

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MPL BRANDS NV, INC.
Petitioner

v.

BUZZBALLZ, LLC,
Patent Owner

IPR2024-01098

U.S. Patent 11,738,904

**DECLARATION OF FOLKERS EDUARDO ROJAS, PH.D. IN
SUPPORT OF PATENT OWNER PRELIMINARY RESPONSE**

Declaration of Folkers Rojas, Ph.D. in Support of Patent Owner Preliminary
Response in *Inter Partes* Review of U.S. Patent No. 11,738,904

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I. INTRODUCTION

1. My current Curriculum Vitae is attached as **Appendix A**. I have summarized my educational and professional background below.

2. I earned four degrees from the Massachusetts Institute of Technology. Bachelors in Mechanical Engineering, Bachelor's in Nuclear Science and Engineering, Master's in Mechanical Engineering, and my PhD in Mechanical Engineering in the Precision Engineering Research Group (PERG). I am the founder of Millie Rojas Engineering Corporation, which was founded in April 2021. I am a licensed professional engineer in Texas and New Hampshire.

II. FEES AND EXPERT TESTIMONY

3. I have been retained by Haynes and Boone, LLP, counsel for BuzzBallz, LLC ("BuzzBallz"), as an expert witness in this matter to provide analysis related to United States Patent No. 11,738,904 (referred to as the '904 patent).

4. The fee for my services in this case is my standard hourly rate, plus expenses. The analysis I give in this case is in no way affected by my compensation. My compensation is not affected by the content of this analysis, the opinion expressed herein, or the outcome of this case. I have no vested interest, financial or otherwise, in the outcome of the current case.

III. MATERIALS CONSIDERED

5. In reaching my conclusions outlined in this report, I have relied upon my education, background, and experience as well as the engineering analysis I performed based on the material for this case. Specifically, I have reviewed and considered the following:

- The original specification, drawings, and claims of U.S. Patent Application No. 12/762,934 (“the Original ’934 Application”) originally filed on April 19, 2010 (**Appendix B**);
- The updated specification, drawings, and claims of U.S. Patent Application No. 12/762,934 (“the Updated ’934 Application”) filed on June 1, 2010 (**Appendix C**);
- Serope Kalpakjian and Steven R. Schmid. Manufacturing, Engineering and Technology. Pearson Prentice Hall. 2006. 5th Ed. pg 552-554 and pg. 1101 to 1102 (**Appendix D**);
- The file history of the ’904 patent (EX1003);
- The Petition filed by Petitioner on July 27, 2024;
- The Declaration of Dr. Nathan J. Delson in support of the Petition (EX1002);
- German Patent Publication DE102004046423 A1 (“Ackermann”);
- U.S. Patent No. 4,465,204 (“Kaminski”); and

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- U.S. Patent Publication 2008/0044603 A1 (“Hutchinson”).

6. I reserve the right to modify or supplement my opinions, as needed, if additional material or information is later provided.

IV. UNDERSTANDING OF PATENT LAW

7. I am not an attorney. For the purposes of this declaration, I have been informed about certain aspects of the law that are relevant to my opinions. My understanding of the law was provided to me by Patent Owner’s attorneys.

8. I understand that a patent application may claim priority to an earlier filed patent application if, among other requirements, the earlier filed patent application provides written description support for the claims of the later filed patent application. I understand that a patent application provides written description support for a particular feature or claim element if it reasonably conveys to a person of ordinary skill in the art (a POSA), that the inventor had possession of that feature or claim element as of the filing date of the patent application.

9. I also understand that when a petitioner challenges a patent by *inter partes* review, the petitioner bears the burden throughout the proceeding to prove that each claim element is anticipated or obvious by some prior art disclosure that predated the priority date of the challenged patent. I understand that a petitioner may show that a claim of a patent is obvious if each element of the claim is

described in more than one prior art reference. However, it is my understanding that only showing that each claim element existed in the prior art is not sufficient to show that the claim was obvious. Rather, the patent challenger must also explain why a POSA would have motivation to combine the prior art references of its proposed grounds.

10. It is my understanding that when multiple references are presented by a patent challenger to challenge the patentability of a patent claim, those references may teach away from one another. I understand that prior art teaches away when a POSA, upon reading a reference would be led in a direction different from the path that was taken by the inventor of the patent challenged.

V. SUMMARY OF OPINIONS AND TESTIMONY

11. I was asked to quantify the volume of the container described in the Original '934 Application filed on April 19, 2010. I performed my analysis based on the content of the Original '934 Application. The Original '934 Application discloses a beverage container that can be manufactured by blow molding. The container lid 113 is a standard “pop top lid” which is considered “very popular with consumers and fairly inexpensive to purchase.” (**Appendix B**, pg. 2). A POSA would have understood that the container disclosed would include 1) the ability for the container to hold its shape, and 2) ergonomically speaking the outer diameter in the range between 60 mm and 90 mm (large insulated mugs). For

reference a disposable red solo cup is approximately ~82 mm in diameter about the middle, and a Yeti insulated mug (20 oz /591 mL) outer diameter is ~ 85 mm.

12. The volume analysis performed using the contents of the Original '934 Application was carried out using Figure 1 and Figure 3 of the Original '934 Application. Based on the analysis I performed, it is my opinion that Figures 1 and 3 were created using a first order computer aided design (CAD) model. The bottom base features shown in Figure 1 of the Original '934 Application indicate that it is more likely than not that the figure comes from a CAD model with additional features superimposed to illustrate those features. Figure 3 of the Original '934 Application also indicates that it is based on a CAD model.

13. The first order CAD model indicates that the total volume of the container is approximately 211.48 mL and the volume of fluid to the inferred fill line (transition between the neck 101 and the side wall 107) is approximately 198.65 mL.

14. A POSA will understand that all dimensions in production have tolerances. Tolerances generally refer to variations in product dimensions as a result of manufacturing. A POSA would have understood that manufacturing tolerances would result in slight variation in dimensions. (**Appendix D**, pg. 1101-1102). A POSA would also understand that beverage dispensers are filled with automated fluid dispensers that dispense a known volume to a container. High

speed filling equipment can have a precise and accurate filling volumes by using a servo control motor to control the dispensing (see per example equipment made by PSR Automation Inc).

15. I was also asked to provide my opinions regarding whether a POSA would have been motivated to combine Ackermann with Kaminski, as proposed by the Petition. A POSA would have recognized multiple significant benefits of using a reusable container as Ackermann describes. A POSA would have also been familiar with the reasons Ackermann discourages single-use containers, like Kaminski's. Based on these teachings, I am of the opinion that a POSA would not have been motivated to combine Ackermann with Kaminski.

