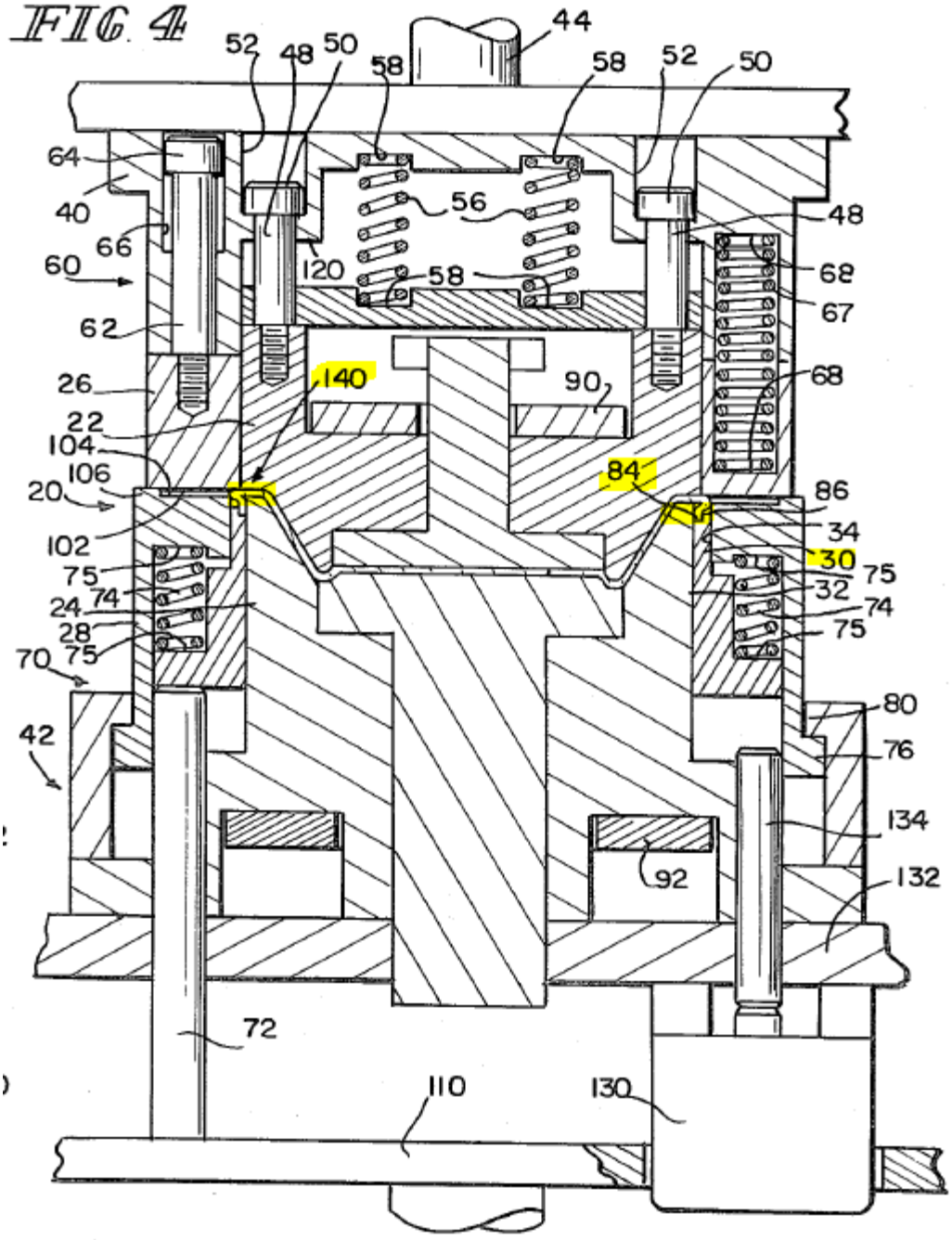
shown here, which illustrates "impinging a ram against the peripheral flange to deflect the spacer towards the extension" (see yellow highlighting).



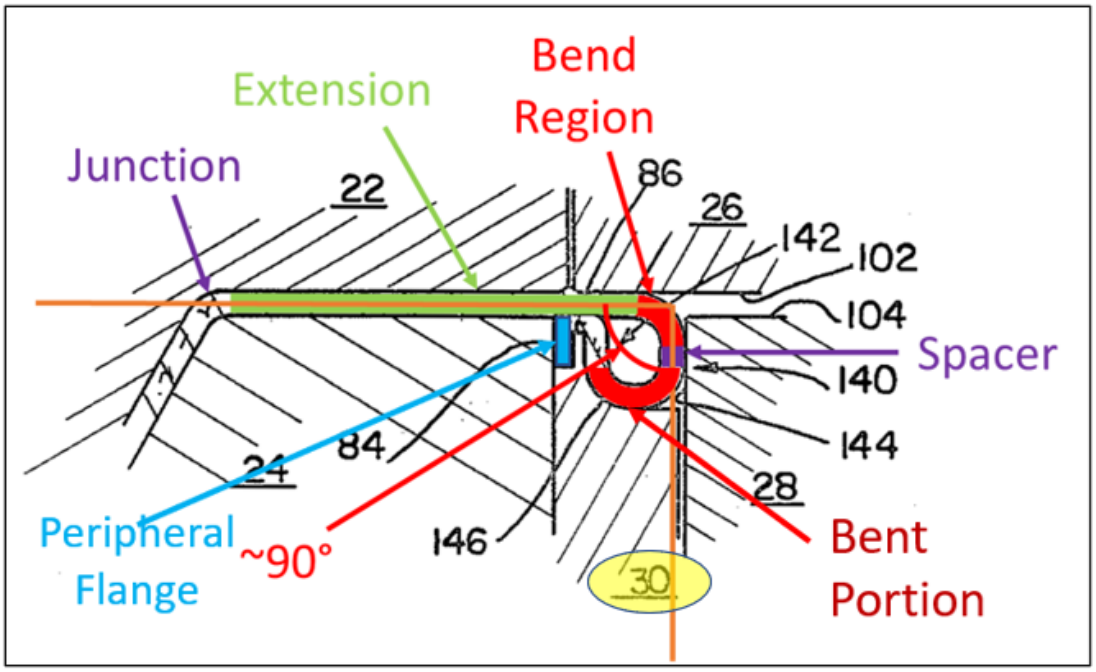
Meadors, Fig. 3 (annotations added).

350. 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") impinges ("begins its upward travel" and "The distal free edge 124 of article 116 is captured in groove 84") the flange. Meadors continues "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 (emphasis added). As discussed earlier in my report, Meadors' flange includes an extension, peripheral flange and spacer, where his spacer is deflected towards the extension by the ram (ring 30), as seen in Meadors Fig. 4, and detailed in Meadors Fig. 8:

Ningbo Linhua Plastic Ex. 1003, p. 302



Meadors, Fig. 4 (annotations added).



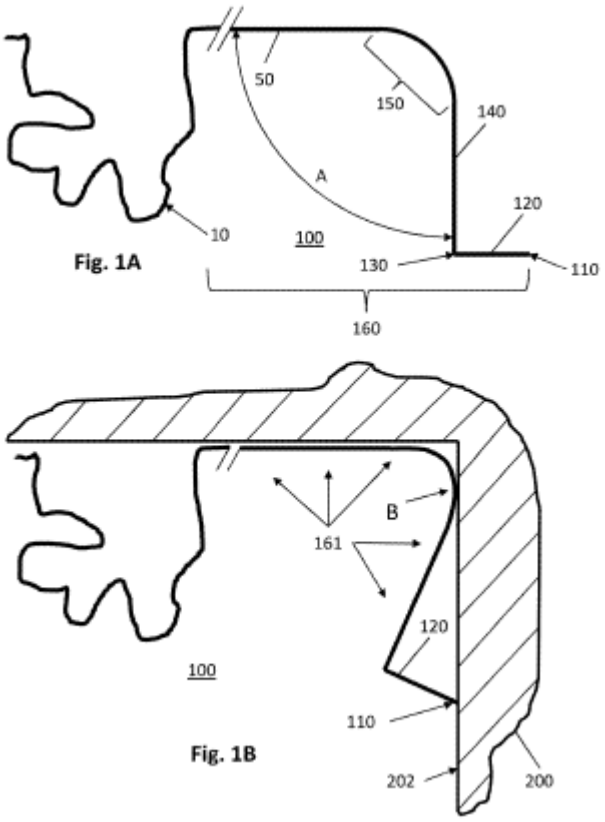
Meadors, Fig. 8 (annotations added).

351. In both Meadors Figs. 4 and 8, the deflection movement taught in his method and apparatus deflects the spacer towards the extension.

352. Therefore, Meadors teaches "impinging a ram against the peripheral flange to deflect the spacer towards 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."

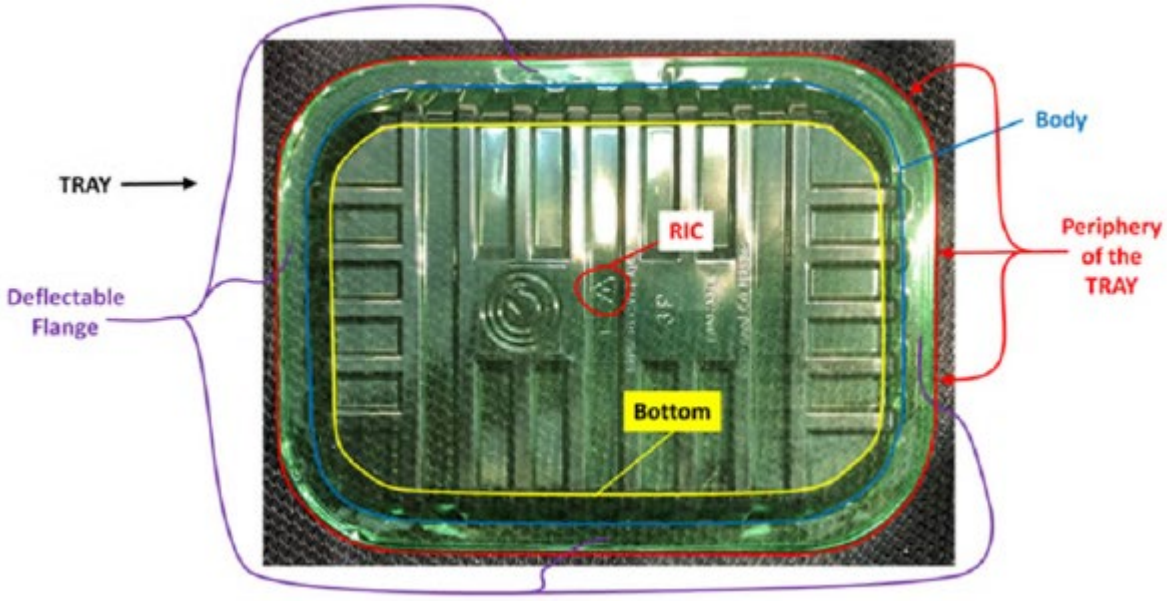
h. **Element 1f: "the bent portion being selected from the group consisting of the extension, the bend region, and the spacer,"**

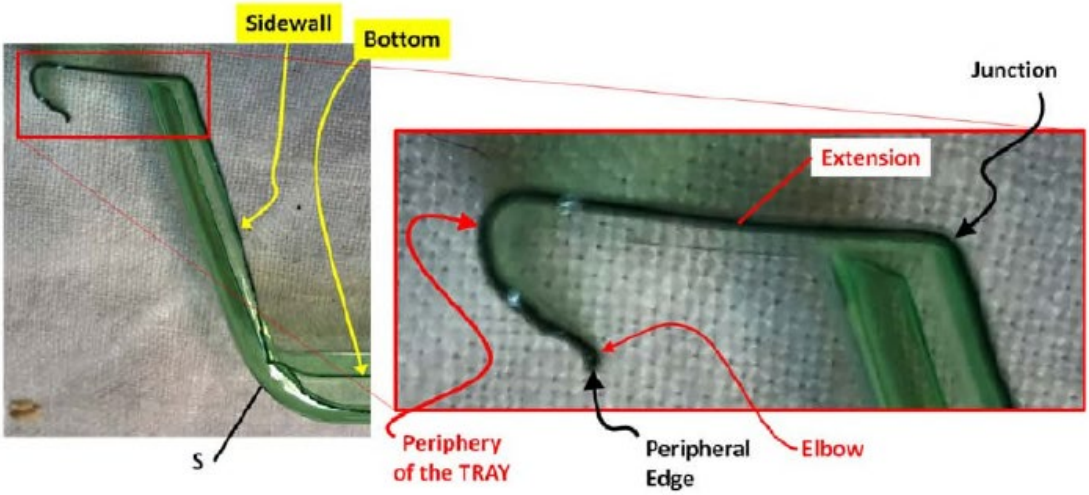
353. As noted previously, the '222 Patent refers to article 100 with extension 50, spacer 140, and bend region 150, as shown here in Figs. 1A and 1B.

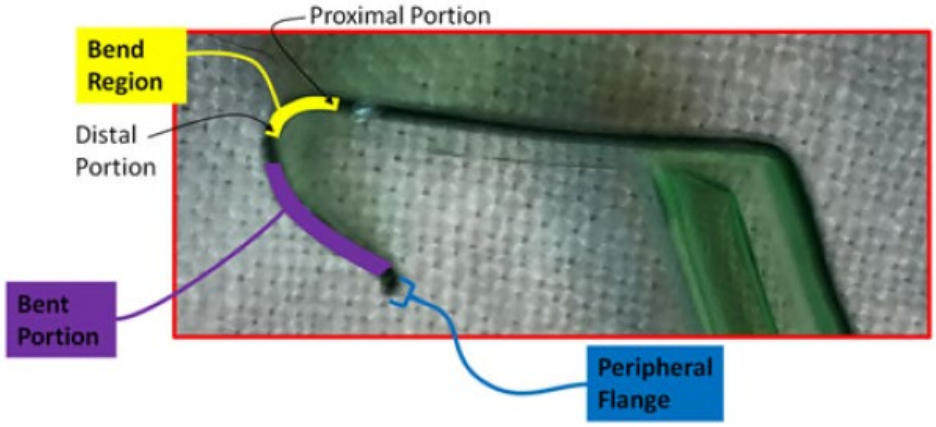


Ex. 1001, Figs. 1A, 1B

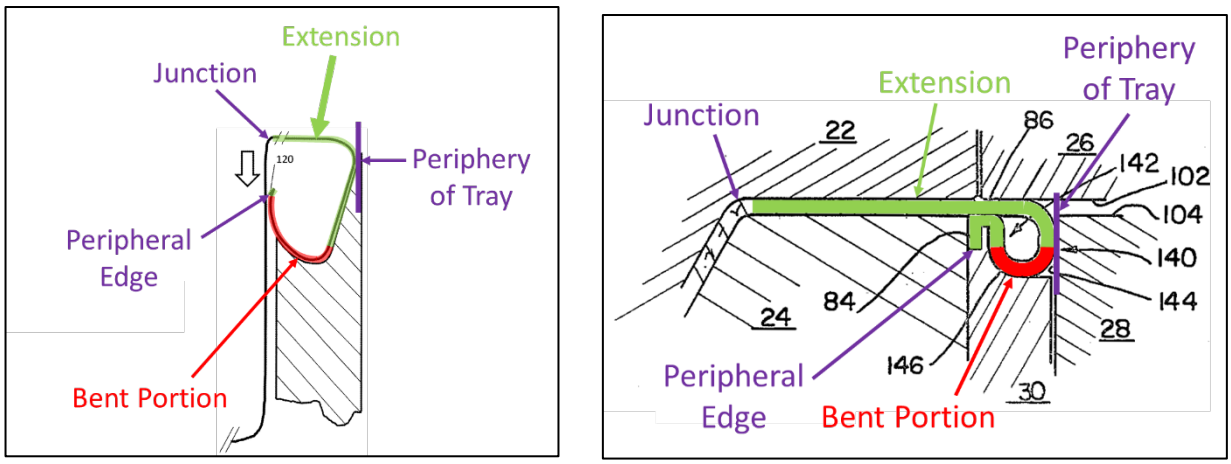
354. Furthermore, the Patent Owner applied the terms "extension," "bend region," and "bent portion" to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in litigation related to the '222 Patent:


TRAY
Deflectable Flange
RIC
Bottom
Body
Periphery of the TRAY


Sidewall
Bottom
S
Junction
Extension
Periphery of the TRAY
Peripheral Edge
Elbow

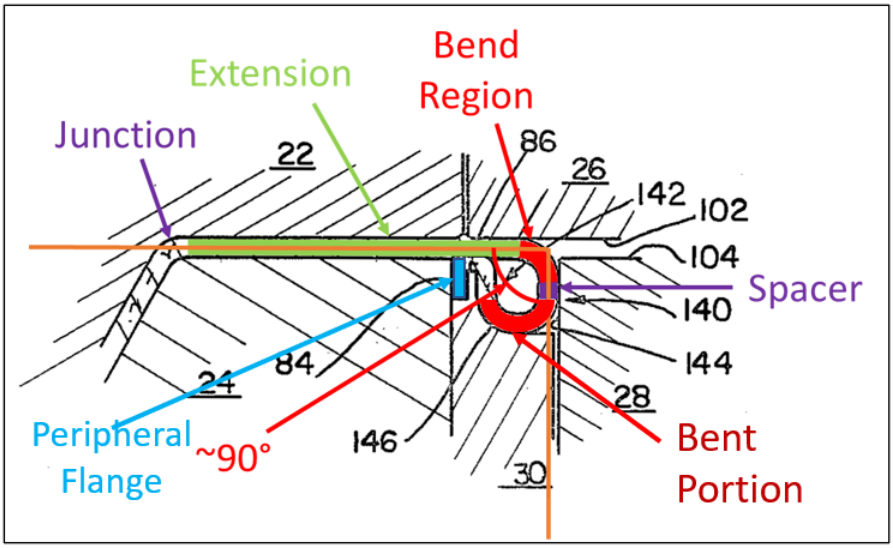

Proximal Portion
Bend Region
Distal Portion
Bent Portion
Peripheral Flange

355. The embodiment illustrated 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 Fig. 8 of Meadors. This is readily apparent from a side-by-side comparison of Fig. 8K of the '222 Patent and Fig. 8 of Meadors, which shows that each geometric feature of the extension recited in Claim 1 appears in almost exactly the same manner in both drawings:



Ex. 1001, Fig. 8K (annotations added). Meadors, Fig. 8 (annotations added).

356. As noted earlier, Meadors discloses a bent portion, bend region and spacer, as shown in annotated Fig. 8 below:



Meadors, Fig. 8 (annotations added).

357. Therefore, Meadors teaches the bent portion being selected from the group consisting of the extension, the bend region, and the spacer.

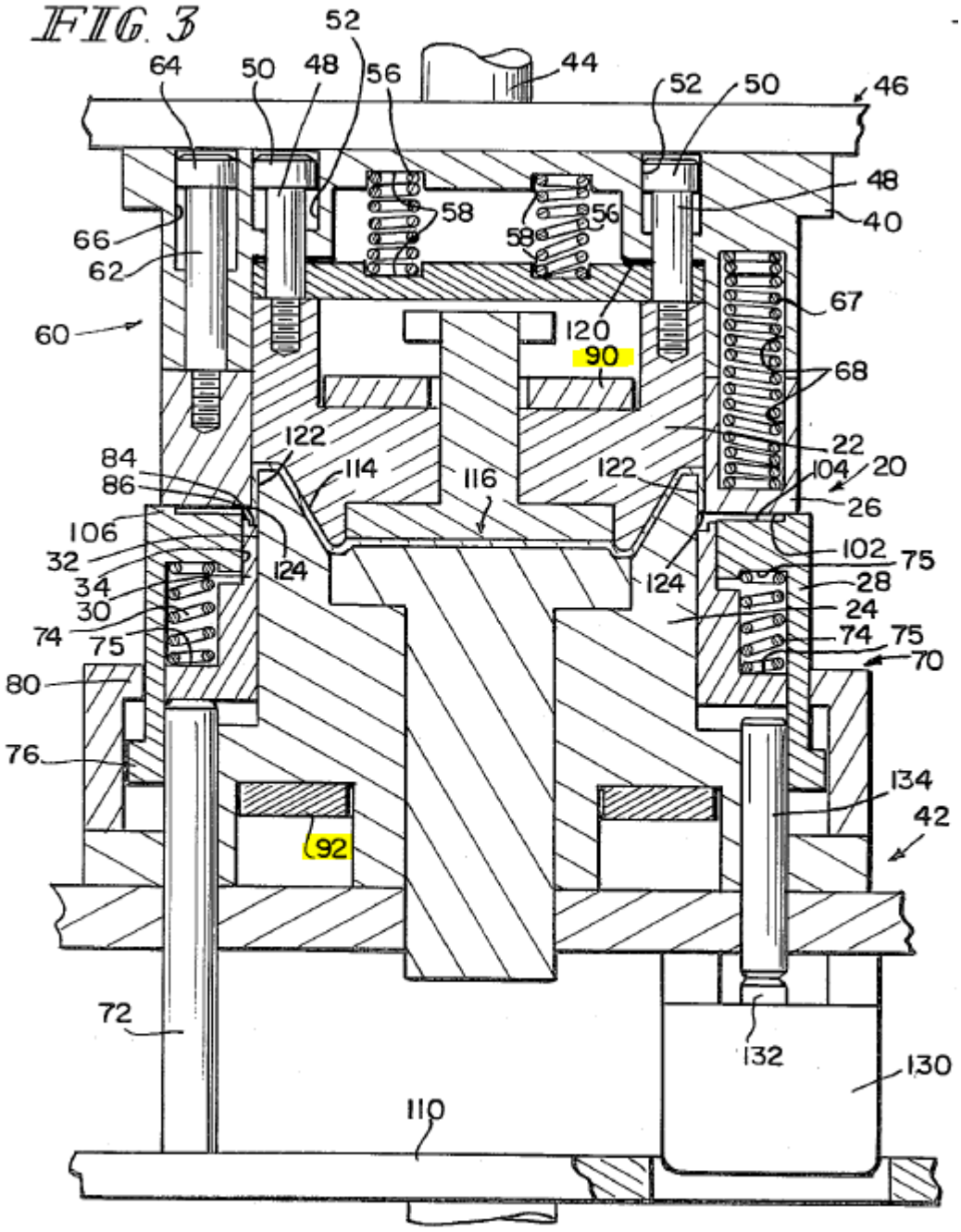
i. **Element 1g: "heating the bent portion to at least the glass transition temperature of the thermoplastic; and,"**

358. See references to the '222 Patent's bent portion above. Meadors teaches a bent portion as noted in several Claim elements, including Claim 1f. directly above.

359. As noted earlier in this report, Glass transition (often abbreviated as "Tg") can be described as the temperature that a thermoplastic transitions from a relatively rigid and glossy material to a soft, pliable one. Said another way, it is the temperature at which a plastic becomes "malleable." The specific glass transition temperature of various thermoplastic materials varies, but is commonly specified and published by most material suppliers.

360. Meadors teaches a thermoformed article, including its method, apparatus and material. Meadors describes using thermoplastic materials for his article, as it is made entirely of plastic (or, for some embodiments, paper). Meadors, Abstract ("container or lid constructed from ***paper stock***"), 1:5-9 ("This invention relates to methods of, and apparatus for, forming a multiple-thickness bead in a sheet or blank of a flexible material, such as ***thermoplastic material or paper stock***, as the sheet or blank is being formed into an article such as a container or lid for a container"), 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.") (emphasis added). He 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. (emphasis added). Meadors Fig. 3 (below) 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 above, thereby heating the bent portion.

Ningbo Linhua Plastic Ex. 1003, p. 309



Meadors, Fig. 3 (annotations added).

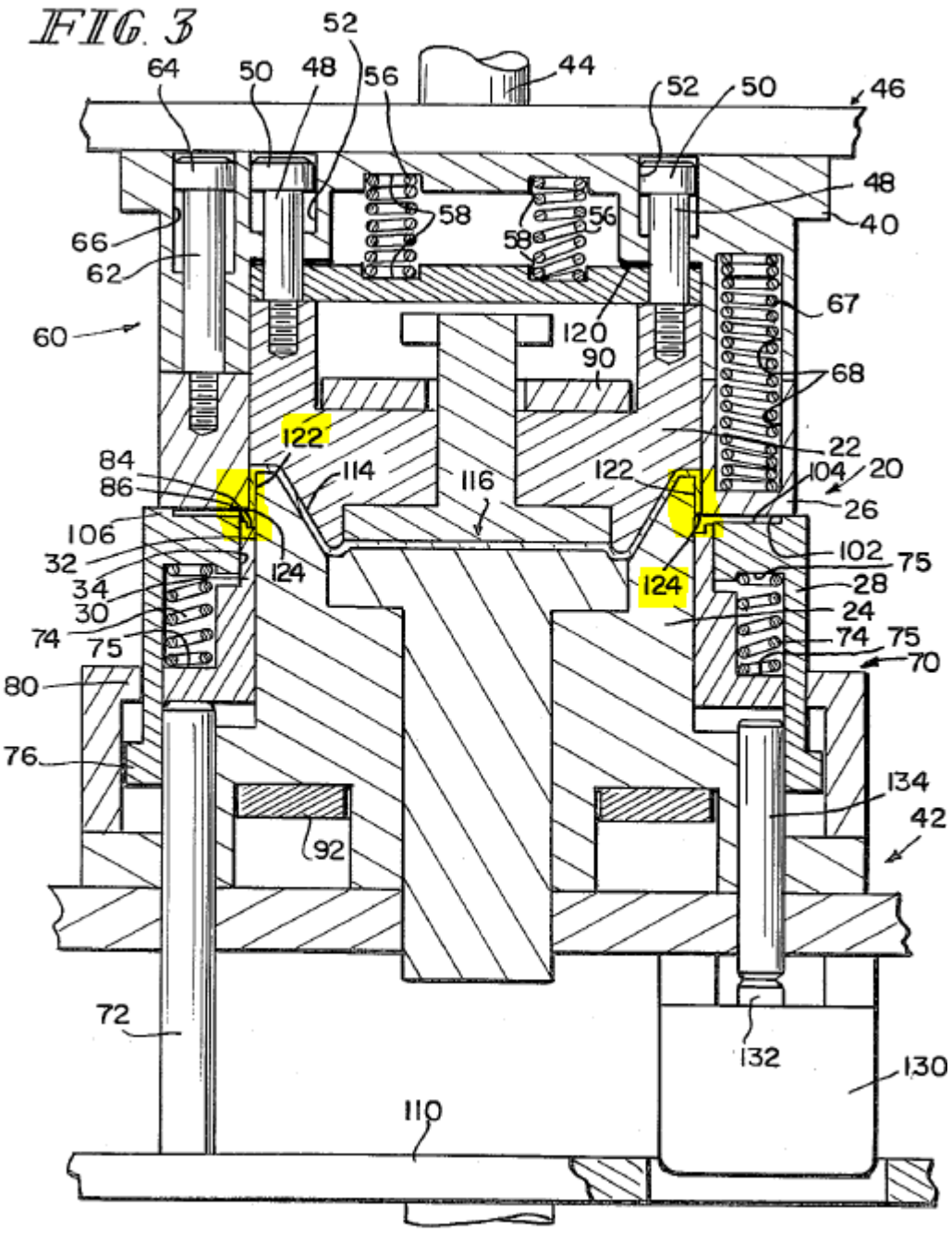
361. A POSITA would readily understand that Meadors' references to thermoplastics and application of heat through conductive metal tooling to the flange 122, to mean that the bent portion is to be heated to at least the glass transition

temperature (or softening point), as that would be necessary in order to displace the peripheral edge of a thermoplastic sheet.

i. Element 1h: "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…"

362. See references above regarding elements of "impinging the ram against the peripheral flange," including Claim element 1e. Also, as noted above regarding Claim 1g., Meadors teaches a method, apparatus, and thermoplastic materials which use a series of incremental steps to heat the bent portion and deflect the spacer toward the extension. Meadors describes his Fig. 2 as "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:

Ningbo Linhua Plastic Ex. 1003, p. 311

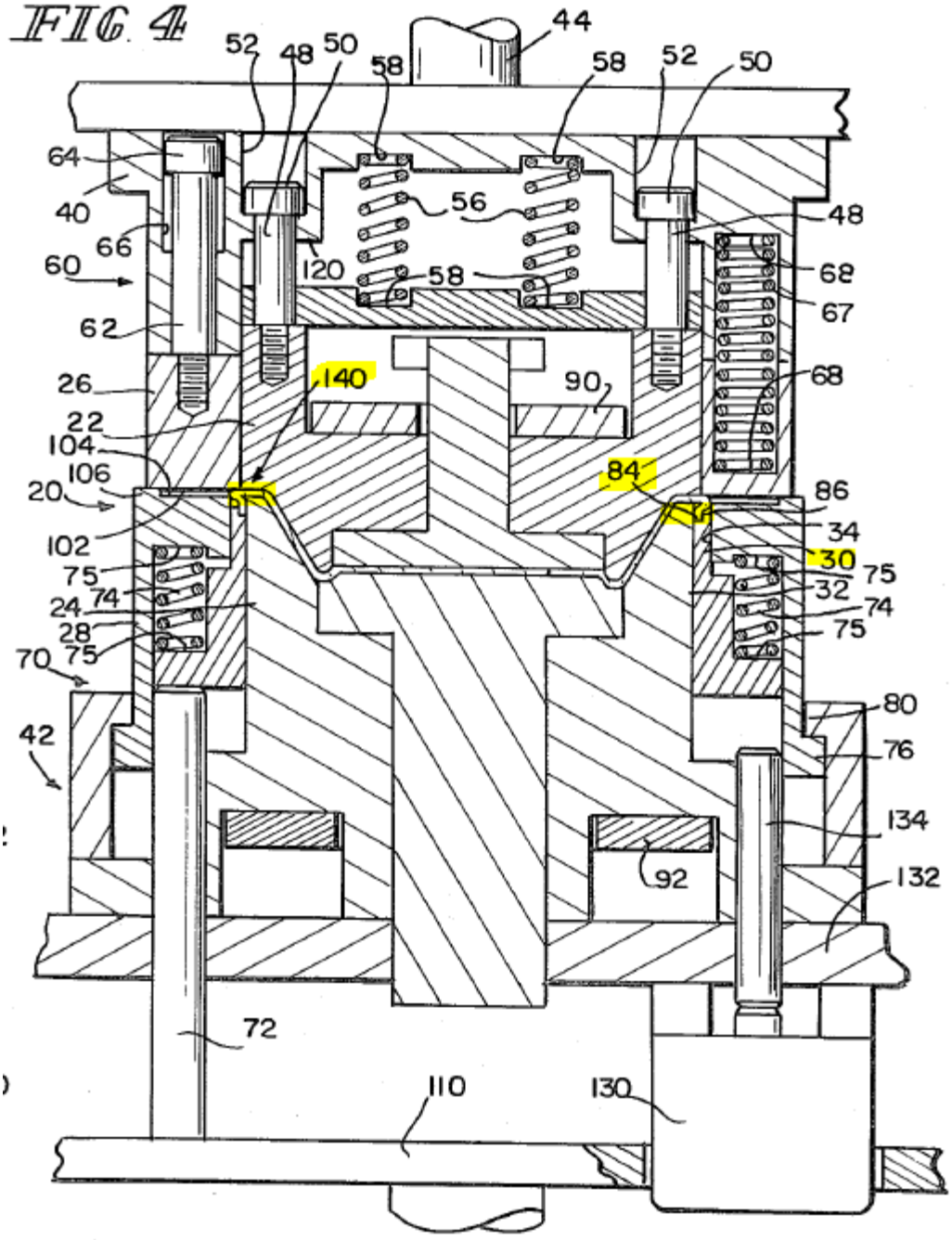


Meadors, Fig. 3 (annotations added).

363. 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") impinges ("begins its upward

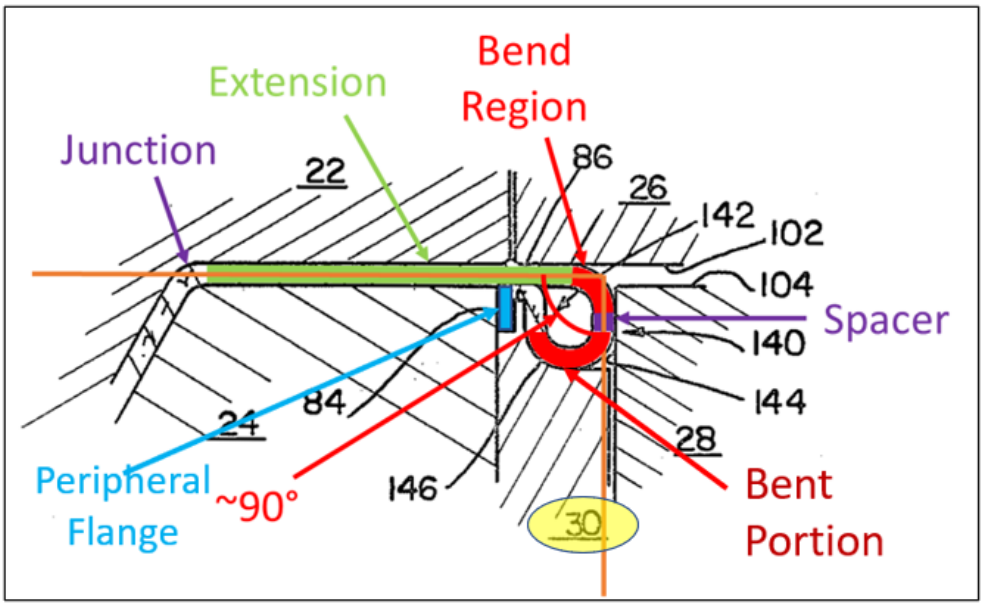
travel" and "The distal free edge 124 of article 116 is captured in groove 84") the flange. Meadors continues "**As the vertically upward travel of ring 30 continues**, the flange 122 is squashed, or crushed, into a double-thickness bead or **rim 140**." Id. 4:31-39 (emphasis added). Meadors discloses the required "***further impinging*** *the ram against the deflectable flange* ***to further deflect the spacer toward the extension***," through his recitation of "As the vertically upward travel of ring 30 continues," as well as his illustrations of incremental impingement of the deflectable flange (free edge 124) in Figs. 3 (above) and 4 (below), where his spacer is deflected towards the extension by ring 30, as detailed in Meadors Fig. 8 (also below):

Ningbo Linhua Plastic Ex. 1003, p. 313



Meadors, Fig. 4 (annotations added).

Ningbo Linhua Plastic Ex. 1003, p. 314



Meadors, Fig. 8 (annotations added).

364. For at least these reasons, Meadors teaches "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."

j. **Element 1i: "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."**

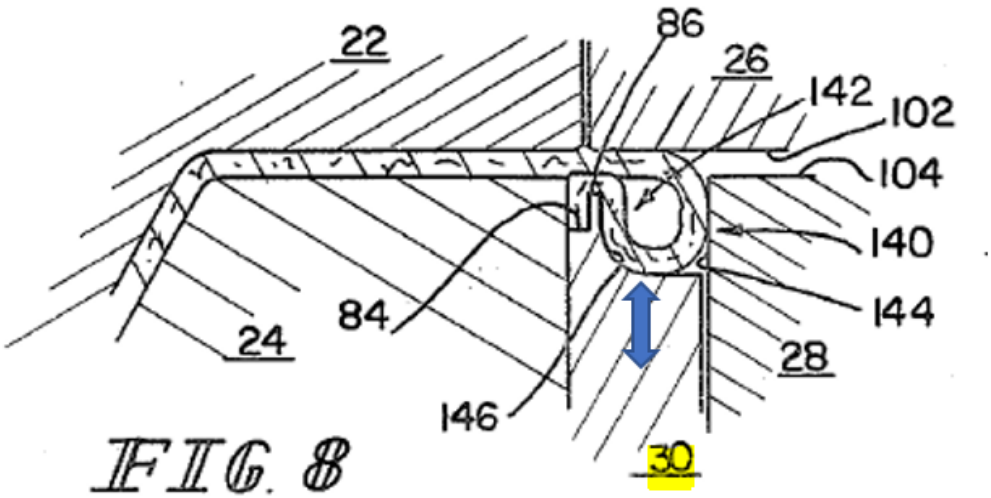
365. See previous references to the "ram," "deflectable flange," "bent portion," and "smooth periphery," and how Meadors teaches each of these claim elements.

366. Meadors further teaches disengaging the ram from the deflectable flange by repeatedly referencing "reciprocably" mounting associated forming components of his tooling or apparatus. For example, he mentions reciprocably 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.

367. A POSITA would readily understand 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 of course are designed to compress and rebound, thereby returning to their original position for each cycle. Indeed, as previously referenced, the prior art of the textbook titled "Technology of Thermoforming" by James. L. 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." *Id* 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.

368. 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.

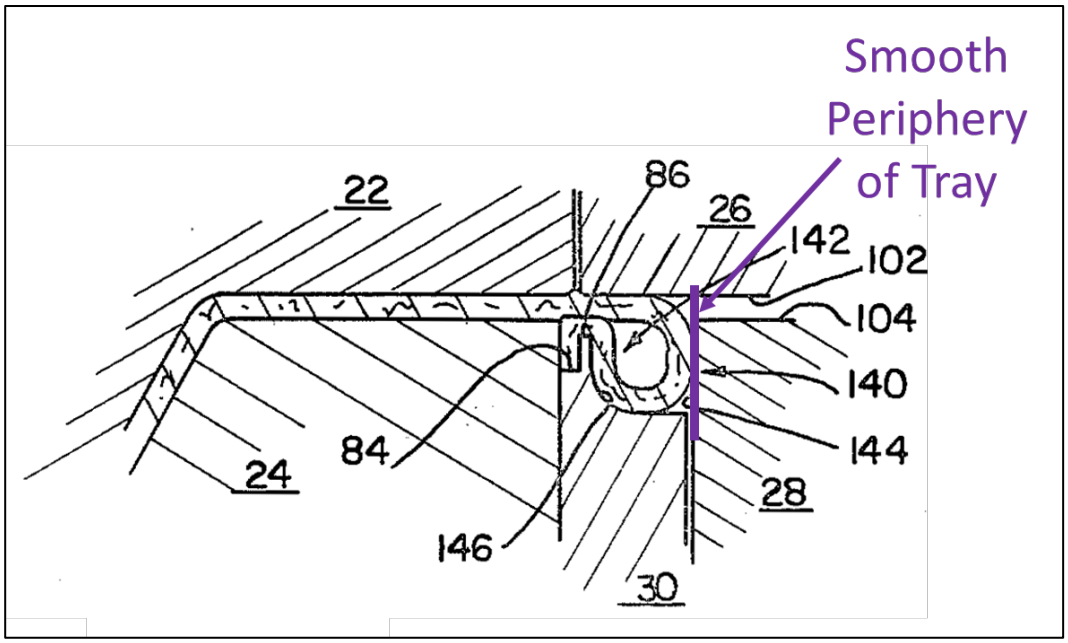


Meadors, Fig. 8 (annotations added).

369. Furthermore, Meadors' refers to his 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.

370. 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 (annotations added).

371. Indeed, the very purpose of Meadors' invention is to yield an article with a smooth periphery. Accordingly, Meadors' method, apparatus and material teachings disclose 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. **Claim 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."**

372. Previously noted were Meadors teachings regarding a bent portion and disengaging the ram. As noted directly above, Meadors describes his method and apparatus in the context of being cyclic and repeatable for forming rolled flanges in a thermoplastic article. A POSITA would readily understand that Meadors use of the terms "reciprocably" and "springs" (Id 3:4-33) refer to the ability for the apparatus components to return or retract, i.e. disengage from the heated article before the cycle is repeated on the next article. A POSITA would further 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.

373. Of course, de-energizing Meadors coils 90, 92 will cause adjacent tooling to likewise cool, in turn 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 be 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 **he 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, as repeatedly shown previously). Figs. 5 and 6 are shown here for reference.

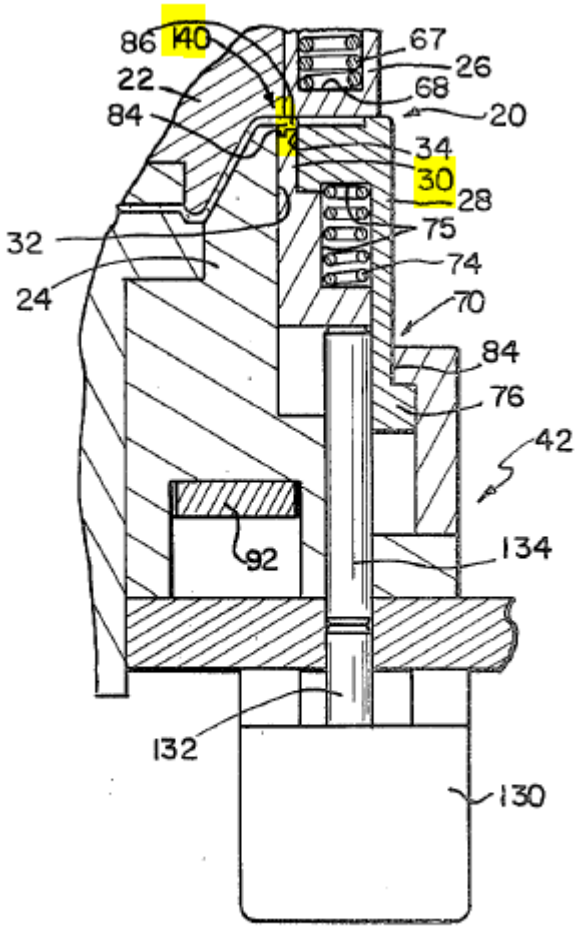


FIG. 5

Meadors, Fig. 5 (annotations added).

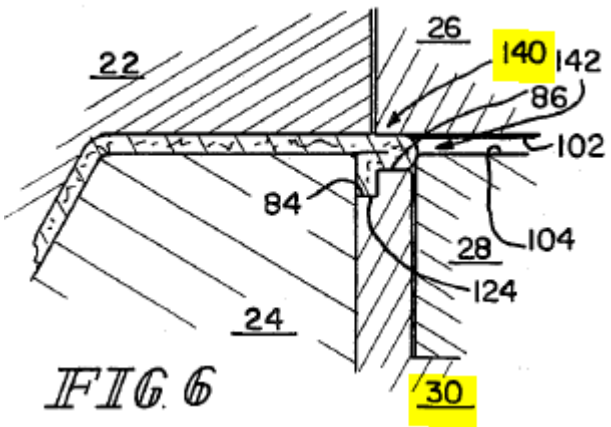


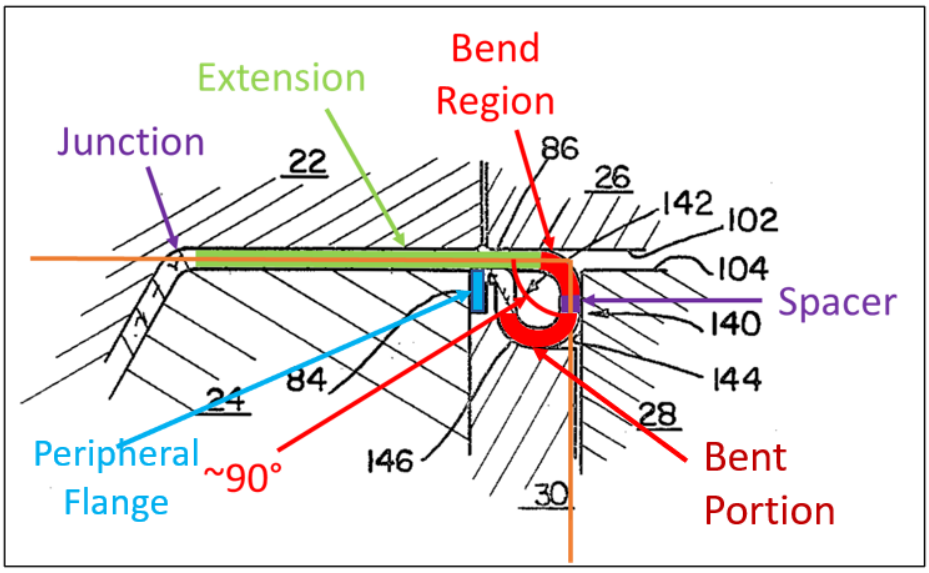
FIG. 6

Meadors, Fig. 6 (annotations added).

374. Furthermore, Meadors' refers to his 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: 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."**

375. As noted earlier, 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 (annotations added).

376. As shown above, 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. Therefore, Meadors teaches this claim limitation, as well.

4. **Claim 4: "The method of claim 1, wherein the bend region interconnects the spacer with the extension at an angle of about 87-93 degrees."**

377. As shown directly above, Meadors Fig. 8 discloses a bend region which interconnects the spacer with the extension at an angle of 90 degrees, or at an angle of about 87-93 degrees, meeting this claim limitation.

5. **Claim 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."**

378. As previously noted, Meadors describes using thermoplastic materials for his article, as it is made entirely of plastic (or, for some embodiments, paper). Meadors, Abstract ("container or lid constructed from ***paper stock***"), 1:5-9 ("This invention relates to methods of, and apparatus for, forming a multiple-thickness bead in a sheet or blank of a flexible material, such as ***thermoplastic material or paper stock***, as the sheet or blank is being formed into an article such as a container or lid for a container"), 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.") (emphasis added).

379. The shape of Meadors's container can be a rounded rectangular tray with a body and a deflectable flange about its entire periphery. For example, Meadors describes his apparatus as, "The apparatus of the present invention includes opposed first and second cooperating dies for holding a central region of the blank, a ring, and opposed first and second draw pads movable axially with respect to the first and second dies. The draw pads cooperatively capture **the perimetral edge of the blank surrounding the central region** and a distal end axially spaced from the proximal end." Id. 2:14-24. Emphasis added. Meadors reference to the "perimetral edge of the

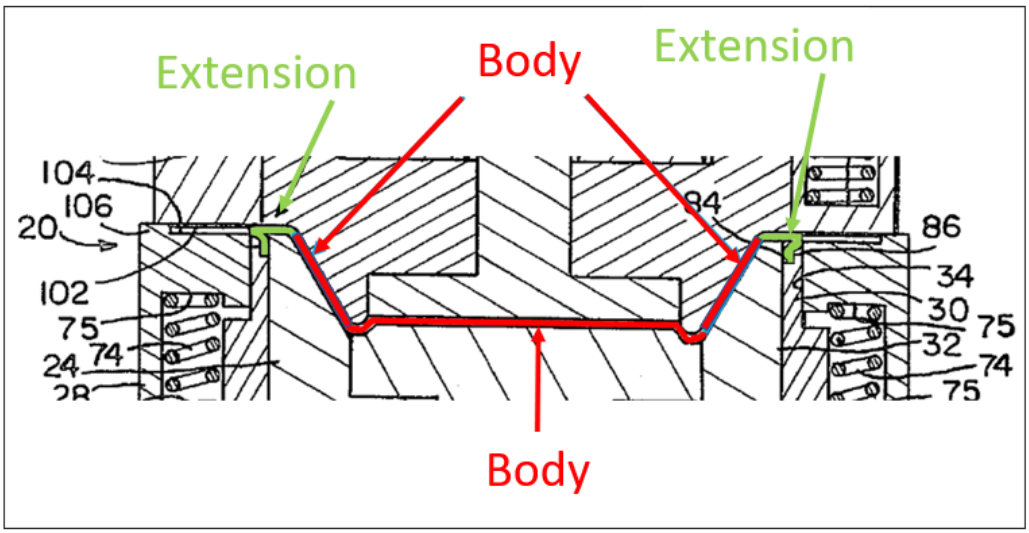
Ningbo Linhua Plastic Ex. 1003, p. 324

blank surrounding the central region" is understood to mean "a thermoplastic shape with a body and a deflectable flange about its entire periphery."

380. Meadors further 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. See, e.g., Meadors, 2:68 (tray-forming mechanism includes a "***perimetrally extending ring 30***"), emphasis added; 3:40-43 ("Blank 100 typically is in the form of a disc-like round, ***rectangular***, elliptical, etc., flat sheet."), 4:36-39 ("As the vertically ***upward travel of ring 30*** continues, ***the flange 122 is squashed, or crushed, into a double-thickness bead or rim 140***."), 6:24-26 ("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*** ….") (emphasis added), Figs. 1-4, 8.

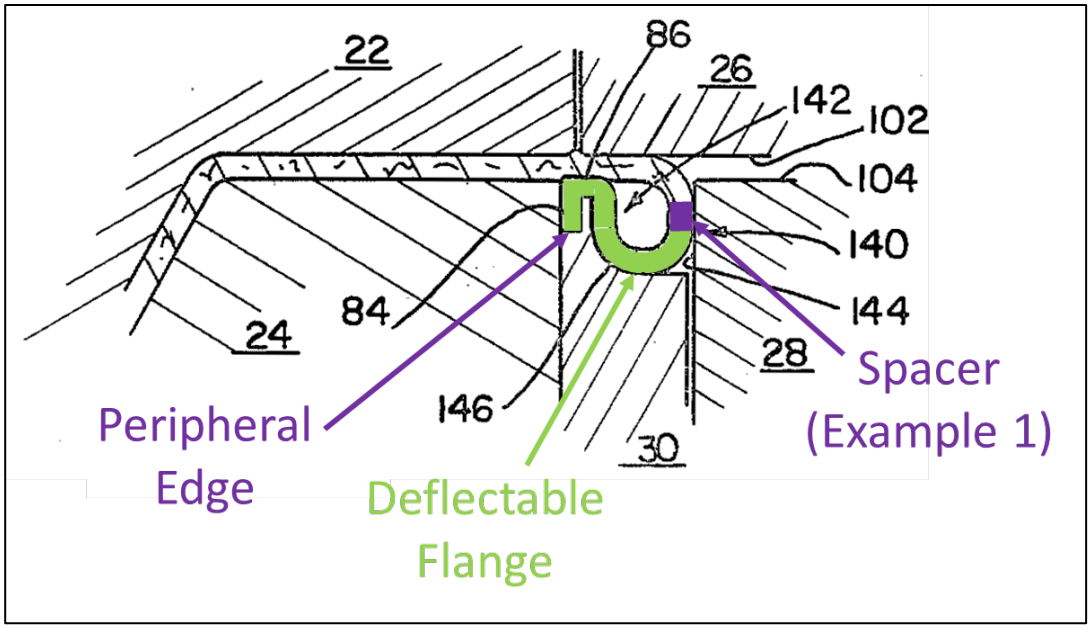
381. Fig. 4 of Meadors illustrates a side view of the tray within the forming apparatus, showing a body including an extension with a deflectable flange about its periphery:

Ningbo Linhua Plastic Ex. 1003, p. 325



Meadors, Fig. 4 (excerpted, annotations added).