16. I was also asked to provide my opinions regarding whether the Petition has identified a container with "an actual volume of the liquid contained in the container" that is "equal to, or less than, 211.5 mL." ('904 patent, claim 1, limitation 1[z]). I am of the opinion that the Petitioner has not identified any disclosure that meets this limitation. Ackermann describes multiple volumes greater than 211.5 mL including 0.25 liters, 0.5 liters, 1 liter, and 2 liters. Kaminski's beverage can end 1 is for a standard can which would likely have a volume of 355 mL. All of these volumes are greater than 211.5 mL. Accordingly, for ground 2, the Petition entirely fails to identify any teaching meeting the required limitation.

17. Finally, I was asked to provide my opinions regarding whether a POSA would have been motivated to also combine Hutchinson with Ackermann and Kaminski. Because a POSA would not have combined Ackermann and Kaminski, they would also not combine Hutchinson with Ackermann and Kaminski. Also, I am of the opinion that there is no reason identified by the Petitioner that would have motivated a POSA to include Hutchinson in the combination, particularly given the disclosed volumes of Ackermann and Kaminski. In this regard, while Hutchinson describes a volume of 200 mL, the Petitioner has not provided any reason why a POSA would combine the references as proposed. It appears the Petitioner's motivation for combining Hutchinson with Ackermann and Kaminski is based on the claim language of the '904 Patent rather than any teachings of the references themselves.

VI. CALCULATION OF VOLUMES DISCLOSED BY THE ORIGINAL '934 APPLICATION

A. Protocols

18. The following outlines the protocols I employed for creating a CAD model of the container shown and described in the Original '934 Application, and calculating the internal fluid volume by using SolidWorks Premium 2024.

19. The methodology consisted of using Figure 1 and 3 to construct a first order engineering CAD model of the container (P100) described in the original filling, and using the lip geometry to fit a standard pop top lid dimensions for a 355

mL to scale the approximate size of the container. Using the SolidWorks cavity feature the internal volume of the container can be determined.

1. Protocol: Container

20. The following protocol was used to create a 3D CAD model based on a side view and bottom view of the container as illustrated in Figures 1 and 3 of the Original '934 Application. The process consisted of four steps 1) creating a solid of revolution based on Figure 1 of the Original '934 Application, 2) creating base features based on Figure 3 of the Original '934 Application, 3) creating a shell based on the shell feature, and 4) completing the details of the rim section.

21. The Original '934 Application (**Appendix B**) was provided by counsel. The PDF document was opened using Adobe Acrobat Photoshop directly, as shown in Fig. A, below. Page one of the drawings was selected, and the Figure 1 from the patent was then isolated using the crop feature. This process was completed for Figure 1 and Figure 3 of the Original '934 Application.

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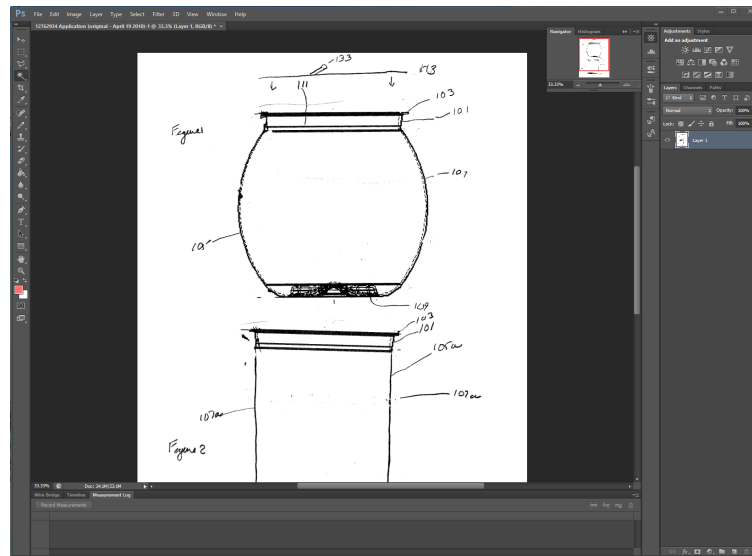


Fig. A. Photoshop processing of Figure 1 of the Original '934 Application.

22. These figures (i.e. Fig. B) were then inserted into a part file of the CAD software SolidWorks. Process: Navigating to the *Tools* tab on top, down to *Sketch Tools*, and down towards the bottom there is *Sketch Picture*.

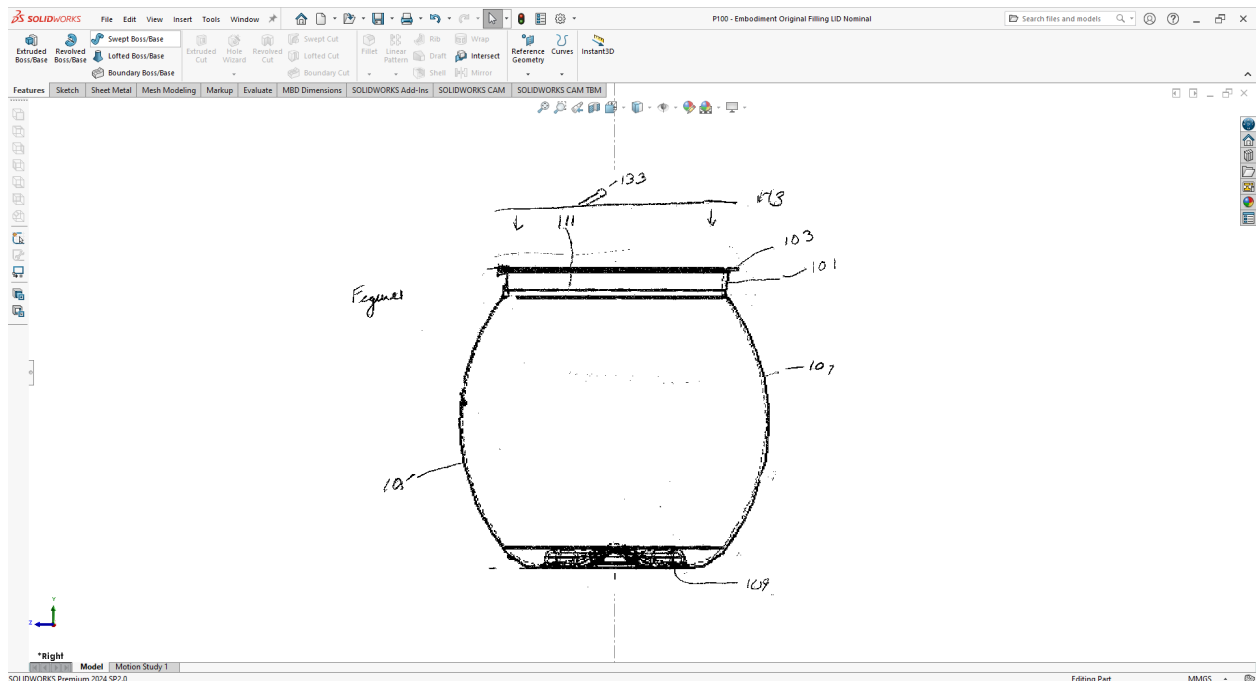


Fig. B. Sketch picture insertion into a sketch in SolidWorks of Figure 1 of the Original '934 Application.