382. The extension of Meadors's 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 (annotations added).

6. **Claim 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."**

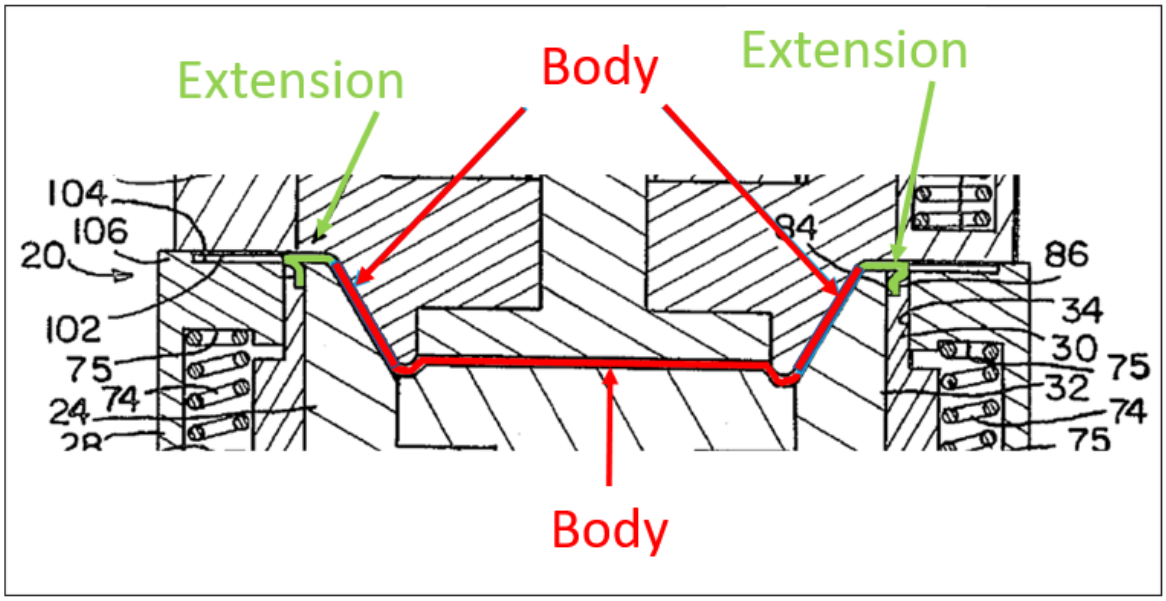
383. As shown above, Meadors describes using thermoplastic materials for his article, which can be a plate, tray, dish or the like ***having a central region and an outer perimetral edge region*** ….") (emphasis added), Figs. 1-4, 8 (see additional references above).

384. Also as noted above, Meadors describes his apparatus as, "The apparatus of the present invention includes opposed first and second cooperating dies for holding a central region of the blank, a ring, and opposed first and second draw pads movable axially with respect to the first and second dies. The draw pads cooperatively capture **the perimetral edge of the blank surrounding the central region** and a distal end

axially spaced from the proximal end." Id. 2:14-24. Emphasis added. Meadors reference to the "perimetral edge of the blank surrounding the central region" is understood to mean "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."

385. The shape of Meadors's container can be a rounded rectangular tray with a body and a deflectable flange about the entire periphery of the opening, i.e. "perimetrally extending ring 30" and "double-thickness bead or rim 140." See further references and cites noted above.

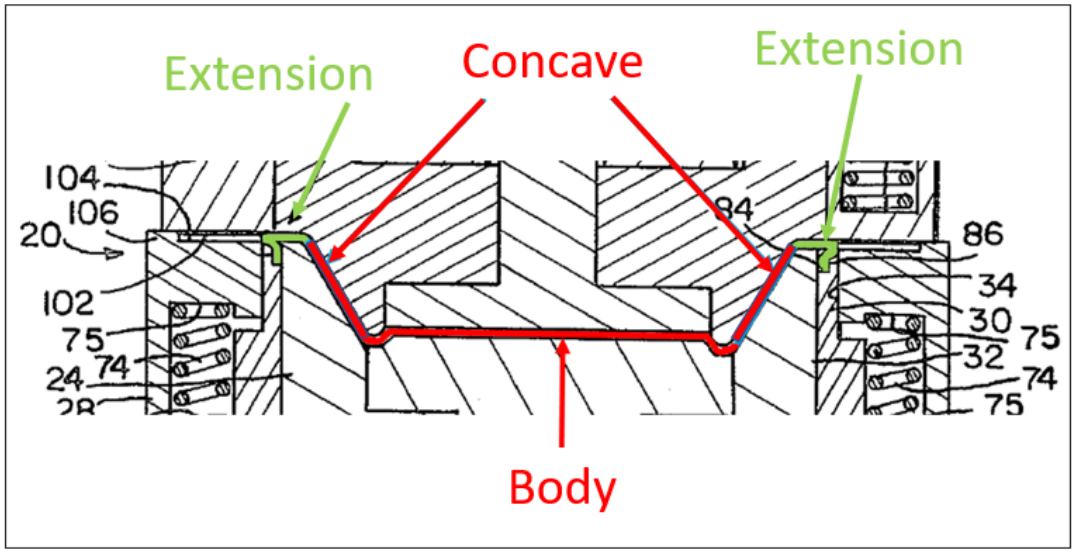
386. Fig. 4 of Meadors illustrates a side view of the tray within the forming apparatus, showing a body including an extension with a deflectable flange about its periphery:

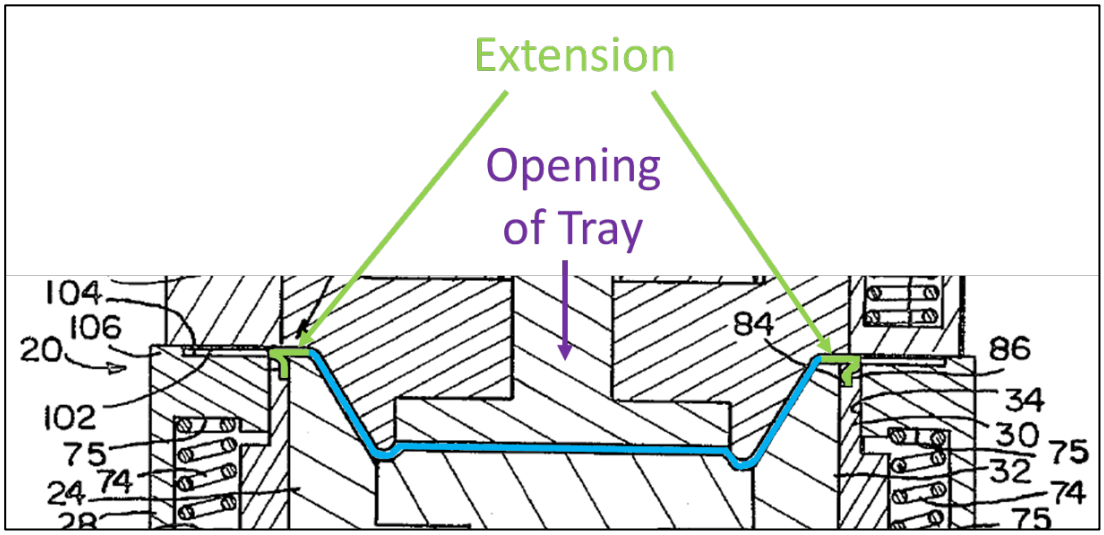


Ningbo Linhua Plastic Ex. 1003, p. 328

Meadors, Fig. 4 (excerpted, annotations added).

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

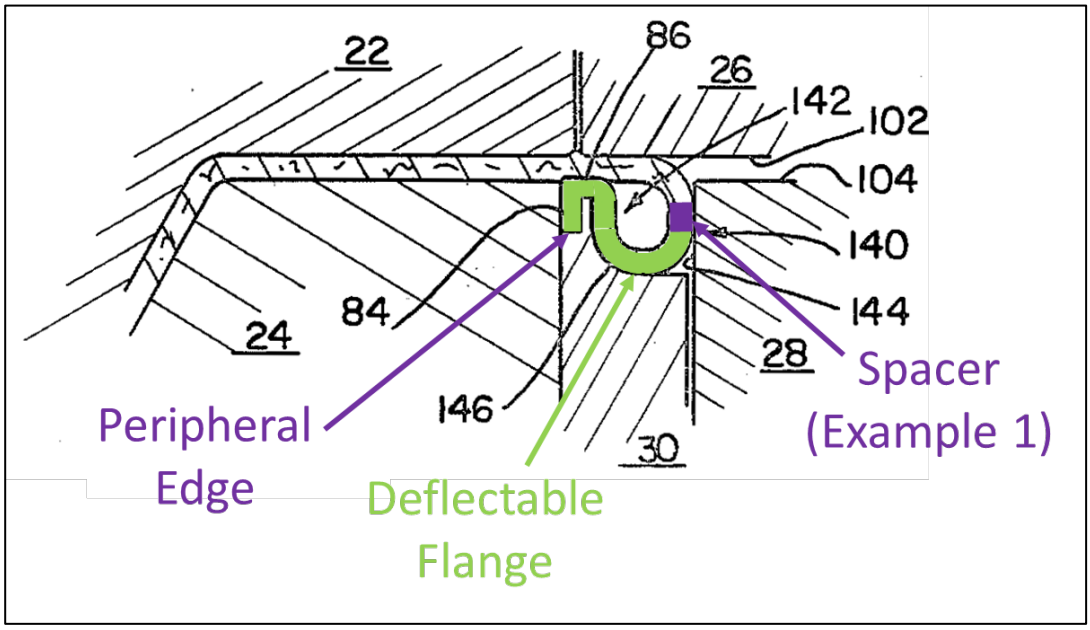




Meadors, Fig. 4 (excerpted, annotations added), both images above.

Ningbo Linhua Plastic Ex. 1003, p. 329

388. The extension of Meadors's 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 (annotations added).

389. Thus, Meadors teaches a thermoplastic article 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.

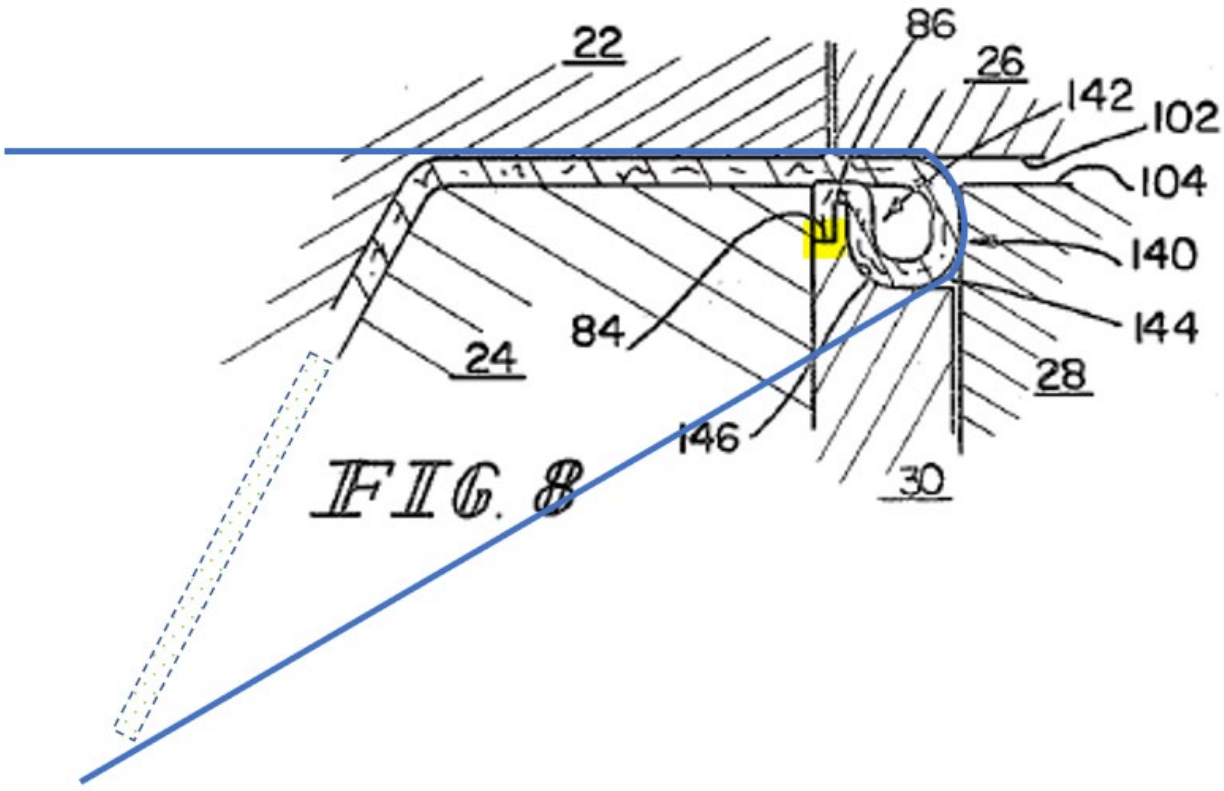
Ningbo Linhua Plastic Ex. 1003, p. 330

7. **Claim 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."**

390. As previously noted, Meadors teaches "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." Id. 6:24-6. He further teaches "a method for forming a bead in an article," (Id. 5:13), and "the flange 122 (with distal free edge 124) is squashed, or crushed, into a double-thickness bead or rim 140." Id. 4:34-39.

391. Meadors also describes his Figs. 3-4 as beginning the bead-forming step, i.e. the rolling of the flange. He discloses 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. Meadors continues "**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 (emphasis added).

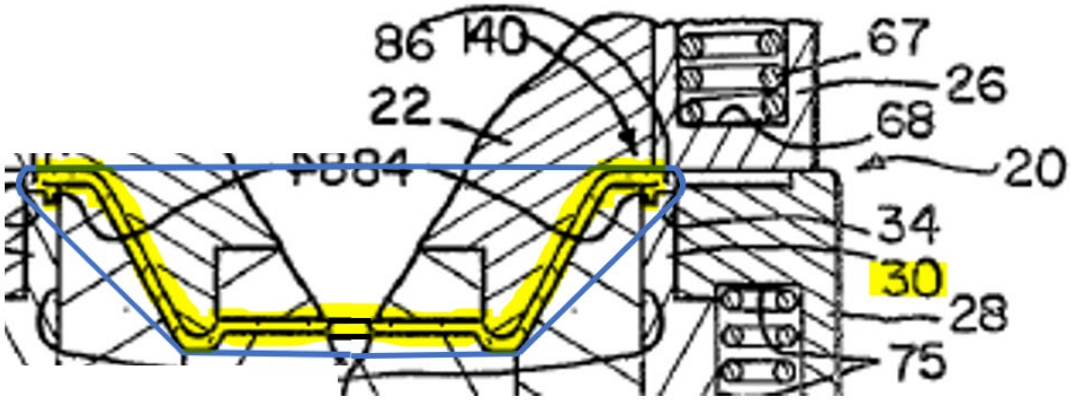
392. Meadors Fig. 8 discloses impingement of the deflectable flange (including peripheral edge aka Meadors "distal free edge" highlighted yellow below). Note Meadors' deflectable flange is sufficiently deflected away from the periphery by ring 30 such that a flexible film (blue) that tautly over-wraps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



Meadors, Fig. 8 (annotations added) showing continued sidewall and deflectable flange sufficiently deflected such that a flexible film (blue) does not contact the peripheral edge (yellow).

393. This can be further envisaged by considering Meadors Fig. 5, which Meadors describes as showing "The bead 140 is finished." Id. 4:51. Here I have shown 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.

Ningbo Linhua Plastic Ex. 1003, p. 332



Meadors, Fig. 5 (excerpted, annotations added) showing mirror image of yellow highlighted article and indicating flexible film (blue) does not contact peripheral edge.

394. Therefore, Meadors teaches that 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.

8. **Claim 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."**

395. See my previous references to the "ram," "impinged," "deflectable flange," "peripheral edge," "body" and "bent portion," all of which are taught by Meadors as defined in the '222 Patent and illustrated in Patent Owner's First Amended Complaint in related litigation.

396. Meadors discloses a variety of bead 140 configurations including those detailed in Figs. 5-10. Furthermore, Meadors also teaches, "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. Emphasis added.

397. Meadors Fig. 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:

Ningbo Linhua Plastic Ex. 1003, p. 334

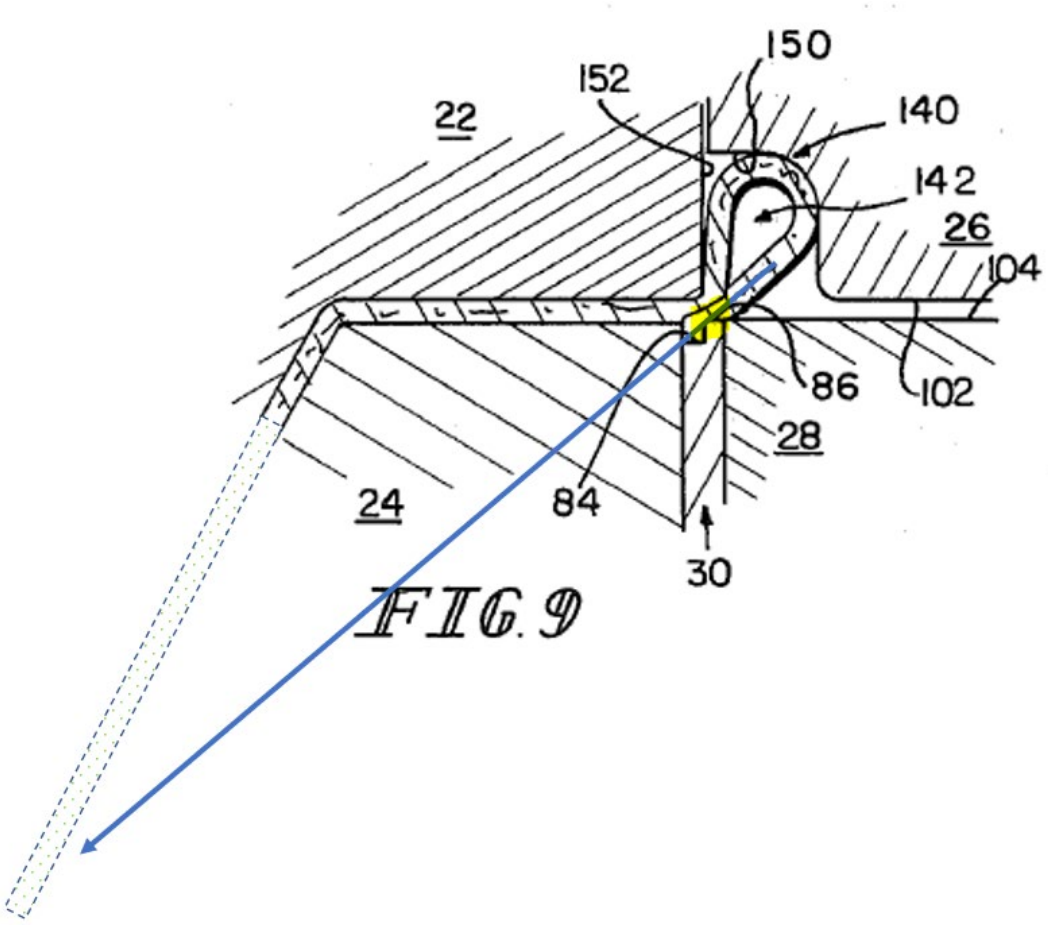


FIG. 9

Meadors, Fig. 9 (annotations added)

398. Meadors Fig. 8 shows examples of die mechanism 20 members 22, 24, 26, 28, 30, highlighted here for reference:

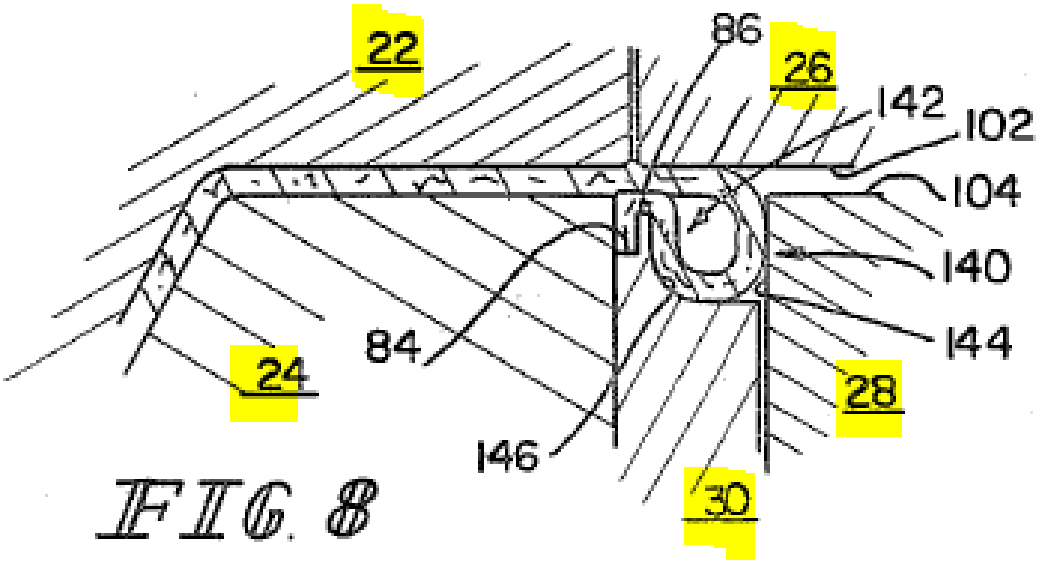
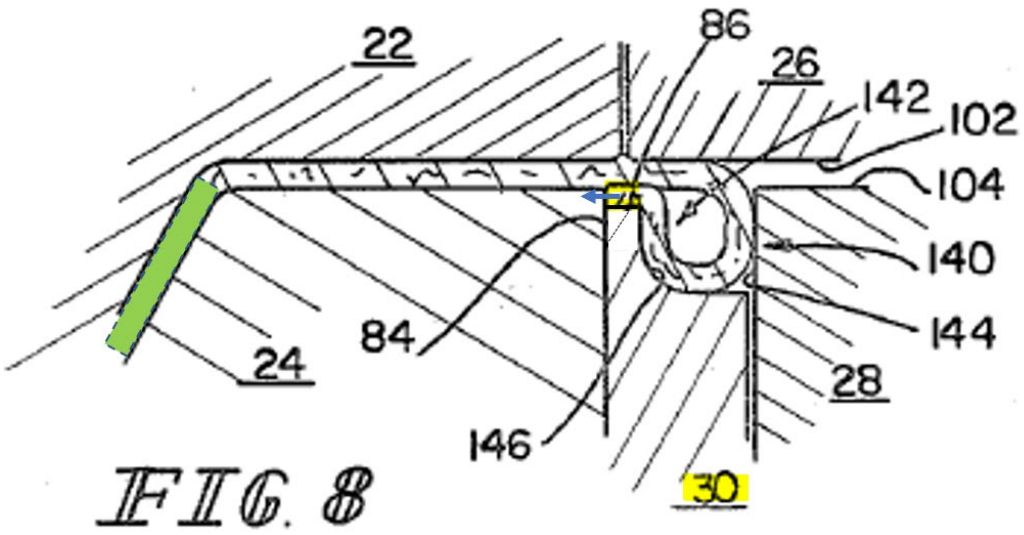


FIG. 8

Meadors, Fig. 8 (annotations added)

399. From even this example, a POSITA would readily understand that through a slight modification of the shape of Meadors ring 30, Meadors' teaching that a wide range of control both during formation, **and in the final configuration**, of the multiple-thickness bead 140, would be realized. For example, a POSITA would know that by flattening the left-most portion of ring 30, Meadors' method and apparatus would deflect the peripheral edge sufficiently that the **peripheral edge** (highlighted yellow) **points (blue arrow) at the body** (green) after cooling the bent portion, as seen here:

Ningbo Linhua Plastic Ex. 1003, p. 336



Meadors, Fig. 8 (annotations added), showing modified ring 30 which deflects peripheral edge sufficiently that peripheral edge (yellow) points at the body (green).

400. Accordingly, armed with the teachings of Meadors, a POSITA would be 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. F**or example, among the various shapes of articles taught by Meadors, he 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 readily 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.

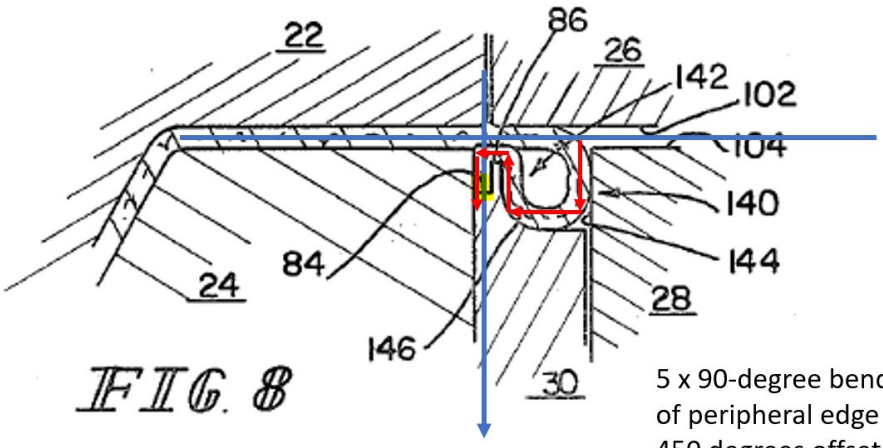
Ningbo Linhua Plastic Ex. 1003, p. 337

9. **Claim 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."**

401. See my previous references to the "ram," "impinged," "deflectable flange," "peripheral edge," and "extension," all of which are taught by Meadors as defined in the '222 Patent and illustrated in Patent Owner's First Amended Complaint in related litigation.

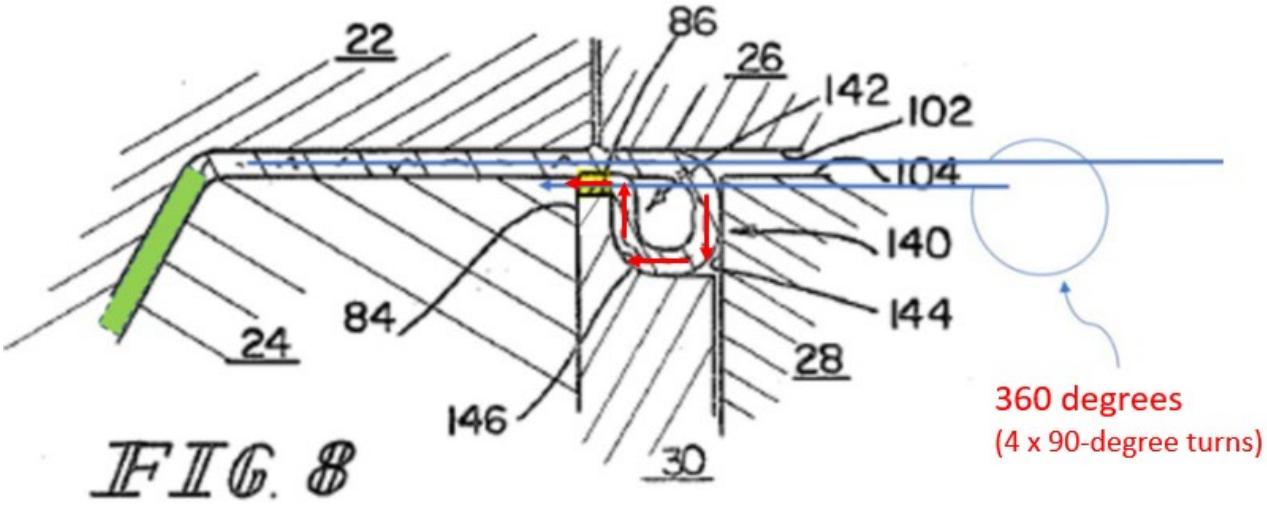
402. Also, as demonstrated directly above regarding Claim element 12, Meadors discloses a variety of bead 140 configurations including those detailed in Figs. 5-10. However, Meadors also teaches, "As will be appreciated, the actual amount of crush or squash in the bead 140 is determined and controlled 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. Emphasis added. Meadors Fig. 8 shows examples of die mechanism 20 members 22, 24, 26, 28, 30, highlighted above for reference.

403. 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 ram (ring 30) impinged against deflectable flange to deflect the peripheral edge 450 degrees, i.e. not less than 180 degrees.

404. 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, 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.

405. 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, i.e. not less than 180 degrees, as seen here:

Ningbo Linhua Plastic Ex. 1003, p. 340

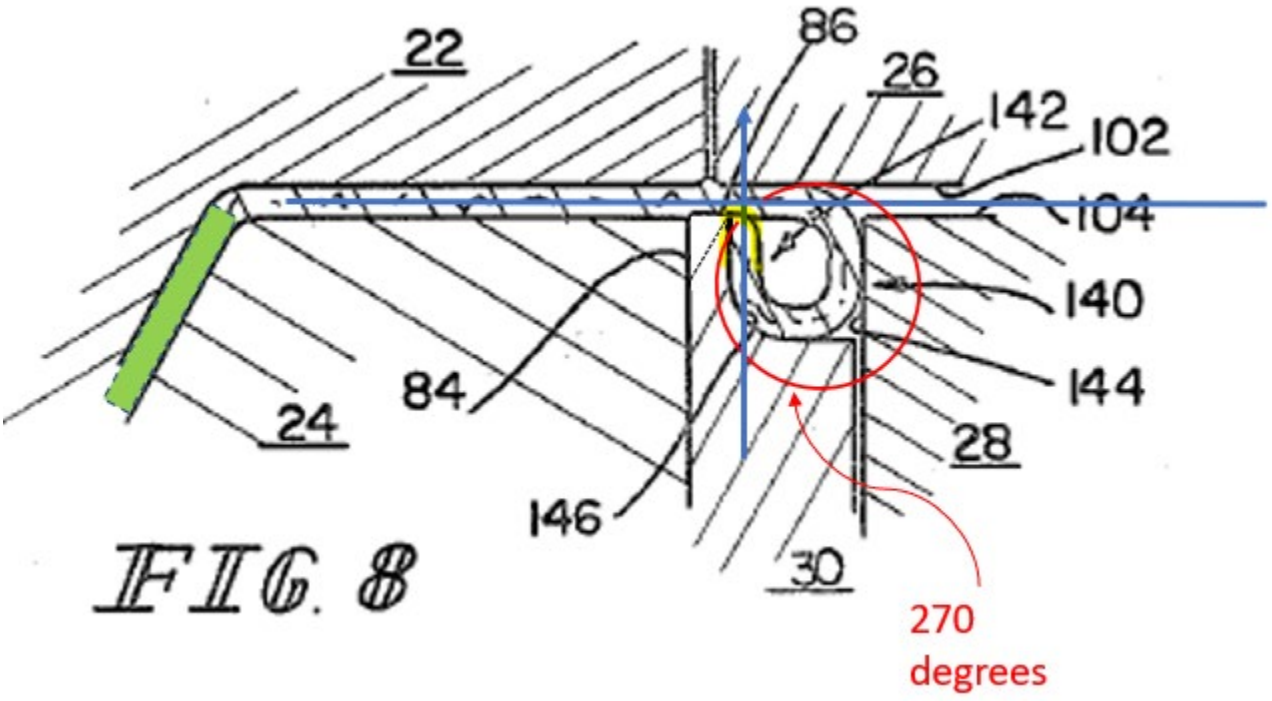


FIG. 8

Meadors, Fig. 8 (annotations added), showing modified ram (ring 30) impinging against deflectable flange to deflect the peripheral edge 270 degrees, i.e. not less than 180 degrees.

406. As also noted above, 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.** As discussed, among the various shapes of articles taught by Meadors, he 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 readily understand that impinging the ram 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, would help further ensure that the sharp peripheral edge was displaced out of the wrap path, regardless of thermoplastic article shape or depth.

10. **Claim 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."**

407. Meadors teaches a 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. For example, in describing his method and apparatus, Meadors states, "**The ring** [ring 30] i**ncludes 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." Emphasis added. Meadors' reference to the groove in the ring constitutes the contoured upper face of the ram, "wherein the deflectable flange is deflected to differing degrees at selected portions of the ram."

Ningbo Linhua Plastic Ex. 1003, p. 342

408. Furthermore, Meadors discloses a variety of bead 140 configurations including those detailed in Figs. 5-10. *Within <u>each</u> of those Figures*, Meadors shows that the deflectable flange is deflected to differing degrees at selected portions of the ram. For reference, the differing degrees of flange deflection are show highlighted below:

Ningbo Linhua Plastic Ex. 1003, p. 343

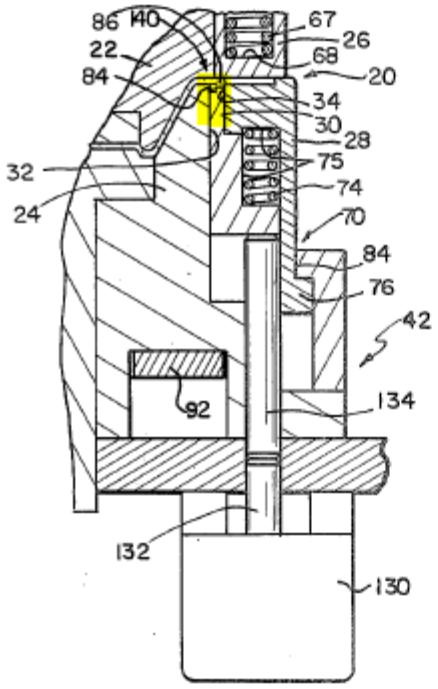


FIG. 5

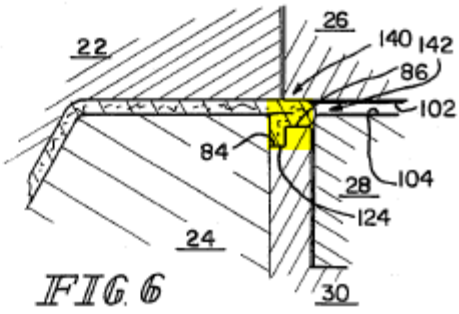


FIG. 6

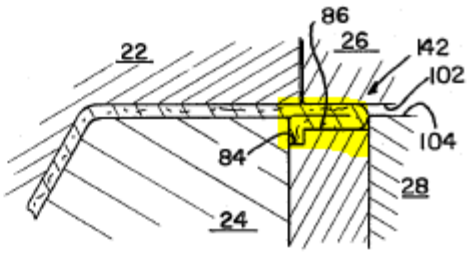


FIG. 7

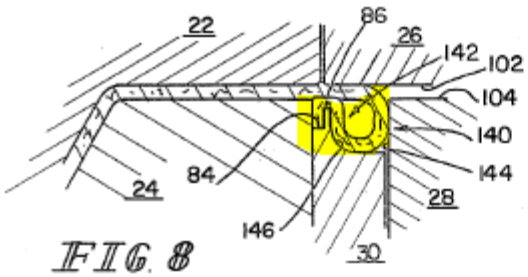


FIG. 8

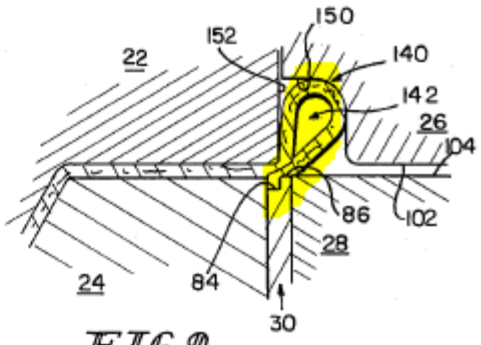


FIG. 9

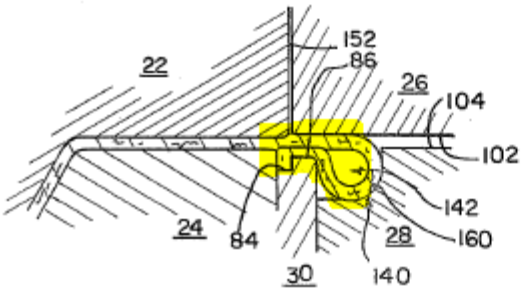
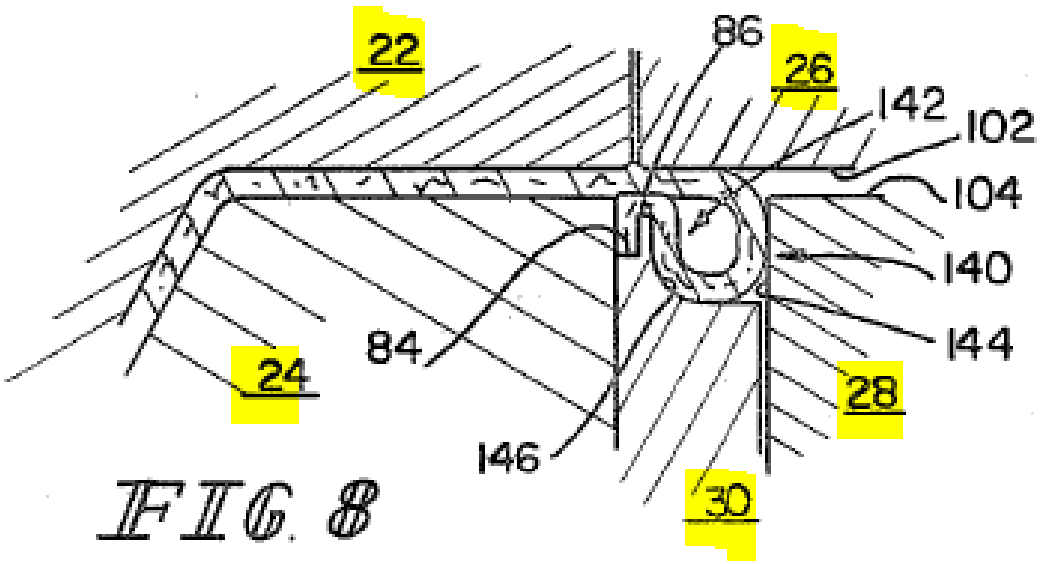


FIG. 10

Meadors, Fig. 5-10 (annotations added), each showing the deflectable flange is deflected to differing degrees at selected portions of the ram

409. However, Meadors also teaches, "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. Emphasis added. Meadors Fig. 8 shows examples of die mechanism 20 members 22, 24, 26, 28, 30, highlighted here for reference:



Meadors, Fig. 8 (annotations added)

410. Taking a closer look at Fig. 8, Meadors teaches the deflectable flange is deflected to differing degrees (highlighted yellow below) at selected portions of the ram (ring 30), whereby the height of the deflected peripheral flange differs at peripheral portions corresponding to the selected portions after cooling the bent portion.

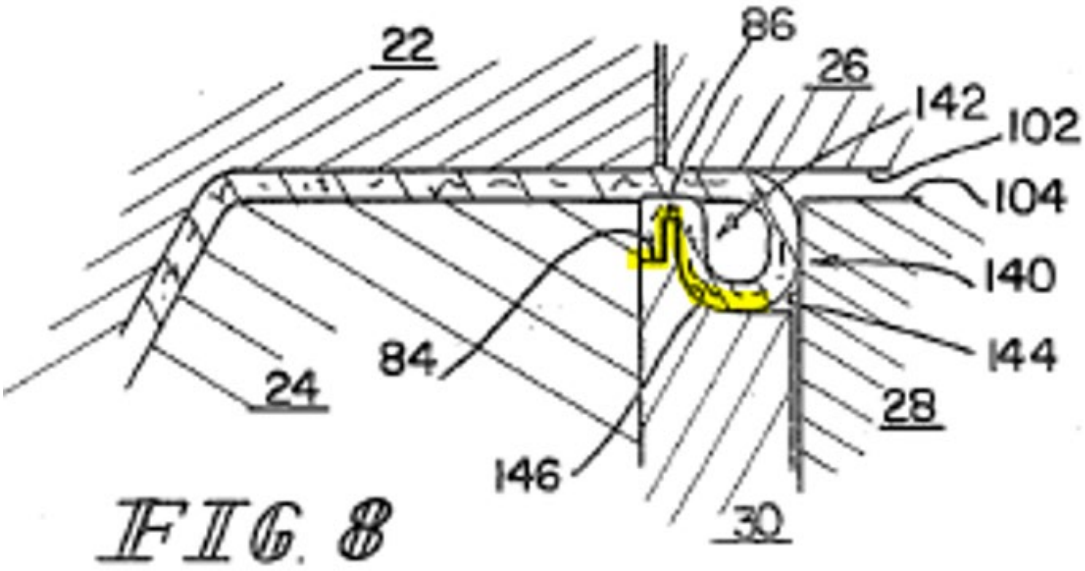
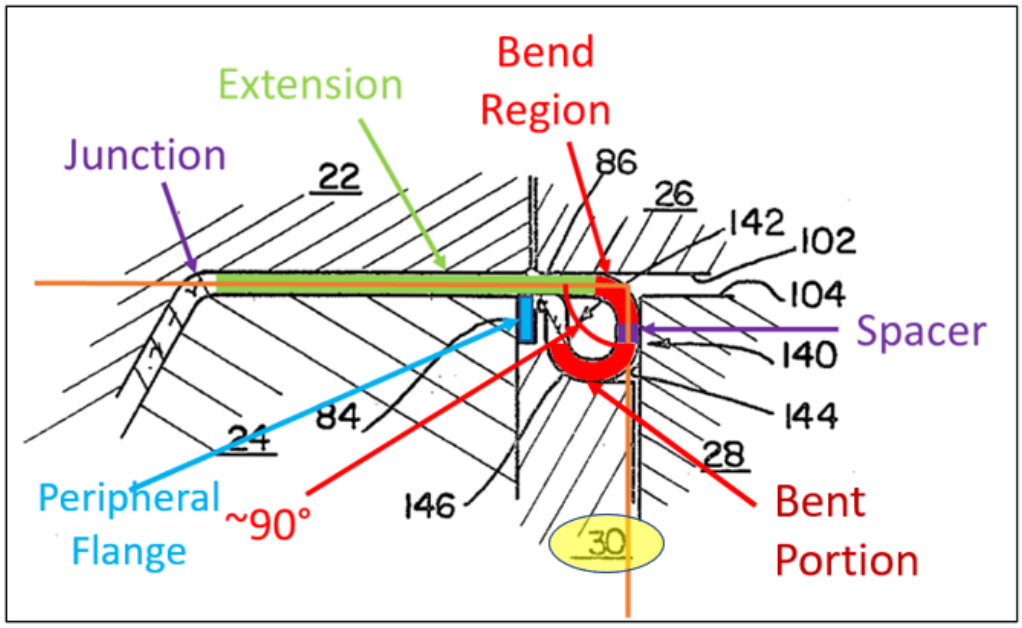


FIG. 8

Meadors, Fig. 8 (annotations added), showing how contour of ram (ring 30) deflects peripheral flange to differing degrees at selected portions of the ram, whereby the height of the deflected peripheral flange differs at peripheral portions

411. Accordingly, 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):

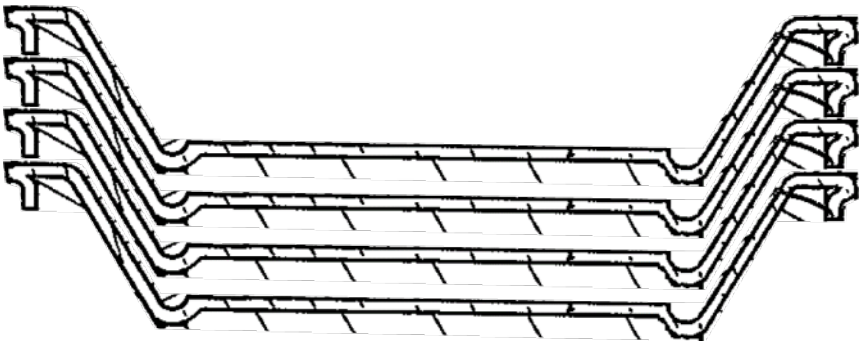
Ningbo Linhua Plastic Ex. 1003, p. 346



Meadors, Fig. 8 (annotated).

412. Meador's article is configured such that yielding at least one portion is useable as a stacking extension. In other words, a plurality of the articles can be stacked in a nested conformation, due to the angles of sidewall. 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. Because of its angled sidewalls, the article of Meadors's Fig. 4 tray is configured such that a plurality of the trays can be stacked in a nested conformation, as can be seen by duplicating and visually stacking copies of the shape:

Ningbo Linhua Plastic Ex. 1003, p. 347



Meadors, Fig. 4 (excerpted, with duplicate shapes added).

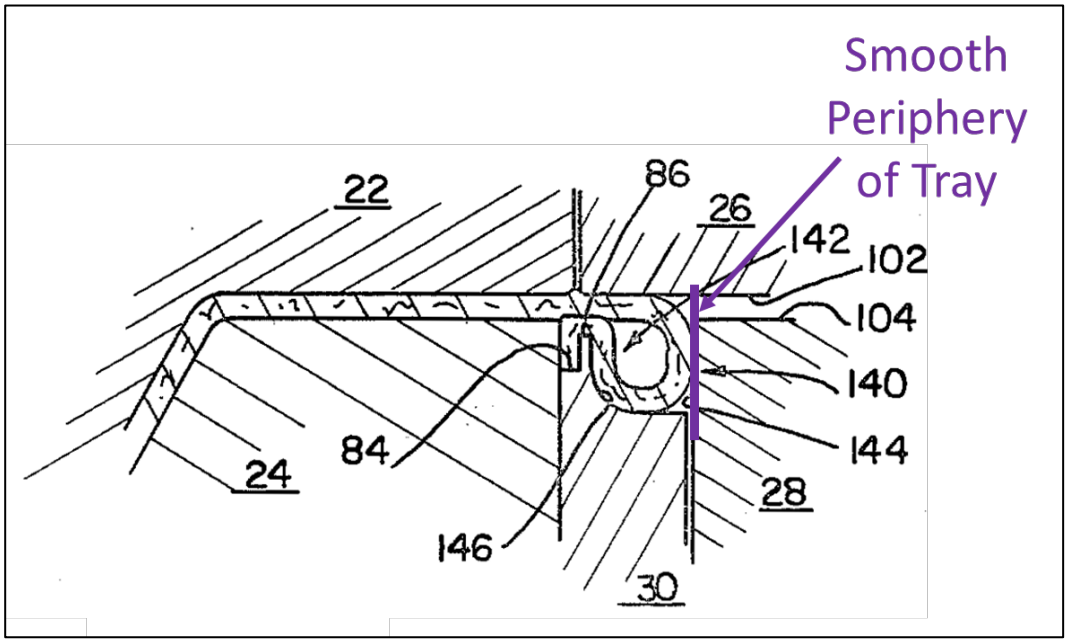
413. I have had direct experience with nesting of thermoformed articles with rolled flanges where, when multiple articles were nested together, the geometry of the rolled flange extension of each article rested on top of the underlying identical article, supporting it about the periphery in a similar manner to that shown above in the annotated Meadors Fig 4. For example, such was the case with the Method Home Products thermoform developed in/around 2006. Additionally, article nesting is also enabled by the inherent requirement of draft angles in the body of thermoformed articles, where the sidewalls are sloped or angled. While draft angles of only 1.5 to 4 degrees are required for non-nested articles, fully nested articles require steeper sidewall draft angles, typically around 7 to 10 degrees. Meadors teaches a sidewall with generous draft angles conducive to stacking (or nesting) and de-stacking (or de-nesting) when combined with the geometry of his peripheral extension geometry.

414. For at least the reasons mentioned, Meadors teaches 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.

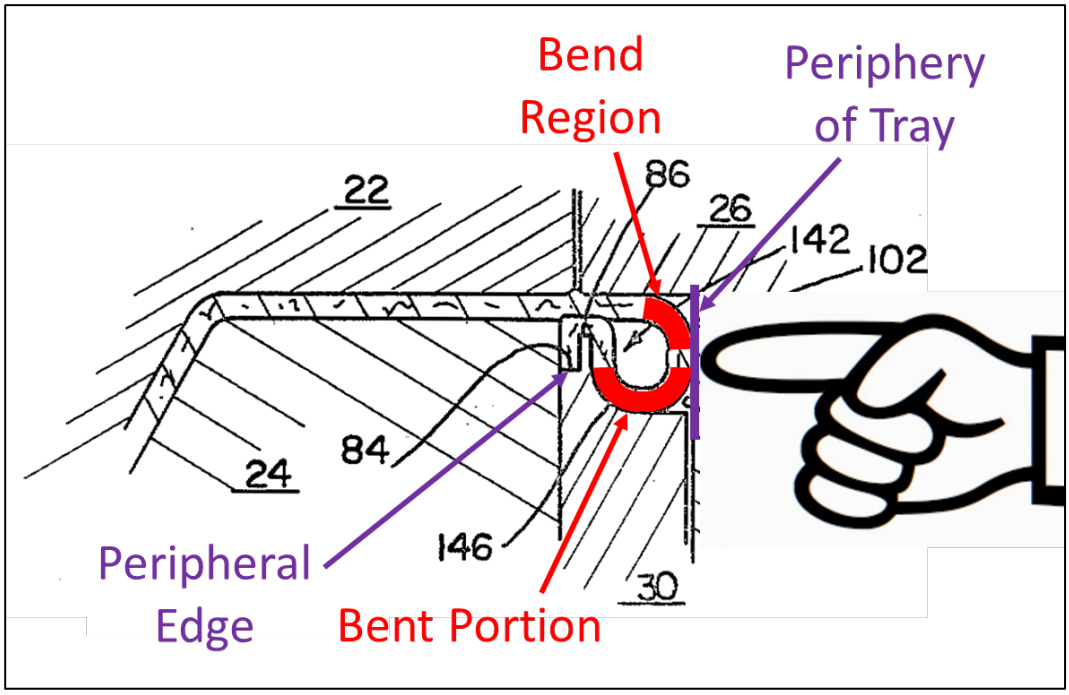
11. **Claim 15: "The method of claim 1, wherein the ram is impinged against the deflectable flange sufficiently to deflect the peripheral edge to a position at which the peripheral edge cannot be perceived by a person running a finger along the periphery of the shaped article after cooling the bent portion."**

415. As previously noted, Meadors illustrates at least the rams (ring 30 and draw pad 28) impinging against the deflectable flange sufficiently to deflect the peripheral edge to a position which, for example in Fig. 8, shows a smooth periphery. 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, i.e. the tray has a smooth periphery:



Meadors, Fig. 8 (annotations added).