23. Figure 1 was then aligned and scaled. The image was rotated by 0.4 degrees to align the bottom line of the container to be horizontal with respect to the SolidWorks reference frame. A vertical line was added from the origin to establish the center line, and to verify symmetry of the body. Based on this symmetry, the *Revolved Boss/Base* SolidWorks feature was used to generate a solid body, as shown in Fig. C.

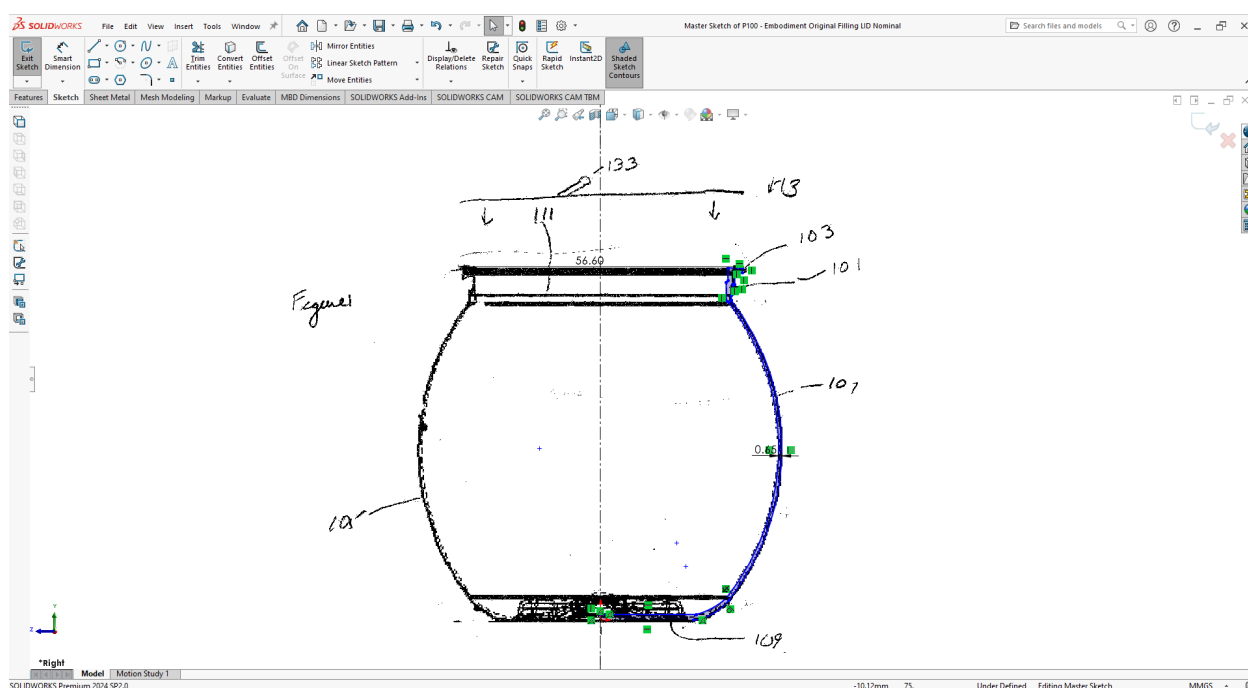


Fig. C. SolidWorks Sketch with Figure 1 of the Original '934 Application during symmetry testing.

24. The Original '934 Application describes a standard metal lid that is “very popular with consumers” commonly used with a 355 mL (12 fl oz) can that is sealed to the lip 103 surface. The known, standard dimensions of this lid,

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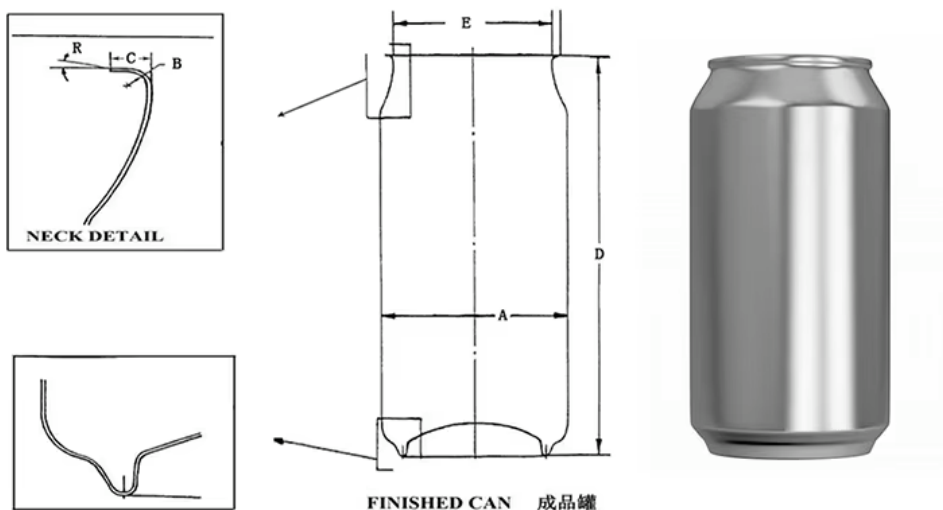
therefore, provides the necessary scale information to determine the geometry of cans that use such a lid. The standard 355 mL (12 fl oz) soda can body has a very distinct lip geometry that is used to mate with a pre-fabricated top as shown in Fig. D.

25. The nominal outer diameter of the lip should be 56.64 mm. This number is based on the tabulated size values and the following formula:

$$\text{Outer Diameter} = \text{Neck Plug Diameter (E)} + 2 * \text{Flange Width (C)}$$

Equation 1

$$56.64 = 52.40 + 2 * 2.12$$



ITEM	NOMINAL							
	Sleek355ml	Standard355ml	Standard473ml	Sleek330ml	Sleek200ml	Slim250ml	Standard330ml	Standard500ml
A Can Body Diameter (mm)	57.4	66.04	66.04	57.4	57.4	53	66.04	66.04
B Flange Radius (mm)	1.524	1.524	1.524	1.524	1.524	1.524	1.524	1.524
C Flange Width (mm)	2.13 ± 0.25	2.12 ± 0.25	2.08 ± 0.25	2.08 ± 0.25	2.08 ± 0.25	2.16 ± 0.25	2.08 ± 0.25	2.08 ± 0.25
D Can Height (mm)	155.6 ± 0.38	122.22 ± 0.3	157.23 ± 0.38	146.05 ± 0.38	95.63 ± 0.38	134.02 ± 0.38	115.20 ± 0.38	167.84 ± 0.38
E Neck Plug Diameter (mm)	52.40 ± 0.18	52.40 ± 0.25	52.40 ± 0.25	52.40 ± 0.25	52.40 ± 0.25	52.40 ± 0.25	52.40 ± 0.25	52.40 ± 0.25
R Flange Angle	0-12°	0-12°	0-12°	0-12°	0-12°	0-12°	0-12°	0-12°

Fig. D. Standard dimensions of 355 mL can.

26. Equation 1 provides the outer diameter of the lip of a container configured to mate to a standard metal lid for a 355 mL can because it an addition of the neck plug diameter E, shown in the center drawing of Fig. D with a flange width C show in the top left “NECK DETAIL” drawing at opposite sides of the container. Thus, the outer diameter of the lip is equal to $E + 2C$, as shown in Equation 1.

27. At the lip region there is a slight break in the symmetry in Figure 1 of the Original '934 Application. Thus, to determine the bounds of the lip outer diameter, the middle ground between outermost lip portion on each side was selected, as shown in Fig. E. The right side is slightly over and the left slightly under by the same amount.

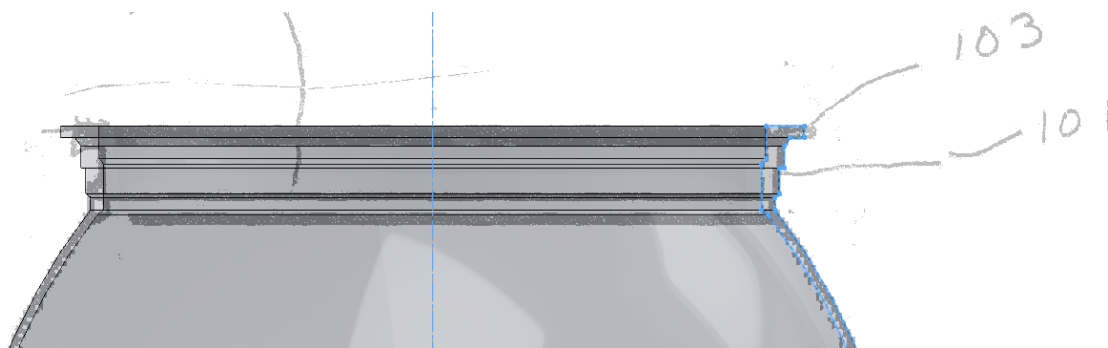


Fig. E. Lip geometry.

28. Once the image is aligned, centered, and scaled, the tracing of the outer shell and features was completed. For clarity, this was performed on a new drawing layer. The outer shape of the container was traced using lines and arcs as shown in Fig. F. Based on the reference diameter of the upper lip being set to

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56.64 mm, the thickness of the body was approximately 0.65 mm based on this first order engineering model approximation.

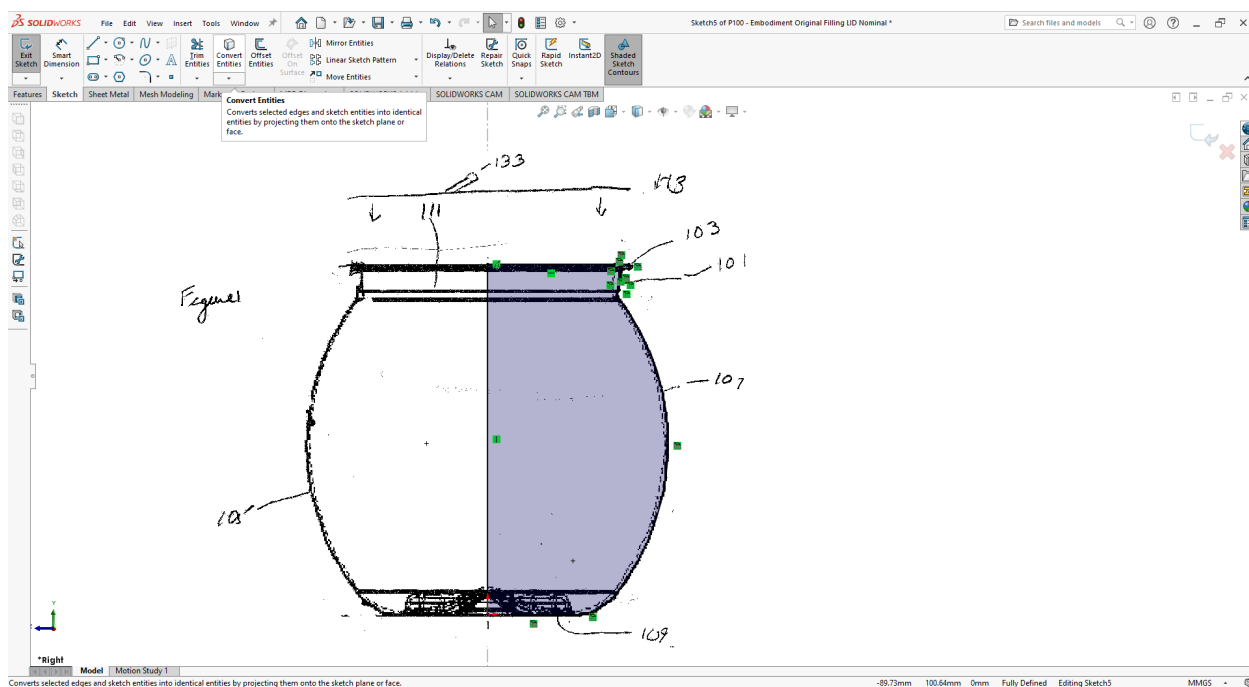


Fig. F. Traced outer contour of Figure 1 of the Original '934 Application.

29. I then verified that the thickness illustrated in Figure 1 of the Original '934 Application was consistent with common products available to consumers. I personally, physically measured the containers listed herein for comparison using a digital caliper. As shown in Table 1 a plastic wall thickness ~0.65 mm is appropriate given the application. For example, an easily crushable 500 mL Arrowhead disposable water bottle has a thickness of about 0.10 mm on body; whereas the base region has thickness that can be 0.18 mm thick or more. On the other hand, a 1L Canada Dry Club Soda container with a body thickness of ~0.3 mm would result in a structure that still crushes rather easily. At a thickness of

~0.5 mm the structure is a little more robust and corresponds to a 28oz of Heinz Yellow mustard that is designed to be squeezed as part of its function. Thus, a POSA would have recognized that the thickness of the container body should be somewhere above 0.55 mm (based on Heinz squeezable container). Note that in most blow molding plastic containers the bottom can be thicker than the walls either by design or due to the manufacturing process. For example, “extrusion blow-molding process for making plastic beverage bottles” can generate different base thickness compared to injection blow-molding process. (**Appendix D** pg. 552-554).