416. Thus, a person running a finger along the periphery or outer perimeter of Meadors's tray would not perceive the peripheral edge since, due to the the rams (ring 30 and draw pad 28) impinging against the deflectable flange sufficiently to deflect the peripheral edge, the peripheral edge is displaced inwardly (toward the left of Fig. 8), away from where the person would be touching the tray:



Meadors, Fig. 8 (annotations added).

417. Meadors therefore discloses the limitation where 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.

Ningbo Linhua Plastic Ex. 1003, p. 350

12. **Claim 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."**

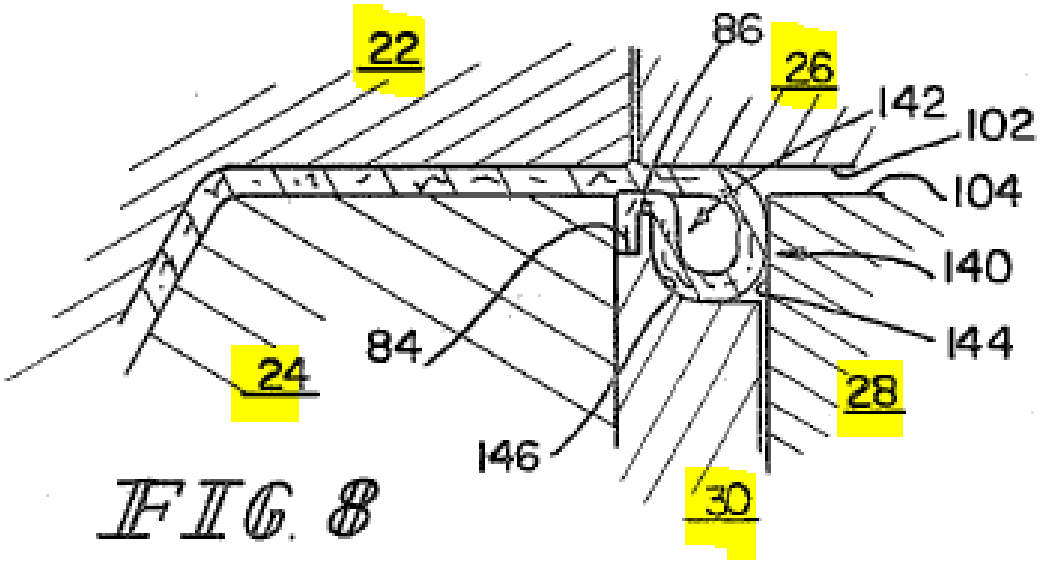
418. See my prior references to the "ram," "periphery of the opening," "body," "deflectable flange," and "extension," all of which are taught by Meadors as defined in the '222 Patent and illustrated in Patent Owner's First Amended Complaint in related litigation.

419. 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. Emphasis added. 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

Ningbo Linhua Plastic Ex. 1003, p. 351

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."

420. As noted earlier, Meadors discloses, "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. Emphasis added. Meadors Fig. 8 shows examples of die mechanism 20 members 22, 24, 26, 28, 30, highlighted here for reference:



Meadors, Fig. 8 (annotations added)

421. 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:

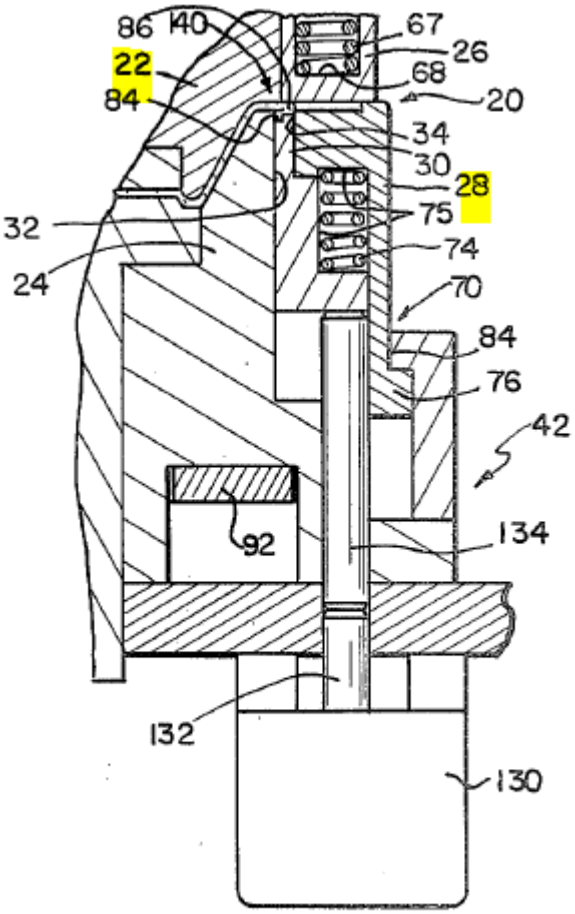
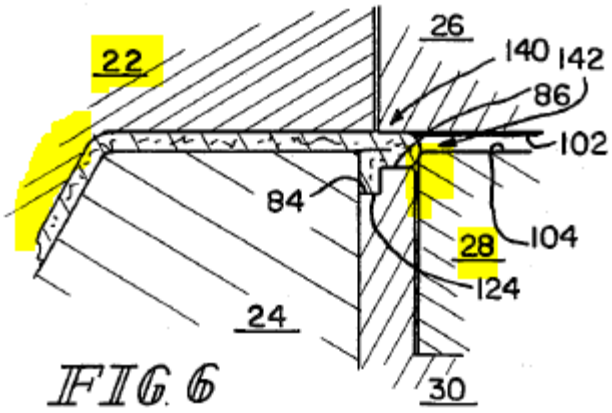


FIG. 5

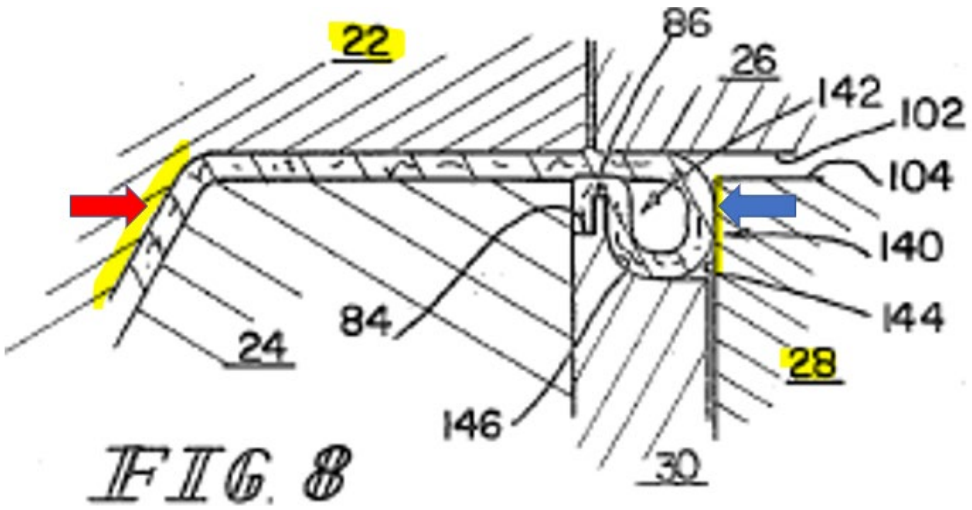
Ningbo Linhua Plastic Ex. 1003, p. 353



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

422. Meadors Fig. 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. Fig. 8 also discloses a ***plug*** (punch 22) ***inhibiting inward displacement of deflectable flange into the tray opening*** (red arrow below). Like all Meadors Figures (and as demonstrated previously above), Fig. 8 also shows the extension extends laterally in a plane about the periphery of the opening of a concave compartment in the body.

Ningbo Linhua Plastic Ex. 1003, p. 354



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.

423. 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. Emphasis added. Notably, Meadors explains that his 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.

13. **Claim 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."**

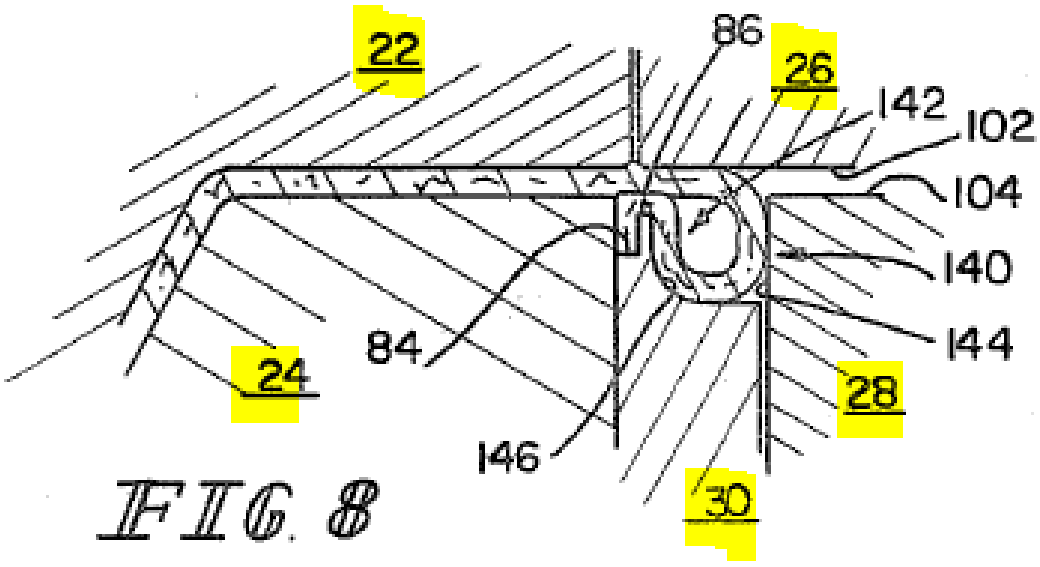
424. See Claim 1 references above, including claim element 1e., regarding Meadors' disclosure of a contoured ram impinging against the deflectable flange to deflect the peripheral edge away from the periphery of the shaped article, which for reference is illustrated in Figs. 3, 4 and 8, among other Figs., specifications, and claims, as noted earlier. My Claim 1 references are incorporated herein in their entirety.

425. As also noted previously, in describing his method and apparatus, Meadors states, "**The ring** [ring 30] i**ncludes 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." Emphasis added. 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."

426. Also as previously demonstrated, Meadors discloses a variety of bead 140 configurations using contoured rams, including those detailed in Figs. 5-10. However,

Ningbo Linhua Plastic Ex. 1003, p. 356

Meadors also teaches, "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. Emphasis added. Meadors Fig. 8 shows examples of die mechanism 20 members 22, 24, 26, 28, 30, highlighted here for reference.



Meadors, Fig. 8 (annotations added)

427. 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:**

Ningbo Linhua Plastic Ex. 1003, p. 357

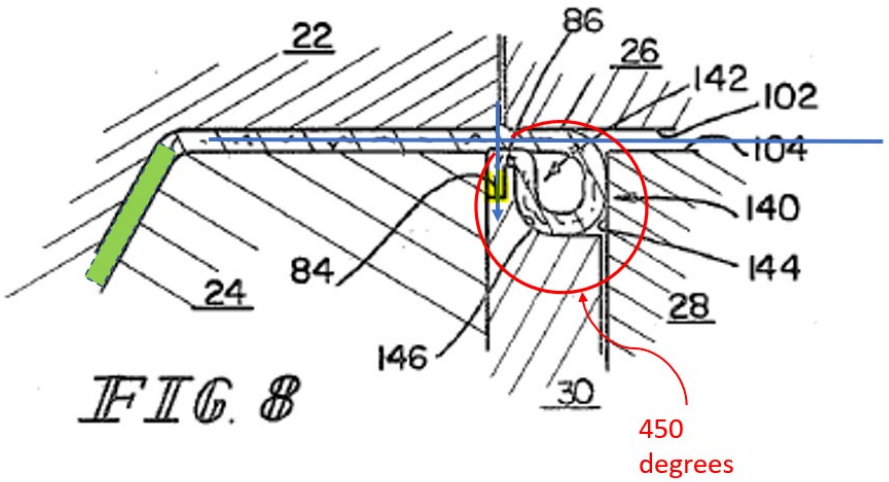
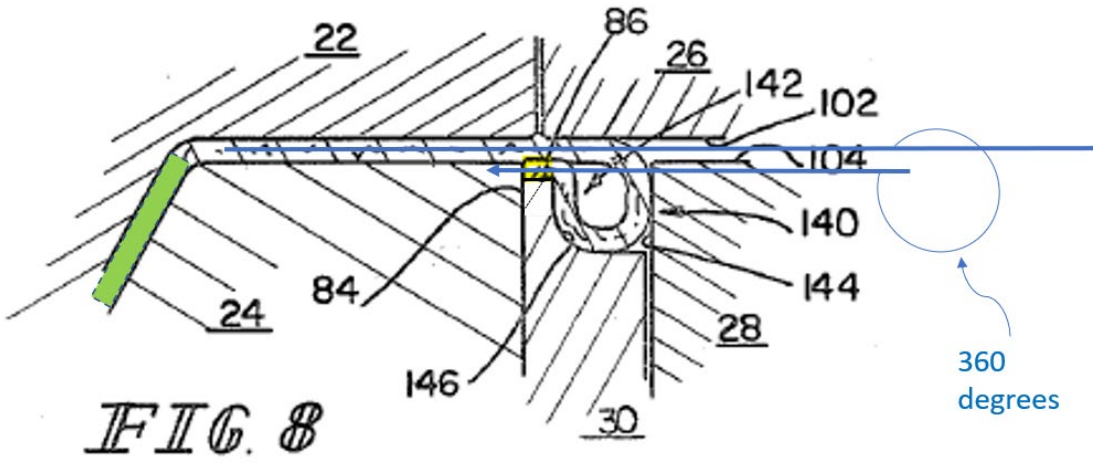


FIG. 8

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."

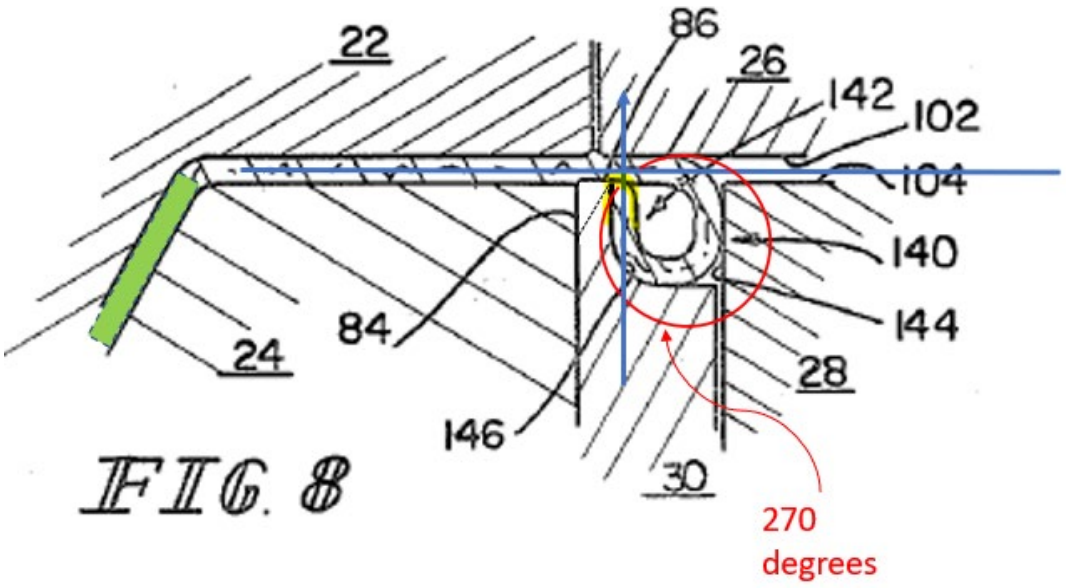
428. Also, as previously noted above regarding the similar claim 13 of the '222 Patent, Meadors teaches "…an upper face of the ram, the upper face having a contour that deflects inwardly toward the body, whereby greater impingement of the deflectable flange against the upper surface of the ram deflects 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." As previously demonstrated, based on 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 partial 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."

429. 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," as seen here:



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."

430. As also noted above, 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.** As discussed, among the various shapes of articles taught by Meadors, he 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 readily understand that *impinging the "ram 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," would help further ensure that the sharp peripheral edge was displaced out of the wrap path, regardless of thermoplastic article shape or depth.

431. For at least these reasons, Meadors teaches "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."

14. **Claim 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."**

432. See my prior references to the "ram," "impinging," and "spacer," all of which are taught by Meadors as defined in the '222 Patent and illustrated in Patent Owner's First Amended Complaint in related litigation.

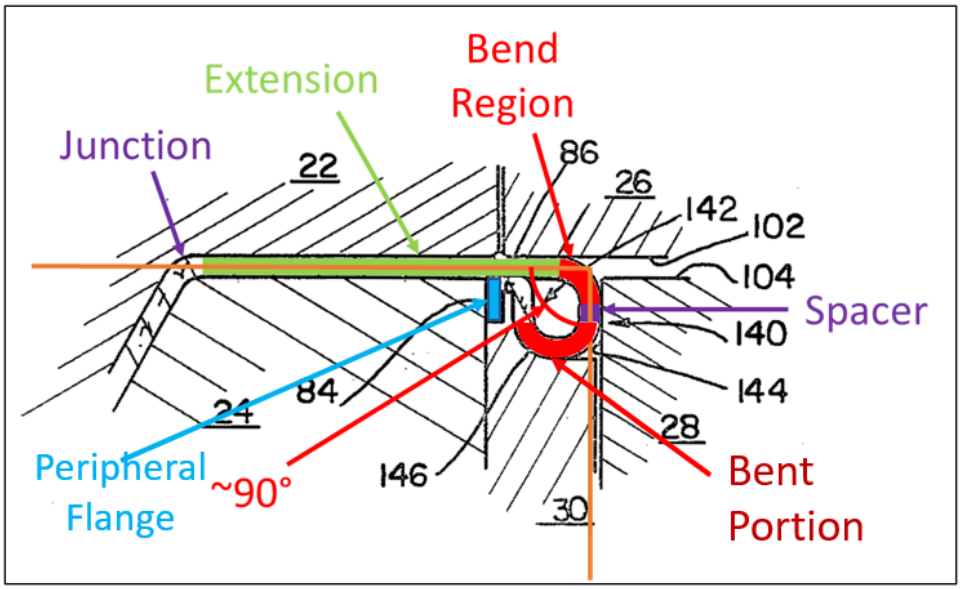
433. Meadors also teaches sequential portions of the spacer are softened by impinging the sequential portions against the ram in a plurality of discrete, incremental

advances. See Claim 1 references above, including claim 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. My Claim 1 references are incorporated herein in their entirety.

434. Also as previously demonstrated, Meadors discloses a variety of bead 140 configurations including those detailed in Figs. 5-10. However, Meadors also teaches, "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. Emphasis added. Meadors Fig. 8 shows examples of die mechanism 20 members 22, 24, 26, 28, 30, highlighted above regarding Claim 17 for reference.

435. As noted earlier, Meadors discloses a spacer, as shown in annotated Fig. 8 below:

Ningbo Linhua Plastic Ex. 1003, p. 362



Meadors, Fig. 8 (annotations added).

436. Meadors illustrates and explains that **draw pad 28** and associated components are positioned in a lower die base 42 (Id. 3:4-6), and urging the ram (draw pad 28) against the peripheral flange, including the spacer, causing displacement of the deflectable flange into the opening (Id. 2: 66, also Figs. 5, 6, 8), as shown below:

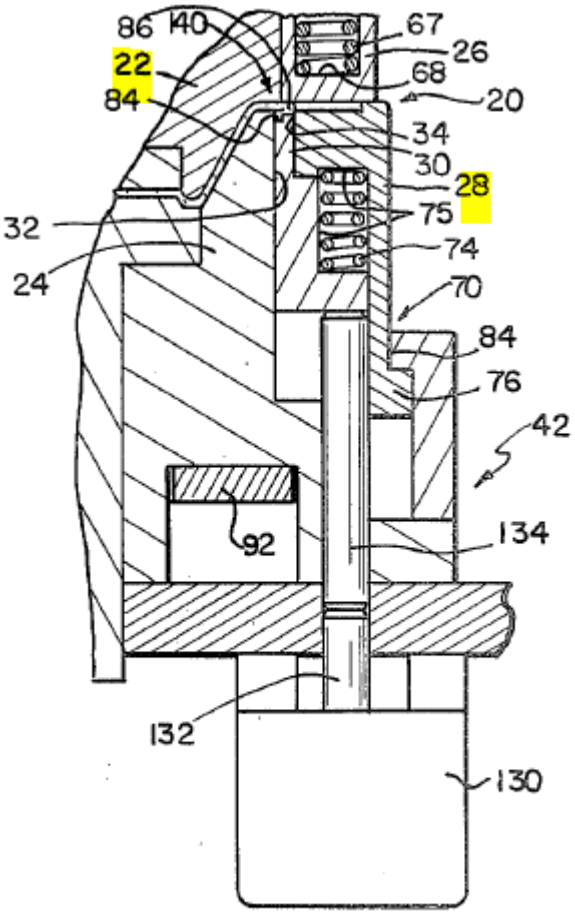


FIG. 5

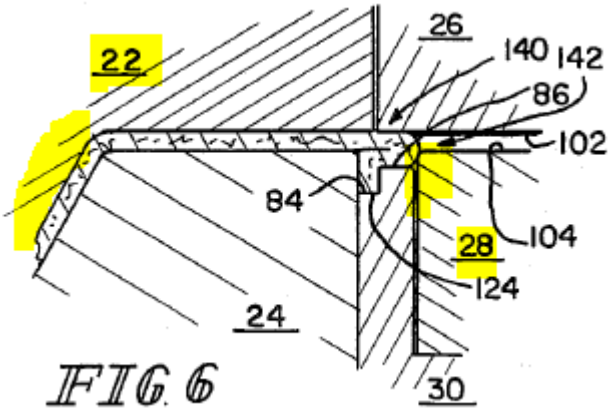
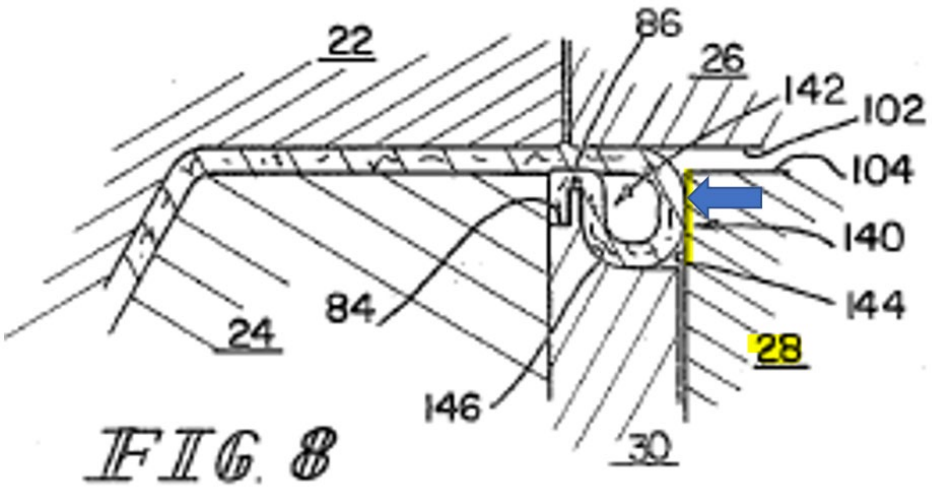


FIG. 6

Meadors, Figs. 5-6 (annotations added), showing ram (draw pad 28) urging the ram against the flange.

437. Meadors Fig. 8 illustrates the ram (draw pad 28) being urged against (blue arrow annotation below) the peripheral flange, including the spacer:



Meadors, Fig. 8 (annotations added), showing ram (draw pad 28) urging against the peripheral flange (blue arrow).