Table 1. Nominal Thickness Considerations

Component	Body Wall Thickness	Material	Notes
Arrowhead Water 500 mL	~ 0.10 mm	Plastic	Base: + 0.18 mm
Canada Dry Club Soda 1L	0.25 mm – 0.28 mm	Plastic	
Heinz Yellow Mustard 28 Oz	0.45 mm – 0.55 mm	Plastic	Designed to Squeeze
Florida’s Natural 1.75L Lemonade	0.56 mm Above Body 0.40 mm Body	Plastic	Base Thickness Ranges 0.5 mm to more than 3 mm

30. The tracing was then revolved to make a Solid body. The *Revolved Boss/Base* feature was used to create a 3D solid body as shown in Fig. G.

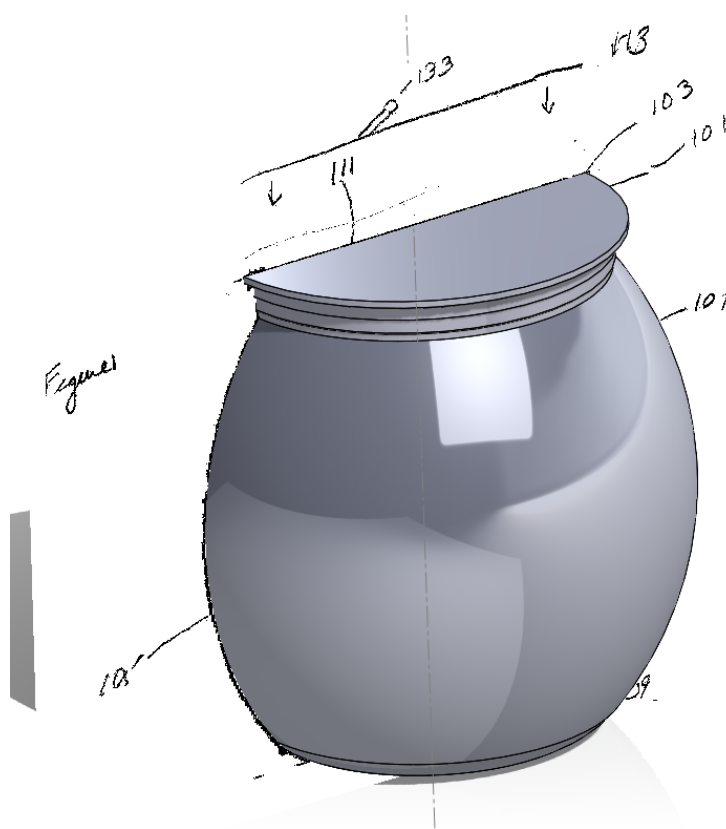


Fig. G. Revolved Boss/Bass geometry to generate solid body w/ Solid body on the right.

31. On the *Top plane*, a new sketch was created in order to incorporate features of the bottom of the container shown in Figure 3 of the Original '934 Application. As described earlier regarding Figure 1, the image was scaled using a known reference and oriented such that the origin is at the center of the circle. For Figure 3 the scaling was governed by the outer diameter of the vessel which must be consistent between the sectional image (Figure 1) and the bottom view of Figure 3. The figure was included and scaled to match the outer diameter of the vessel. As shown in Fig. H, a bottom view shows how Figure 3 of the original patent maps

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to the solid revolution already created.

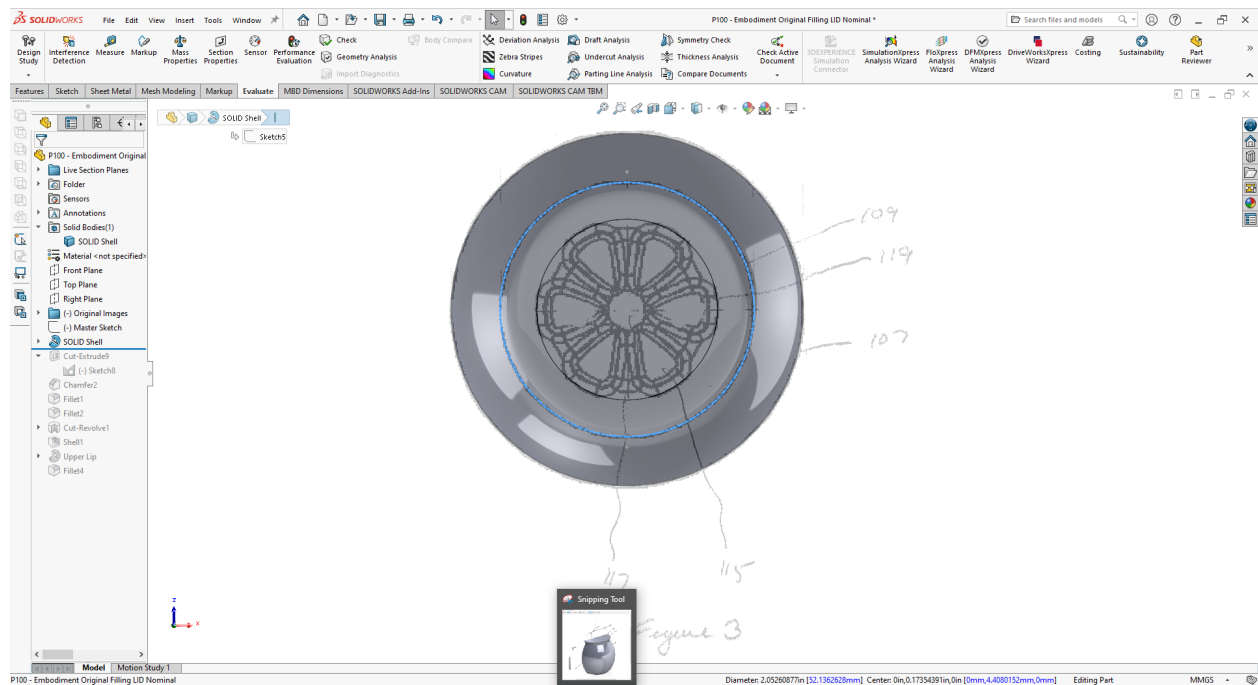


Fig. H. Bottom view of container showing six leaf design superimposed on a top plane sketch prior to creating features.

32. A new sketch in the top plane was used to trace out the cut outs at the bottom of the container. An extrude cut feature was used to remove material from the *SOLID body*. The depth of cut is approximately 4 mm using the cross section of Figure 1, based on the reference dimension described above, as shown in Fig. I.