438. Furthermore, Meadors teaches the use of a plurality of discrete, incremental advances in his Figs. 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:

Ningbo Linhua Plastic Ex. 1003, p. 365

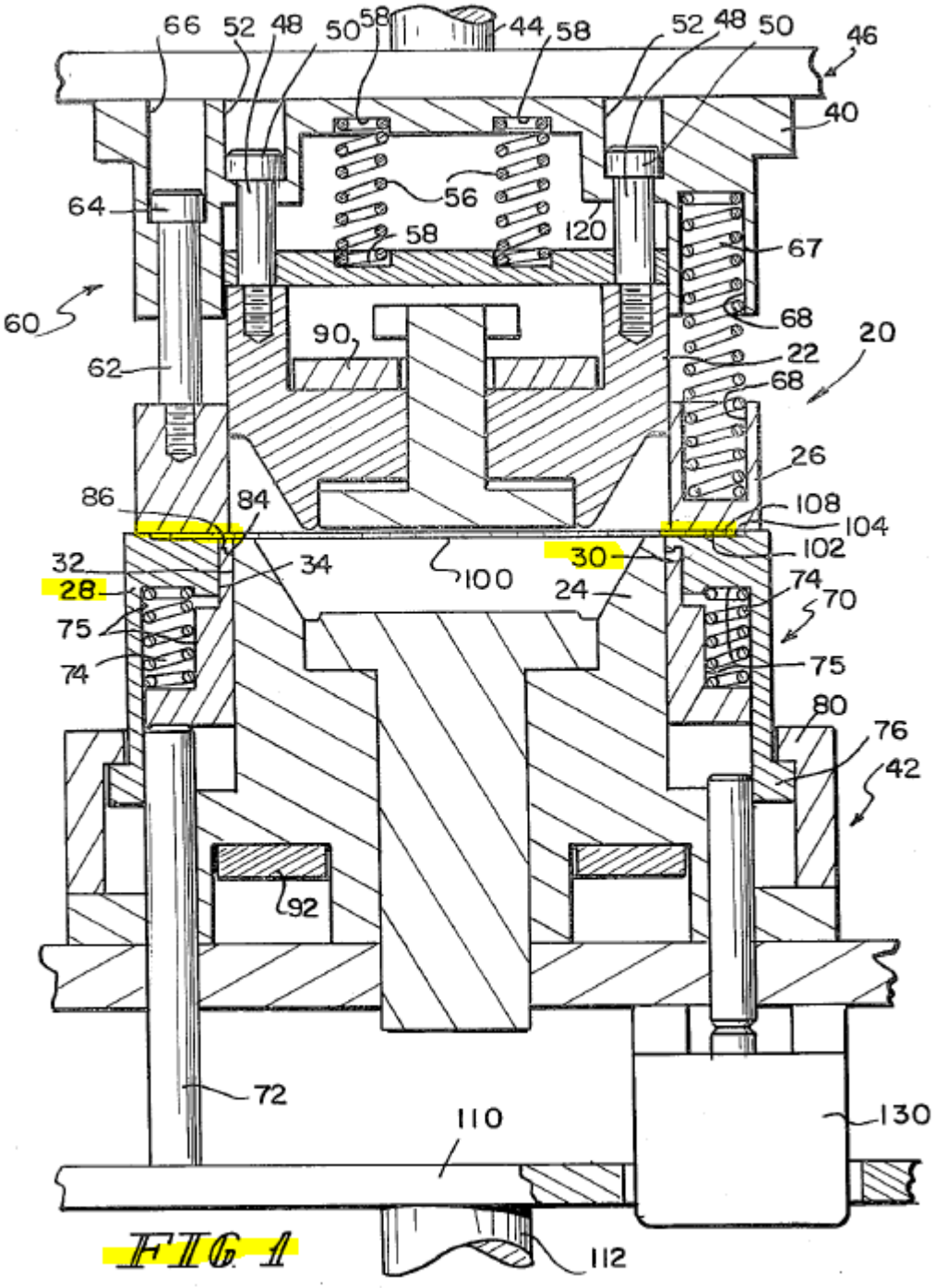

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FIG. 1

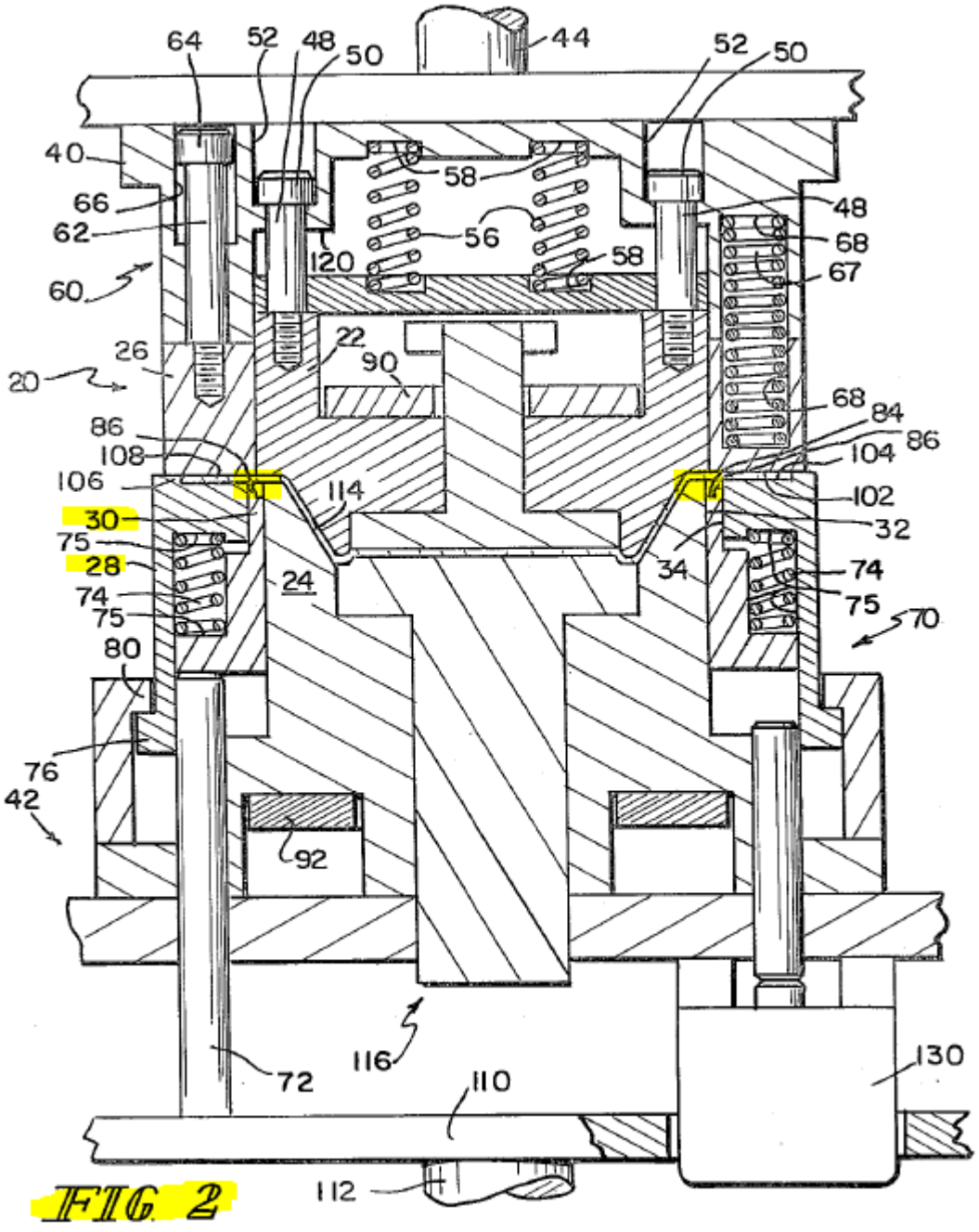
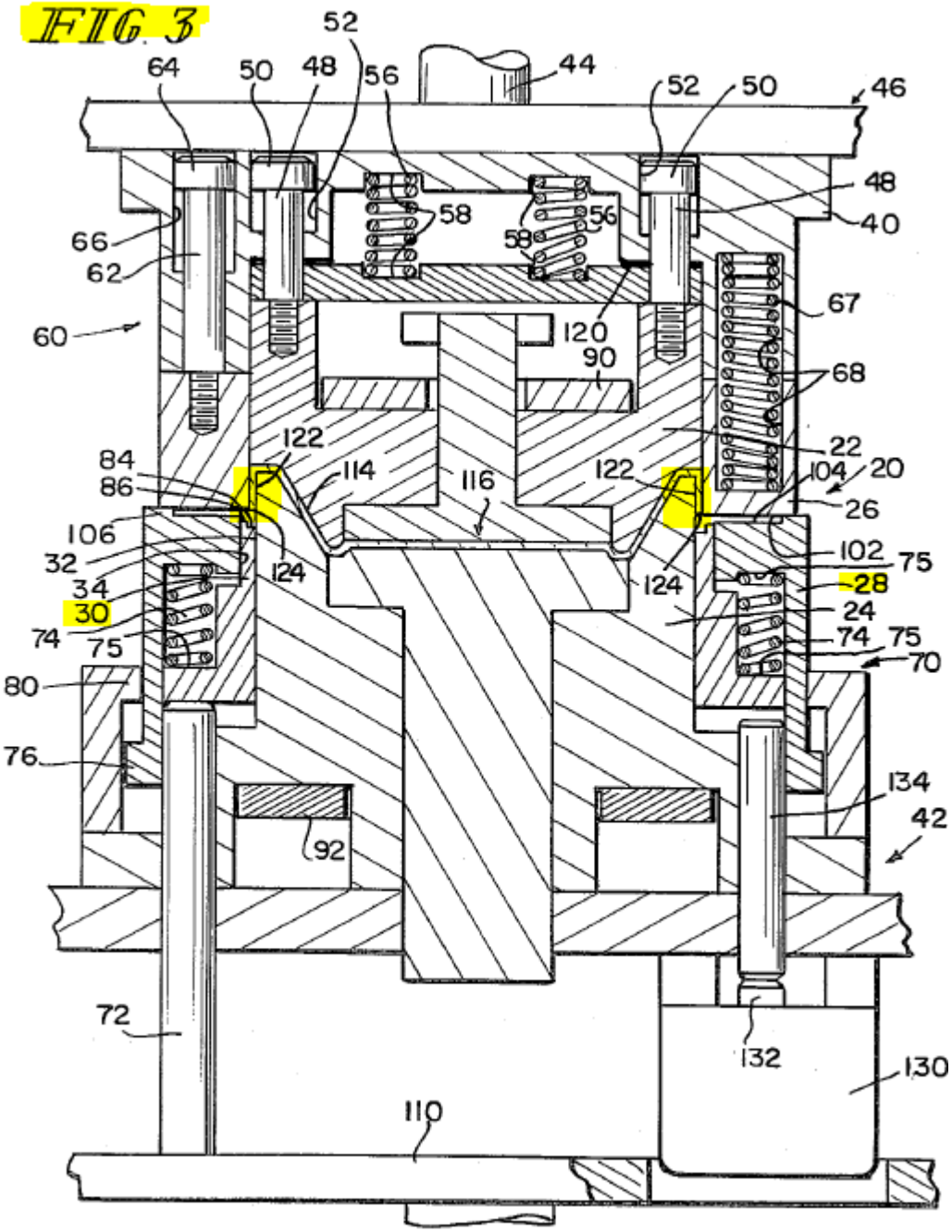
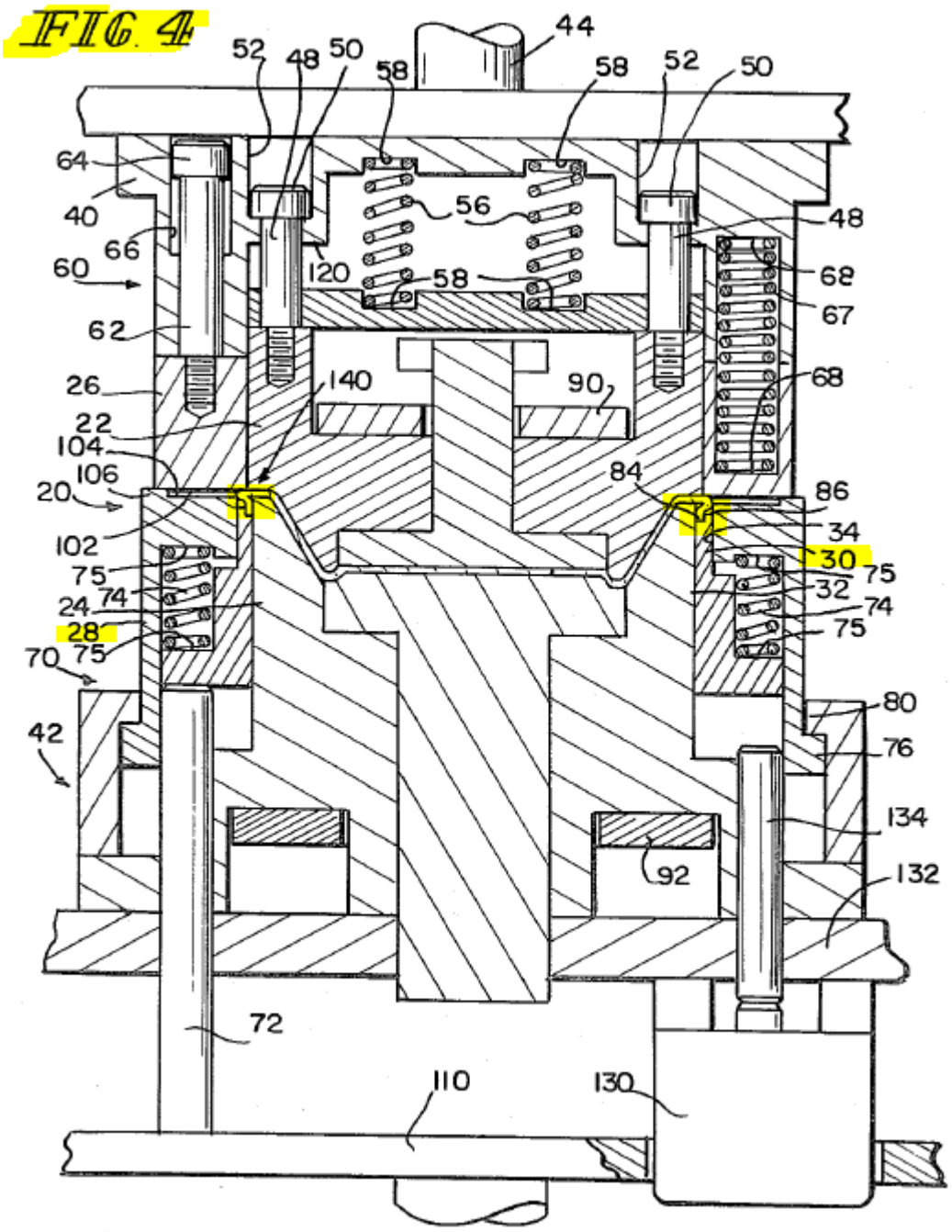


FIG 2

Ningbo Linhua Plastic Ex. 1003, p. 367



Ningbo Linhua Plastic Ex. 1003, p. 368



Meadors, Fig. 8 (annotations added), showing plurality of discrete, incremental advances of impinging ram.

Ningbo Linhua Plastic Ex. 1003, p. 369

439. In describing his Figs. 1-5, Meadors mentions a plurality of discrete, incremental advances. He states, "The invention may best be understood by referring to the following description and accompanying drawing which illustrate the invention. In the drawings:

> 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;"

Id. 2:33-52.

440. Meadors further describes the discrete, incremental advances of impinging ram in stating, "With particular reference to Figs. 3-4, the bead-forming step is begun. **Ring 30 beings its upward travel**… **The distal free edge 124 of article 116 is captured in groove 84** against radial deflection either outward or inward. **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.

441. Further speaking to his teachings regarding incremental advances of impinging ram, Meadors discloses, "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 the formation, and in the final configuration, of the multiple-thickness bead** 140." Id. 4:53-58. Emphasis added. Meadors explains, and a POSTIA would readily understand, that "the void" enabling "a wide range of control during the formation and in the final configuration" of the rolled flange configuration, is created by discrete, incremental advances of the impinging ram.

442. Furthermore, a POSITA would be very familiar with incremental 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 well understood to have a virtually infinite incremental advancement capability, and are extremely precise in their movement, meaning that "further impinging a ram against the peripheral flange" would be a routine matter and well within the capability of both a POSITA and their equipment. This is especially true when combined with the curved ram facings disclosed by the prior art.

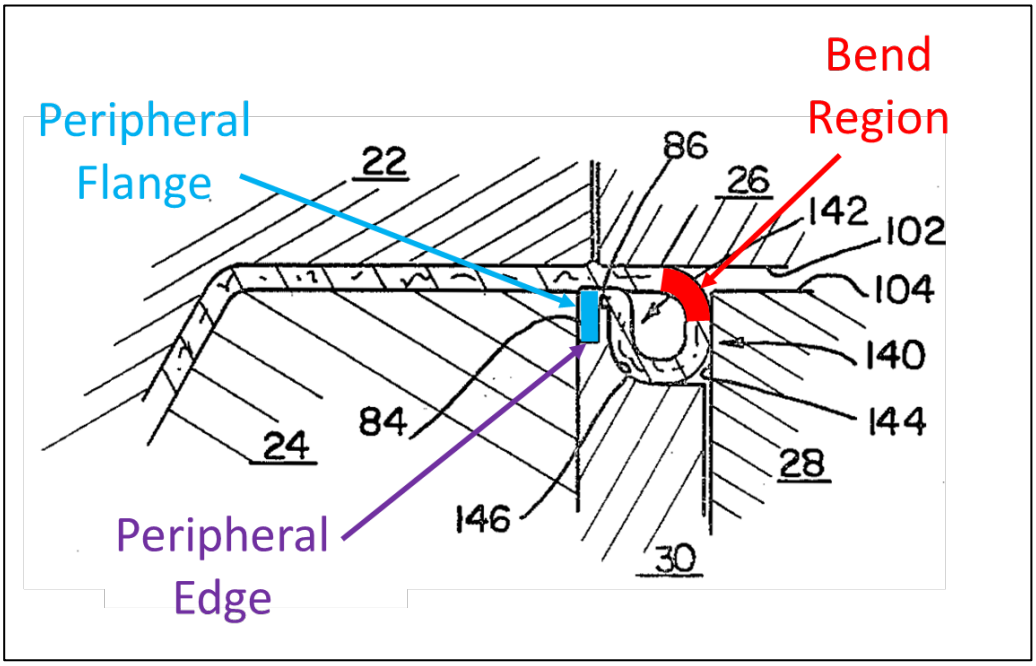
443. Through his Figures and corresponding descriptions, Meadors teaches sequential portions of the spacer are softened by impinging the sequential portions against the ram in a plurality of discrete, incremental advances.

Ningbo Linhua Plastic Ex. 1003, p. 371

15. **Claim 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."**

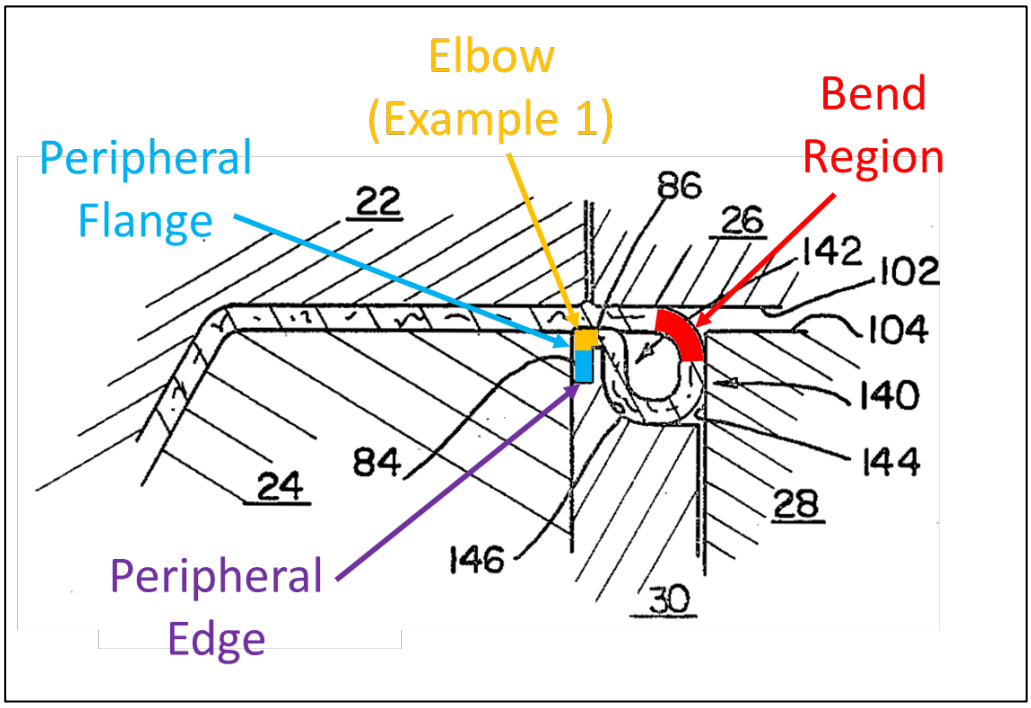
444. See my prior references to the "elbow," "peripheral flange," and "spacer," all of which are taught by Meadors as defined in the '222 Patent and illustrated in Patent Owner's First Amended Complaint in related litigation.

445. As also noted previously, including but not limited to my references in Claim 1d., Meadors teaches the elbow connects the peripheral flange to the spacer. Specifically, Meadors's tray includes a spacer that is connected with a peripheral flange which bears a peripheral edge of the thermoplastic. The "peripheral flange" limitation is met by the vertical segment slightly to the right of center in Fig. 8, where the extension ends at the peripheral edge of the thermoplastic:



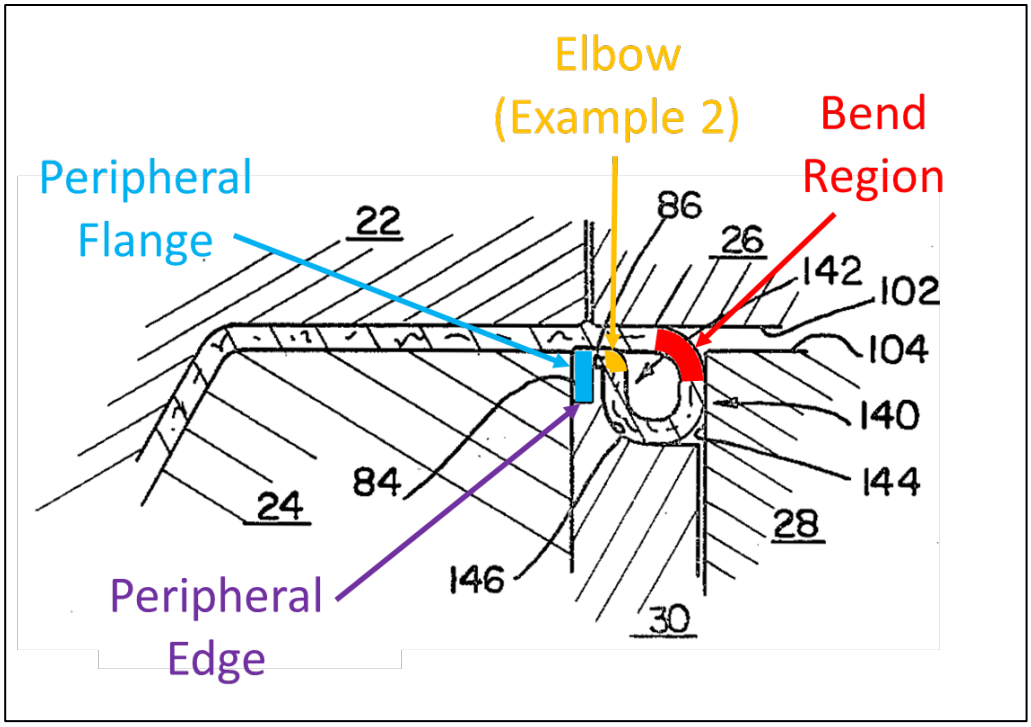
Meadors, Fig. 8 (annotations added).

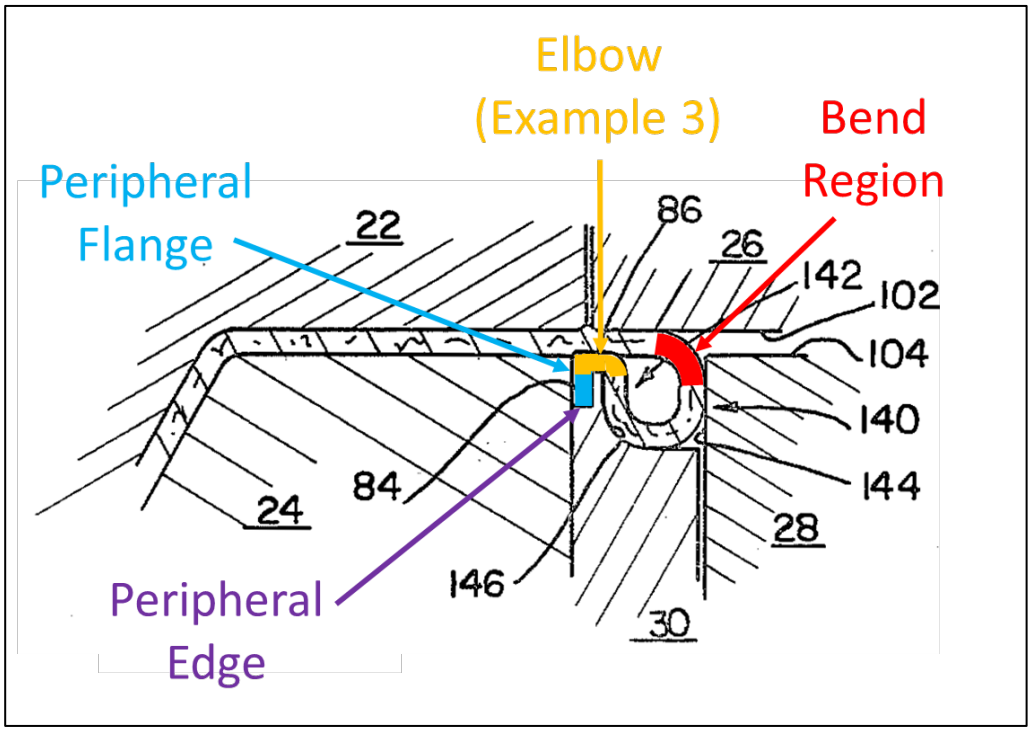
446. The peripheral flange of Meadors's tray is connected to the bend region by an elbow. For example, the sharp bend immediately adjacent to the peripheral flange is an "elbow":



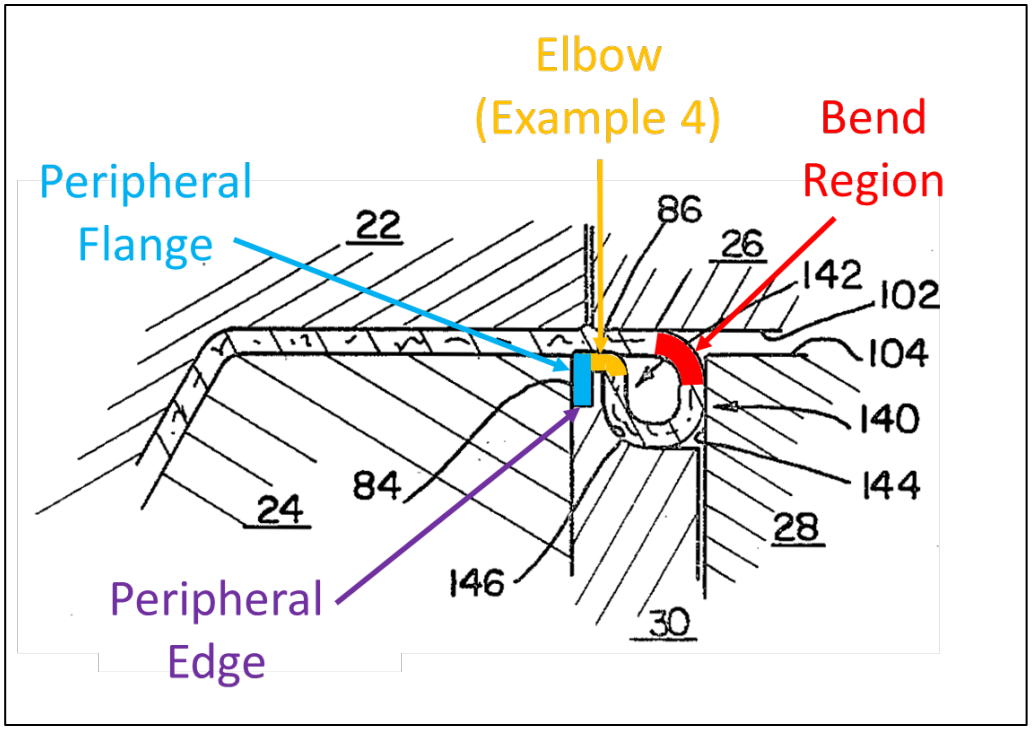
Meadors, Fig. 8 (annotations added).

447. Furthermore, 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:



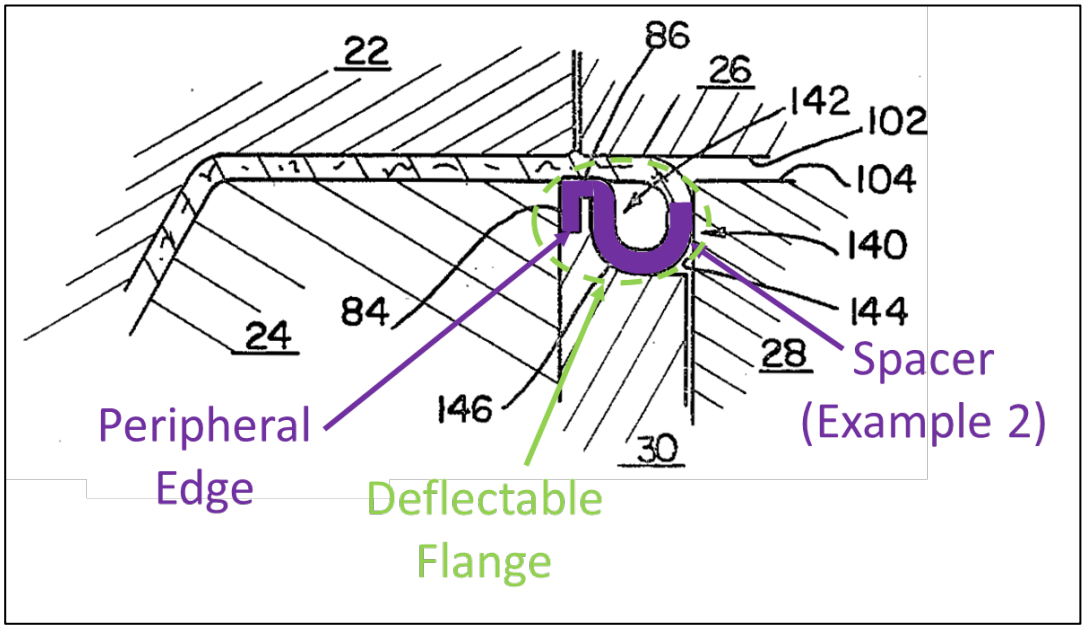


Ningbo Linhua Plastic Ex. 1003, p. 374



Meadors, Fig. 8 (annotations added), 3 examples above.

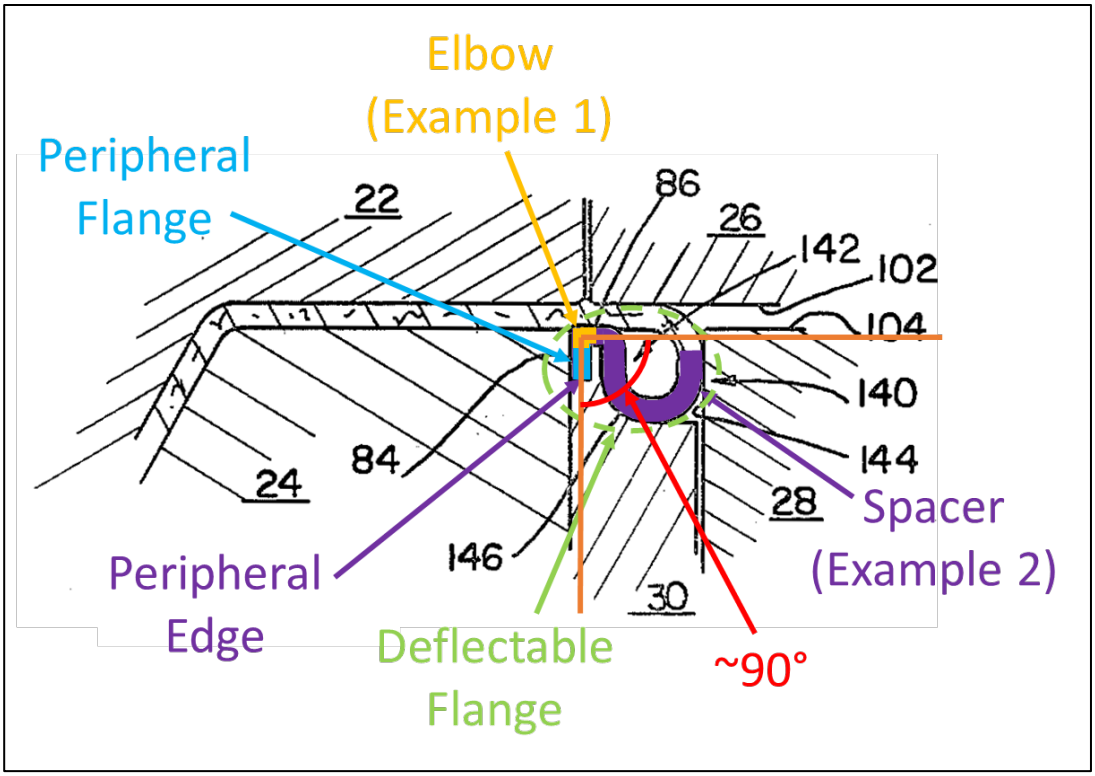
448. Meadors Fig. 8 also shows that the **spacer** can include the remainder of the extension from that straight segment to the peripheral edge:

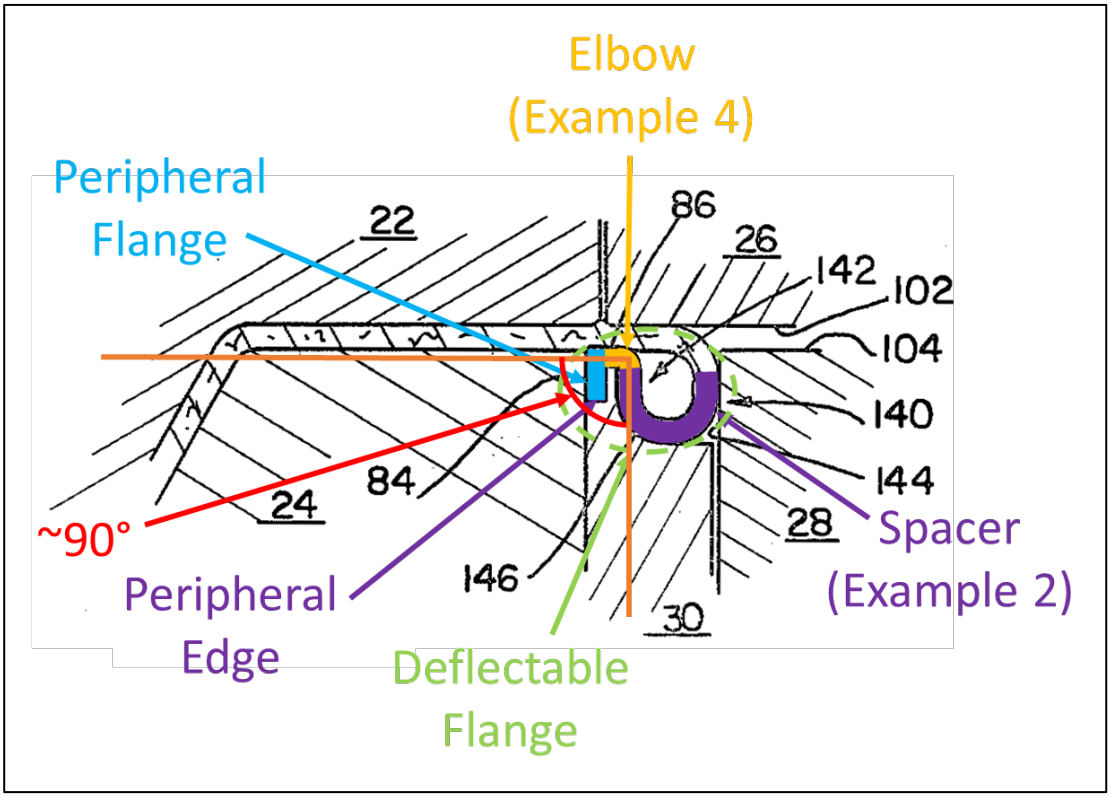


Meadors, Fig. 8 (annotations added), showing spacer example 2, which includes peripheral edge.

449. In the Spacer Example 2 directly above, the peripheral flange and the elbow are inclusive of the spacer. In other words, the spacer in Meadors's 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, among other things: (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:

Ningbo Linhua Plastic Ex. 1003, p. 376





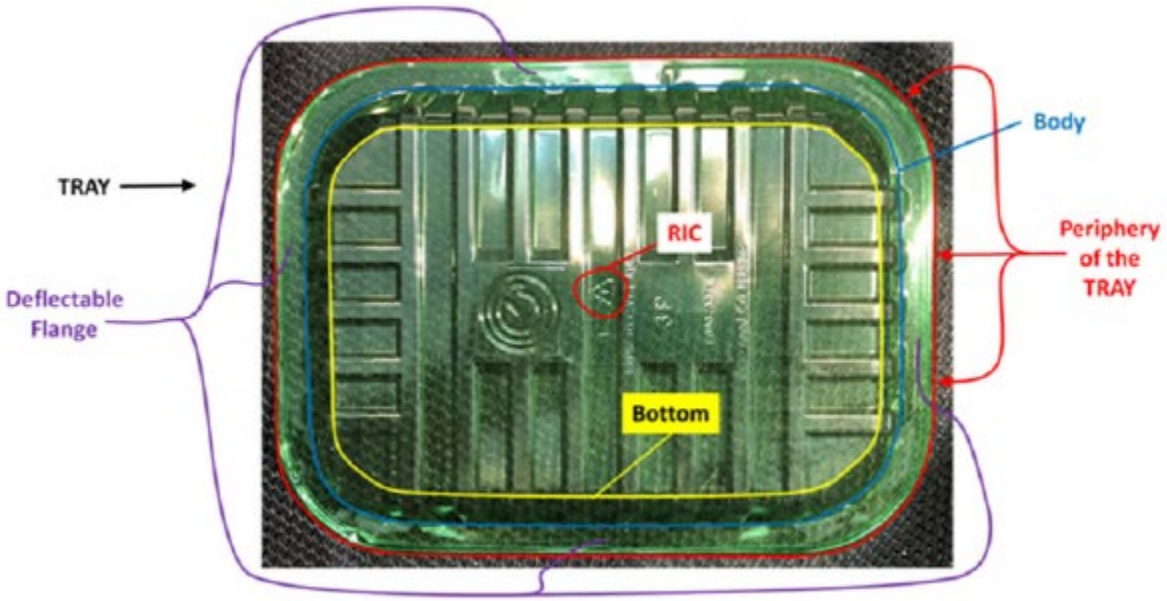
Meadors, Fig. 8 (annotations added).

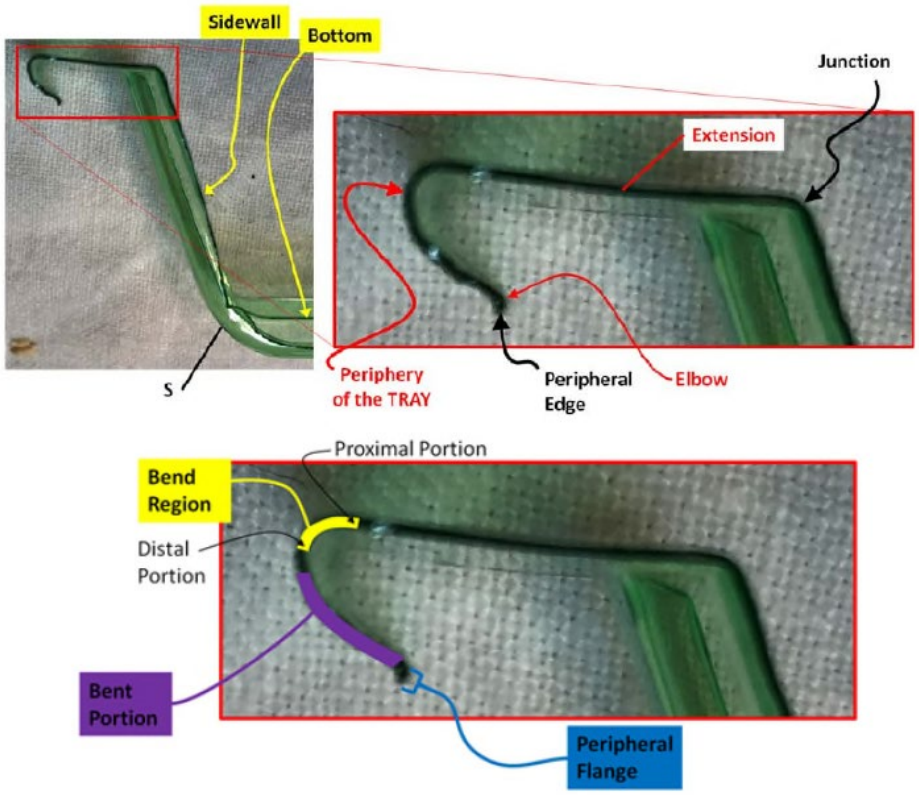
450. In each of Elbow Example 1 and 4 above, the elbow has a 90-degree bend, which is between 60 to 120 degrees. Thus, Meadors teaches the elbow connects the peripheral flange to the spacer at an angle of from 60 to 120 degrees.

i. <u>Claim 21:</u>

a. **<u>Preamble: "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…"</u>**

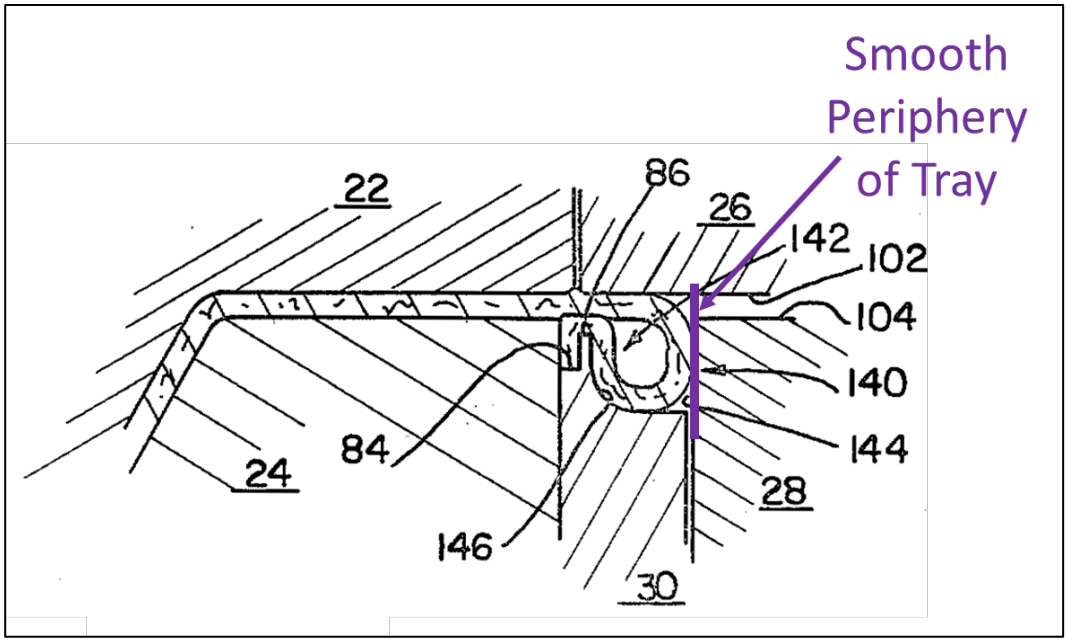
451. The Patent Owner applied the terms "peripheral edge" and "periphery" to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in litigation related to the '222 Patent:





Ex. 1007, p. 8

452. 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. As previously noted, Meadors describes at least the rams (ring 30 and draw pad 28) forming the deflectable flange by deflecting the peripheral edge to a position which, for example in Fig. 8, shows a smooth periphery. 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, i.e. the tray has a smooth periphery:

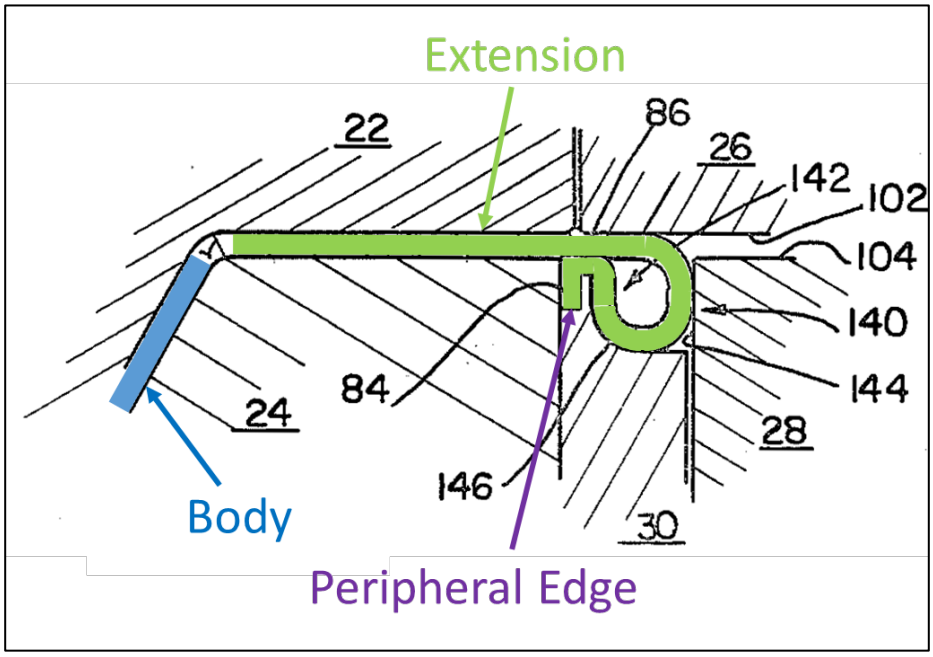


Meadors, Fig. 8 (annotations added).

453. As noted earlier, Meadors describes using thermoplastic materials for his article, as it is made entirely of plastic (or, for some embodiments, paper). Meadors, Abstract ("container or lid constructed from ***paper stock***"), 1:5-9 ("This invention relates to methods of, and apparatus for, forming a multiple-thickness bead in a sheet or blank of a flexible material, such as ***thermoplastic material or paper stock***, as the sheet or blank is being formed into an article such as a container or lid for a container"), 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.") (emphasis added). He 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.

454. 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**." 6:24-26 (emphasis added), Figs. 1-4, 8.

455. Meadors Fig. 8 discloses the extension, highlighted in green below, i.e. the horizontal portion extending to the right of the body/sidewall; the rolled-over shape that continues from the horizontal portion and bends down, left, and up; and the inflected portion that continues from the rolled-over shape and bends left and down, ending in the peripheral edge:



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

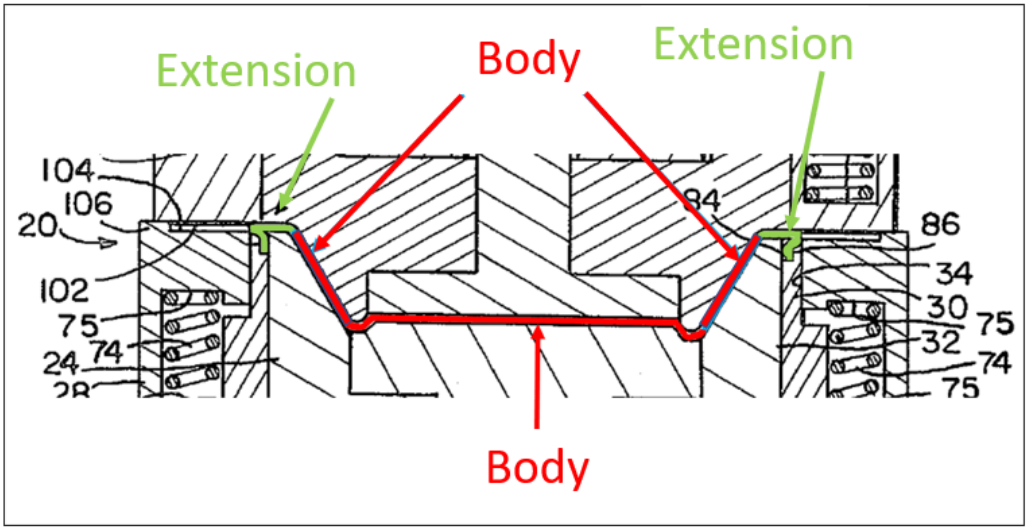
b. **Element 21a: "forming a deflectable flange about the peripheral edge of the article,"**

456. As noted previously, the Patent Owner applied the terms "deflectable flange" and "peripheral edge" to Petitioner's article ("Model E090733TE Accused Product") in their First Amended Complaint in litigation related to the '222 Patent, and Meadors teaches those same elements.

457. Also as explained above, Meadors describes "The apparatus of the present invention includes opposed first and second cooperating dies for holding a central region of the blank, a ring, and opposed first and second draw pads movable axially with respect to the first and second dies. The draw pads cooperatively capture **the perimetral edge of the blank surrounding the central region** and a distal end axially spaced from the proximal end." Id. 2:14-24. Emphasis added. Meadors reference to the "perimetral edge of the blank surrounding the central region" is understood to mean "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."

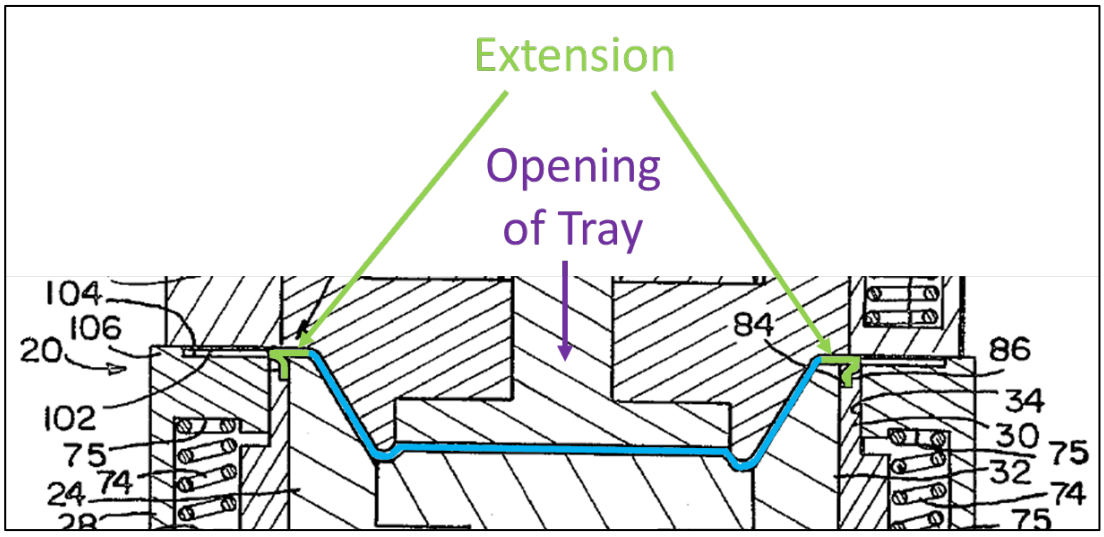
458. The shape of Meadors's container can be a rounded rectangular tray with deflectable flange about the entire periphery of the opening, i.e. "perimetrally extending ring 30" and "double-thickness bead or rim 140." See further references and cites noted above.