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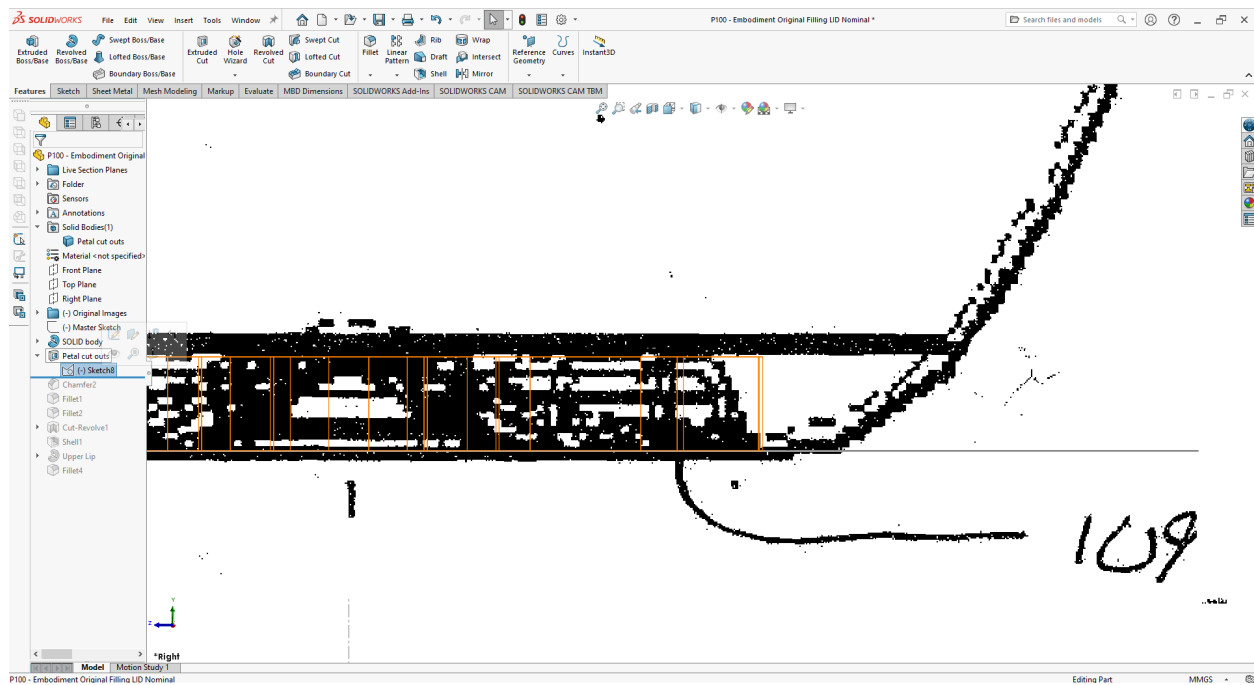


Fig. I. Depth of cut of petal cut out at bottom of container.

33. The walls of the petal cut out were then chamfered to match the vertical cross section and the corners were rounded to match both the vertical cross section and the bottom view as shown in Fig. J and Fig. K. Note that the blue lines of the image follow the contour of the vertical cross section (Figure 1).

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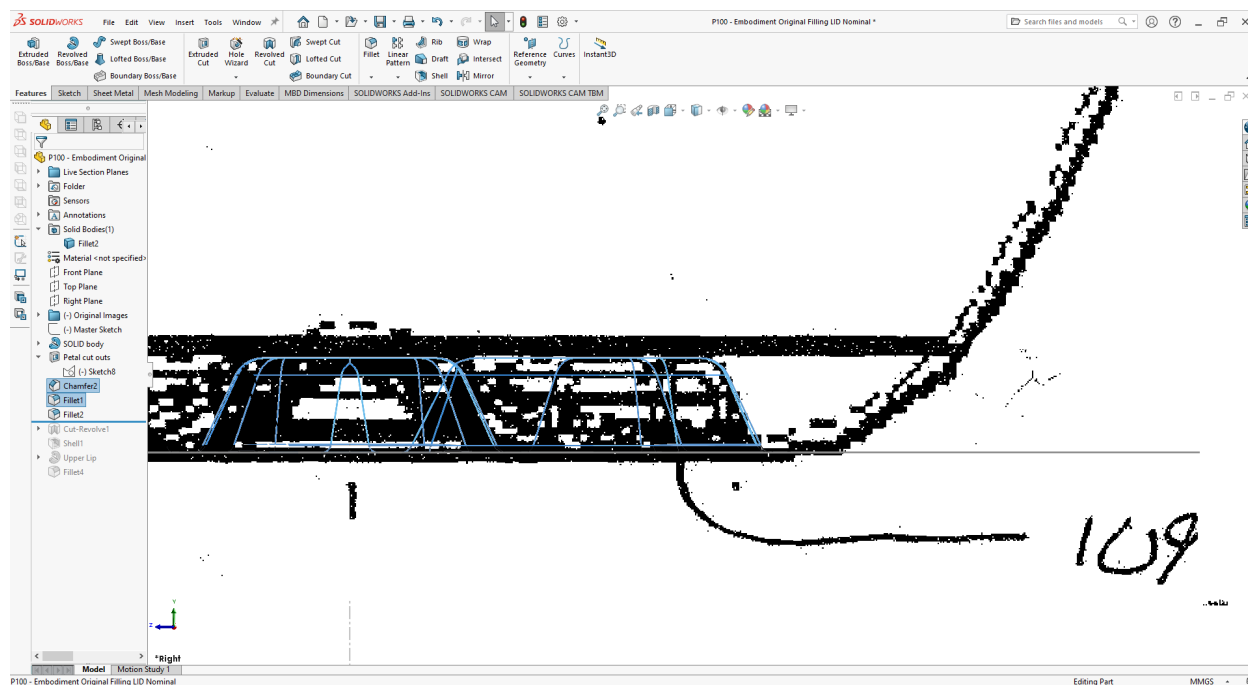


Fig. J. Petal cross bottom feature after chamfer and rounding from a vertical cross section comparison.