459. 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 formed about its periphery:



Meadors, Fig. 4 (excerpted, annotations added).

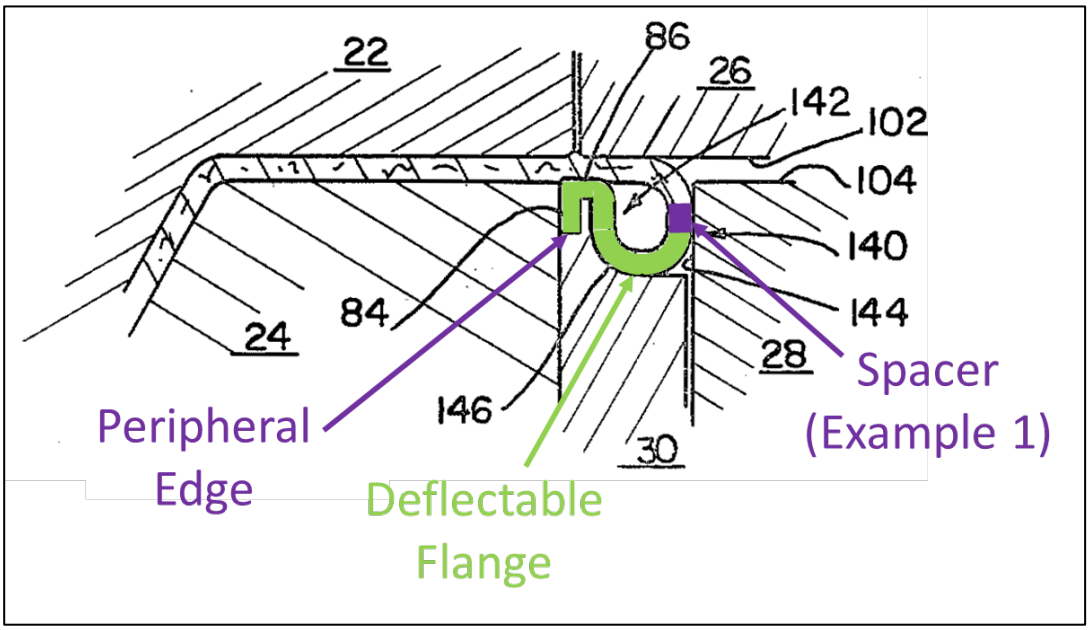
460. A POSITA would interpret the cross-sectional side view of Meadors's tray in Fig. 4 as indicating the article having a deflectable flange about the entire periphery of the opening:



Ningbo Linhua Plastic Ex. 1003, p. 383

Meadors, Fig. 4 (excerpted, annotations added).

461. The extension of Meadors's 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:



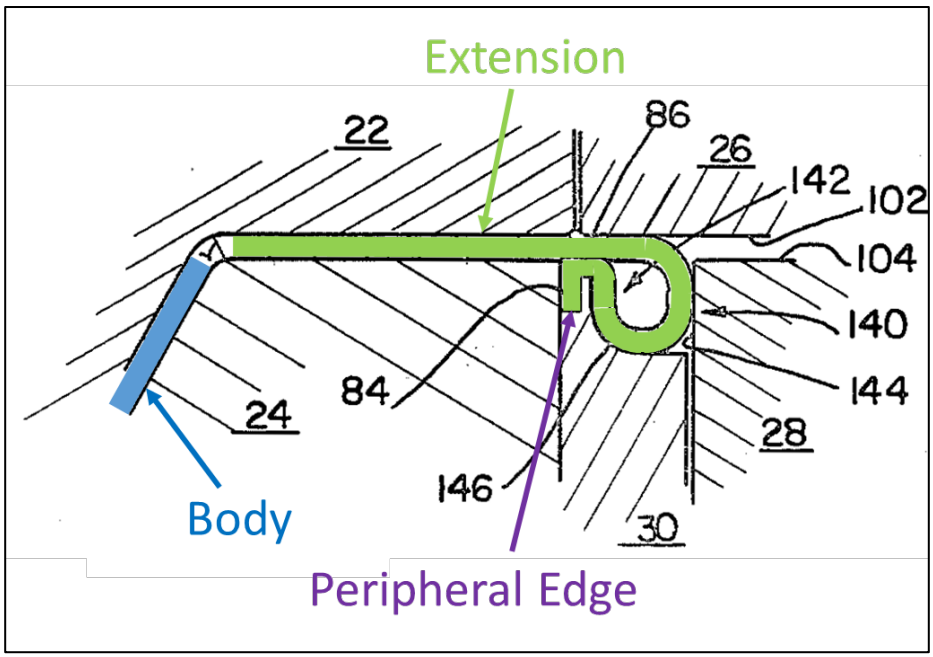
Meadors, Fig. 8 (annotations added).

462. Therefore, Meadors teaches "forming a deflectable flange about the peripheral edge of the article."

c. **Element 21b: "the deflectable flange comprising an extension that extends peripherally away from the body and connects thereto"**

463. See my prior references to "deflectable flange," "extension," and "body" all of which are taught by Meadors as defined in the '222 Patent and illustrated in Patent Owner's First Amended Complaint in related litigation.

464. As previously noted regarding Element 1b., Meadors's tray has an extension extending peripherally away from the body and connected to 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; the rolled-over shape that continues from the horizontal portion and bends down, left, and up; and the inflected portion that continues from the rolled-over shape and bends left and down, ending in the peripheral edge:



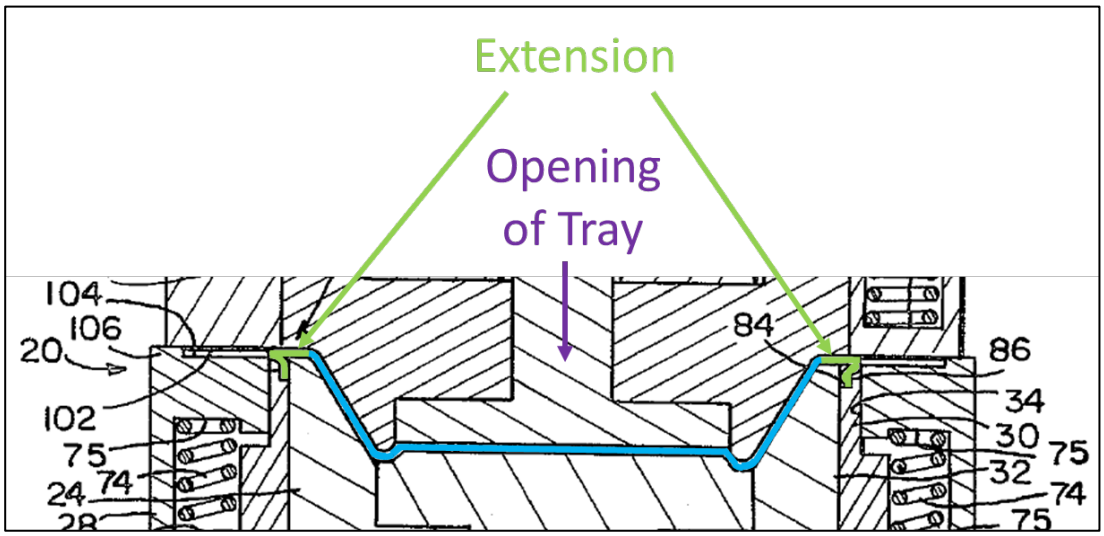
Meadors, Fig. 8 (annotations added); *see also id.* Figs. 1, 2 (illustrating forming of thermoform "blank" with extension; extension is referred to as the "perimetral portion 108" or "perimetral region 108" of "blank 100"), 3:53 ("perimetral portion 108 of blank 100"), 4:4-18 (describing initial forming step in which "perimetral region 108 of blank 100" is restrained by pressure from draw pads 26 and 28).

465. Meadors describes his apparatus as, "The apparatus of the present invention includes opposed first and second cooperating dies for holding a central

Ningbo Linhua Plastic Ex. 1003, p. 385

region of the blank, a ring, and opposed first and second draw pads movable axially with respect to the first and second dies. The draw pads cooperatively capture **the perimetral edge of the blank surrounding the central region** and a distal end axially spaced from the proximal end." Id. 2:14-24. Emphasis added. Meadors reference to the "perimetral edge of the blank surrounding the central region" constitutes "an extension that extends peripherally away from the body and connects thereto," i.e. surrounding his thermoplastic article.

466. Furthermore, A POSITA would interpret the cross-sectional side view of Meadors's tray in Fig. 4 as indicating the deflectable flange of the tray comprising the extension which extends peripherally away from the body and connects thereto:

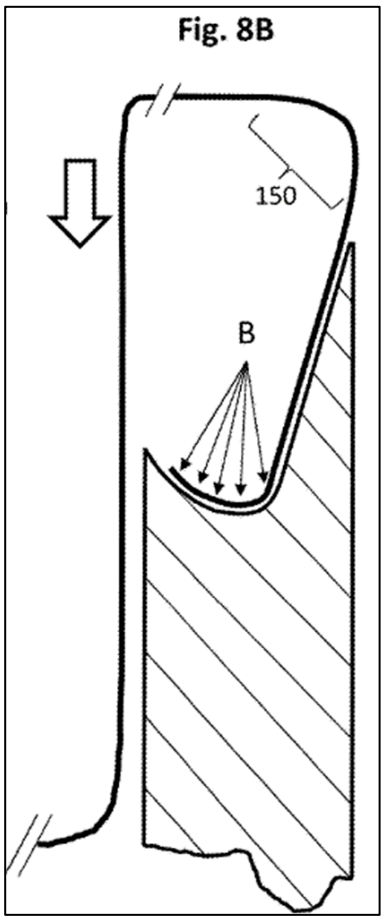


Meadors, Fig. 4 (excerpted, annotations added).

d. **Element 21c: "a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer that is connected with**

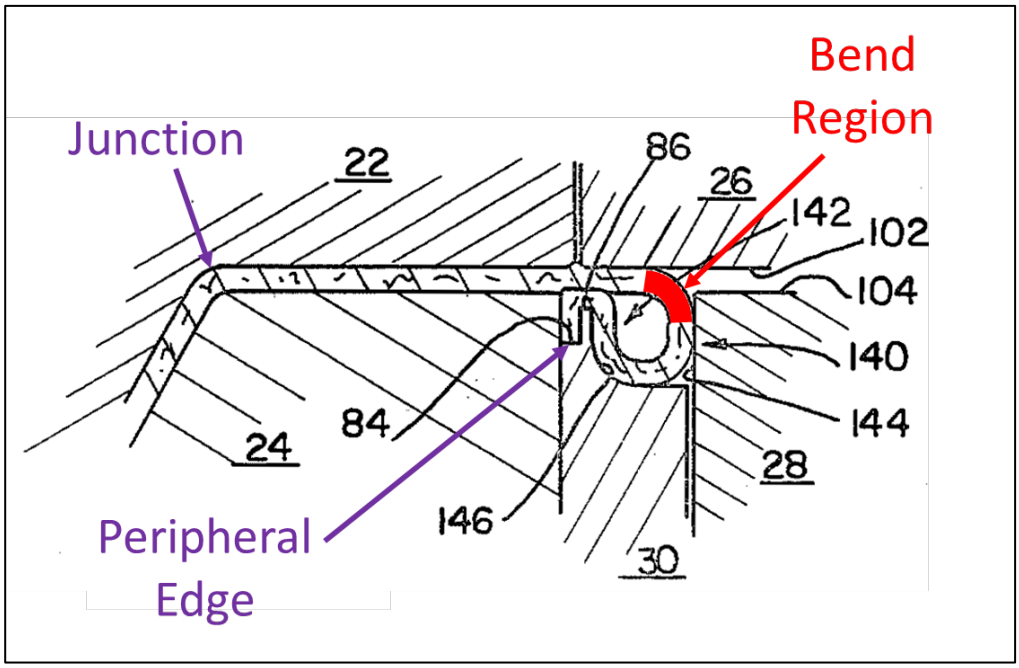
467. See my prior references to "bend region," "extension," and "spacer" all of which are taught by Meadors as defined in the '222 Patent and/or illustrated in Patent Owner's First Amended Complaint in related litigation.

468. As previously noted regarding Claim element 1c., Fig. 8B of the '222 Patent illustrates the "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:



See Ex. 1001, 26:63-27:26, Fig. 8B.

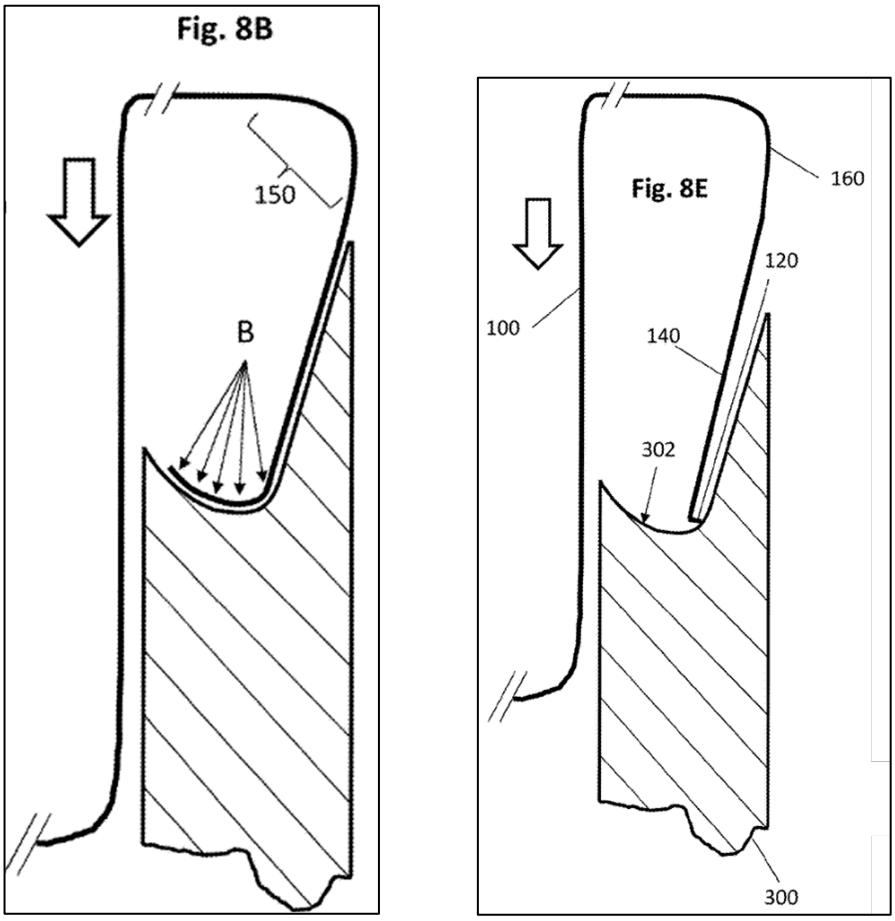
469. Similarly, the extension in Meadors's tray includes a bend region, which is the first curved portion of the deflectable flange, starting at the end of the straight segment that adjoins the body of the tray at the junction between the body and the extension. Meadors bend region has a smooth contour and interconnects the extension. For example, the upper right portion of the rolled-over, curved shape on the right side of Fig. 8 comprises a bend region:



Meadors, Fig. 8 (annotations added).

470. Further, Fig. 8E of the '222 Patent illustrates the "spacer 140" as comprising the straight segment immediately below the curved bend region in the upper right of the drawing. As discussed in the previous section, the bend region is

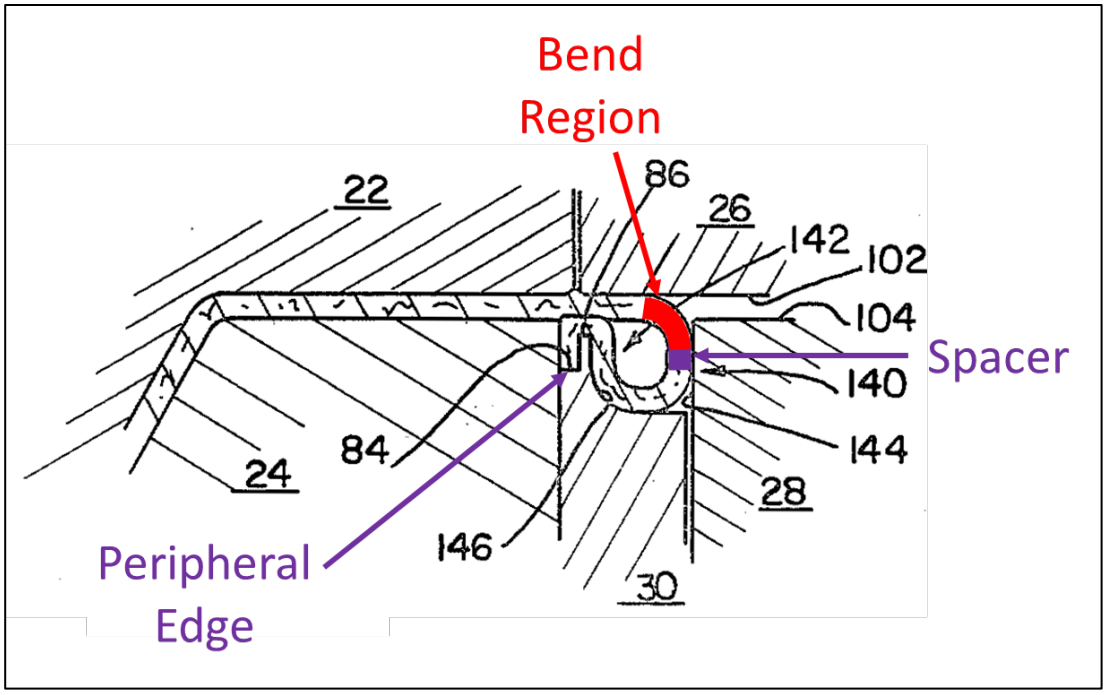
labeled 150 in Fig. 8B; it is present but unlabeled in Fig. 8E ("160" denotes the whole deflectable flange, Ex. 1001, 9:16-18):



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

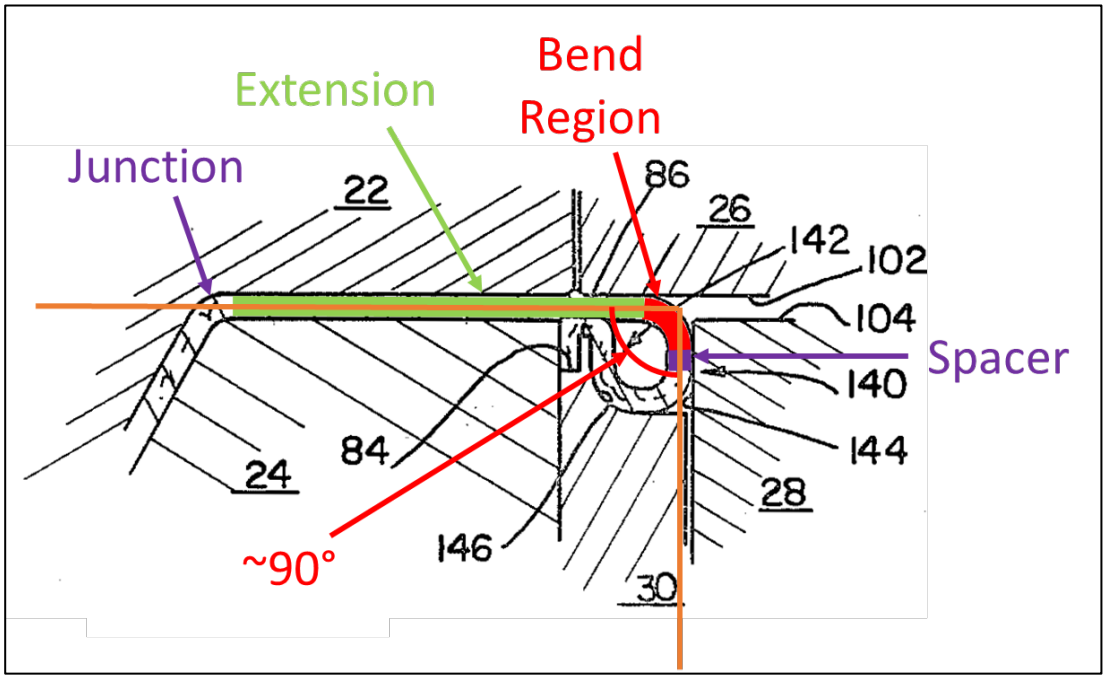
471. Similarly, the extension in Meadors's tray includes a spacer interposed between the peripheral edge and the bend region. For example, the straight, vertical portion of the rolled-over shape on the right side of Fig. 8 comprises a spacer:

Ningbo Linhua Plastic Ex. 1003, p. 389



Meadors, Fig. 8 (annotations added).

472. As previously detailed, I measured the angle between Meadors' extension and spacer elements and determined the angle to be 90 degrees:



Meadors, Fig. 8 (annotations added).

473. Therefore, Meadors' teaches a bend region having a smooth contour and interconnecting the extension, at an approximately right angle, with a spacer.

e. **Element 21d: "[a spacer that is connected with] 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;"**

474. See Claim element 1d. above regarding Meadors' disclosure of "[a spacer that is connected with] a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peripheral flange being connected… at an elbow."

475. In short, Meadors's tray also includes a spacer that is connected with a peripheral flange which bears a peripheral edge of the thermoplastic. The "peripheral flange" limitation is met by the vertical segment slightly to the right of center in Fig. 8, where the extension ends at the peripheral edge of the thermoplastic (see Meadors, Fig. 8 in Claim element 1d. above).

476. The peripheral flange of Meadors's tray is connected to the bend region by an elbow. For example, the sharp bend immediately adjacent to the peripheral flange is an "elbow" (see Meadors, Fig. 8 in Claim element 1d. above).

477. Furthermore, 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. (See Meadors, Fig. 8 (annotations added), 3 examples in Claim element 1d. above):

478. Other examples of an elbow taught by Meadors are shown in Claim element 1d. above. In at least one example, Meadors teaches a spacer that is connected with a peripheral flange which bears a peripheral edge of the thermoplastic, the spacer and peripheral flange being connected at an elbow.

479. As another example, the **spacer** can additionally include the remainder of the extension from that straight segment to the peripheral edge (see applicable annotated Fig. 8 in Claim element 1d. above).

480. In such an example, the peripheral flange and the elbow are inclusive of the spacer. In other words, the spacer in Meadors's 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, among other things: (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, —the corner slightly to the right of the peripheral flange,—or the horizontal segment directly touching the peripheral flange plus the corner directly to the right of that segment. (see examples in Claim element 1d. above).

Ningbo Linhua Plastic Ex. 1003, p. 392

481. In each example directly above, 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.

f. **Element 21e: "impinging a ram against the peripheral flange to deflect the spacer towards 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,"**

482. See Ground 2 Claim element 1e. above for explanation of Meadors' teaching of impinging a ram against the peripheral flange to deflect the spacer towards 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.

g. **Element 21f: "the bent portion being selected from the group consisting of the extension, the bend region, and the spacer,"**

483. See Ground 2 Claim element 1f. above for explanation of Meadors' teaching of the bent portion being selected from the group consisting of the extension, the bend region, and the spacer.

h. **Element 21g: "*heating the bent portion* to at least the glass transition temperature of the thermoplastic;"**

484. See Ground 2 Claim element 1g. above for explanation of Meadors' teaching of heating the bent portion to at least the glass transition temperature of the

thermoplastic;

i. **Element 21h: "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…"**

485. See Ground 2 Claim element 1h. above for explanation of Meadors' teaching of "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."

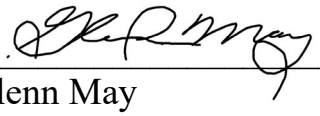
j. **Element 21i: "cooling the bent portion below the glass transition temperature, whereby the bent portion remains deflected from its pre-impingement position even upon discontinuation of the impingement; and disengaging the ram from the deflectable flange to yield the article with a smooth periphery."**

486. See Ground 2 Claim element 1i. above for explanation of Meadors' teaching of 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.

487. In sum, Meadors teachings render obvious the '222 patent Claims 1-21, considering Meadors disclosures regarding method, apparatus, and materials, the skill and knowledge of a POSITA, and the Patent Owner's own interpretation of Claims 1-21 elements indicated above.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 12, 2024

By: 
Glenn May

Ningbo Linhua Plastic Ex. 1003, p. 395