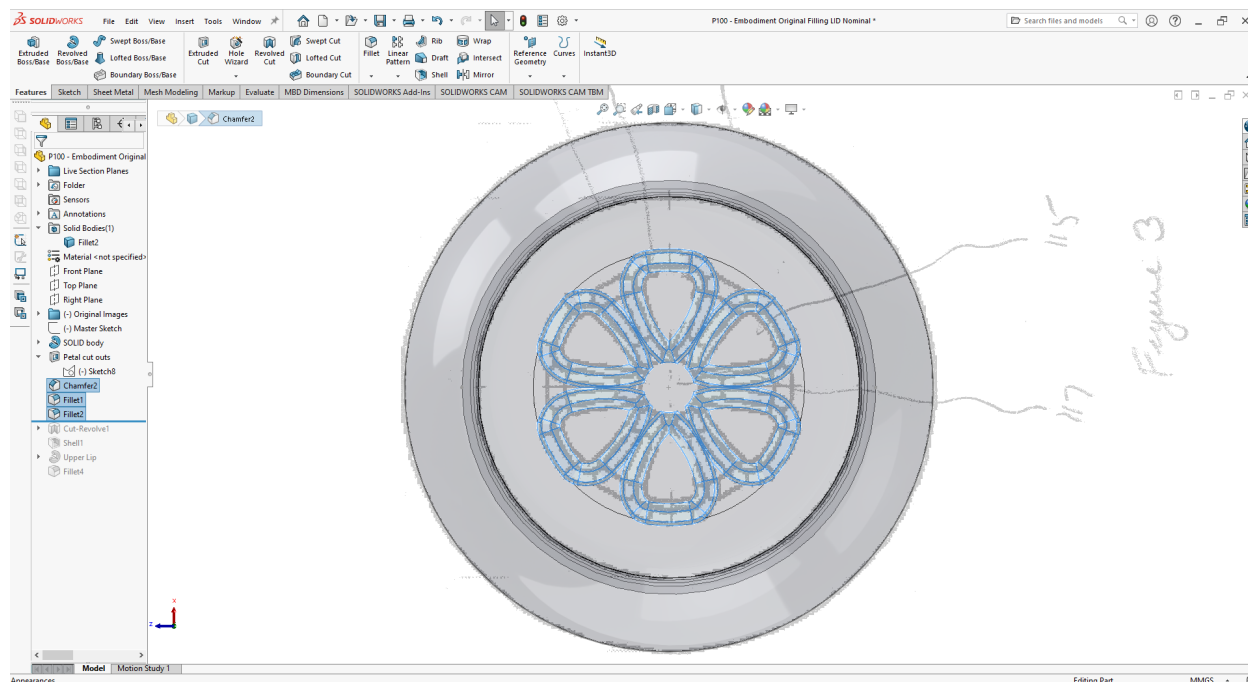


Fig. K. Petal cross bottom view.

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34. With the primary features created the Solid body was cored out using the *Shell* feature with an approximate thickness of 0.65 mm that was determined using the scaled Figure 1 original drawing in the Master Sketch. The result is an even thickness container as shown in Fig. L bottom view.

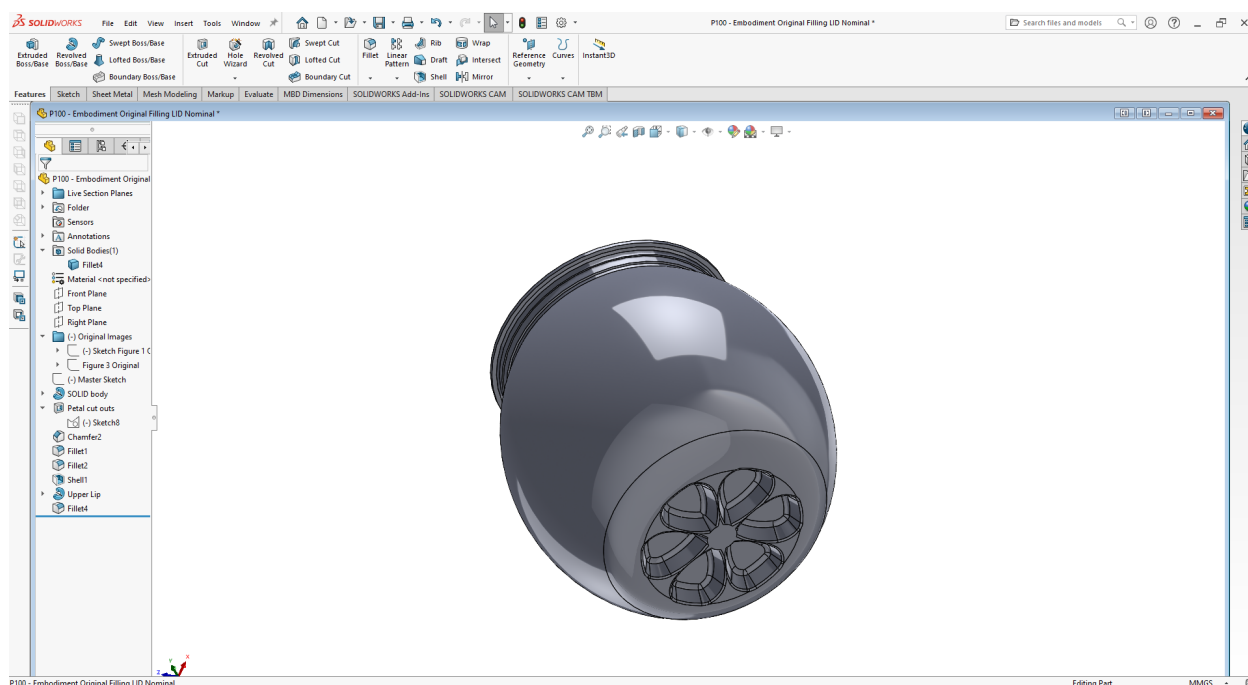


Fig. L. Model after the *Basic Shell* feature in the design tree.

35. Based on the Figure 1 original drawing cross section we know that the neck of the container may be thicker; thus, material was added to the geometry using the Master Sketch tracing to create an Upper Lip (as shown in Fig. M) that is thicker based on the dimensions shown in the Figure 1 drawing.

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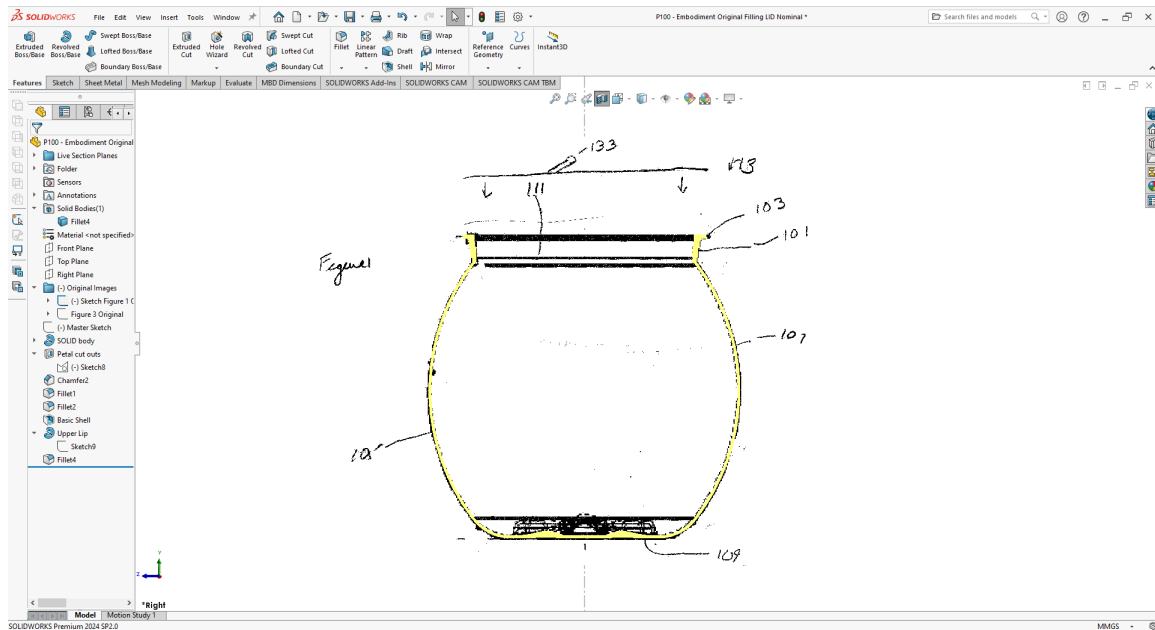


Fig. M. Model after the *Basic Shell* feature in the design tree.

36. The final step was to add a couple of fillets to the inside of the container, as shown in Fig. N. A plastic blow molded container will rarely have any sharp transitions they will be usually rounded based on the deformed plastic ability to conform to the mold shape.

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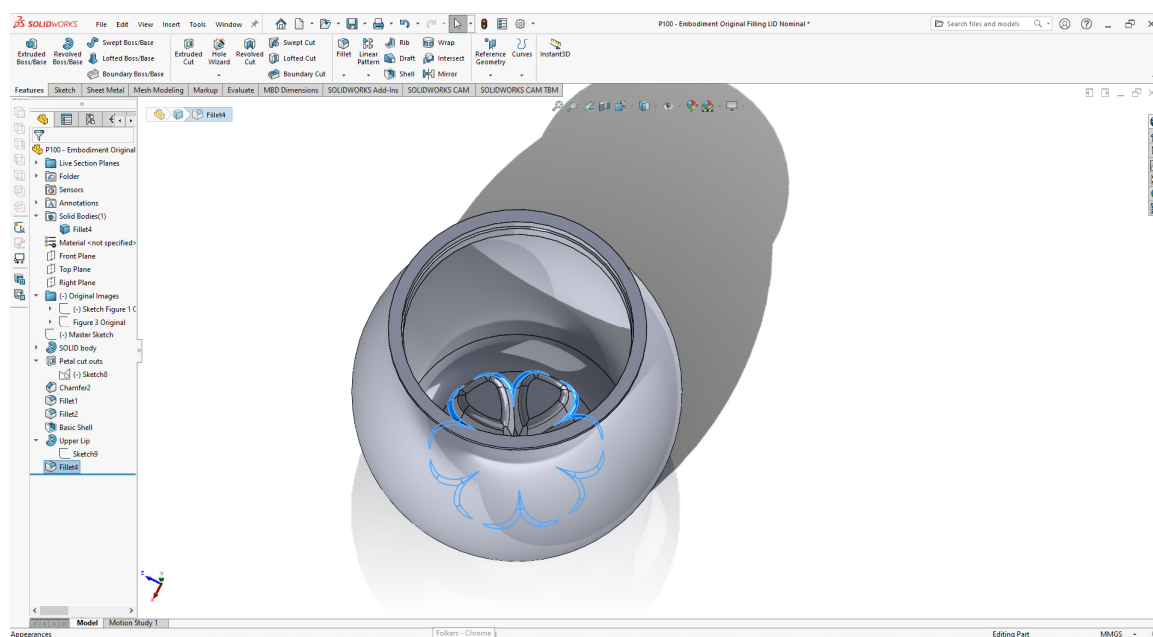


Fig. N. Internal bottom view of rounding detail.

2. Protocol: Fluid Volume

37. The volume was calculated using SolidWorks cavity feature and querying the mass properties.

38. A new part was created that was larger than the diameter of the container and taller, to be referred to as the fluidic space. The outer shape of the geometry is not important, only that the entire container fits within the inner volume. For this particular case a cylindrical hex that is 80 mm in diameter and 80 mm in height is created using the *Extrude Boss/Base* feature as shown in Fig. O.

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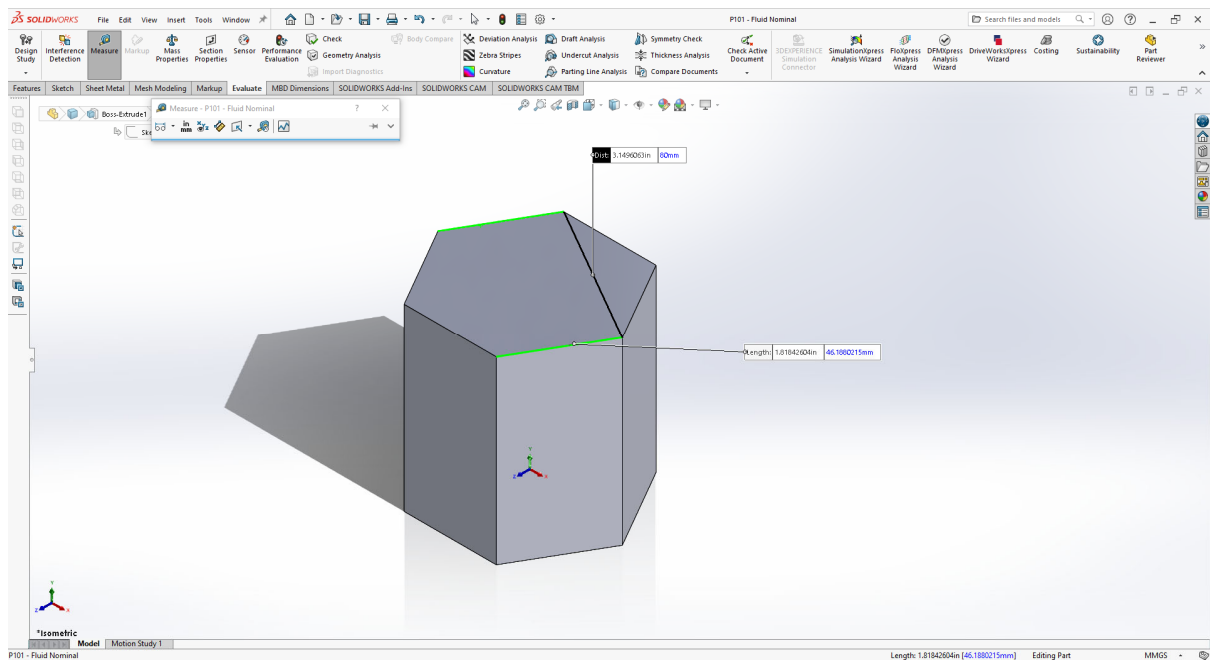


Fig. O. Fluidic Space base cylindrical hex shape.

39. The volume of the container was then subtracted from the fluidic space as shown in Fig. P.

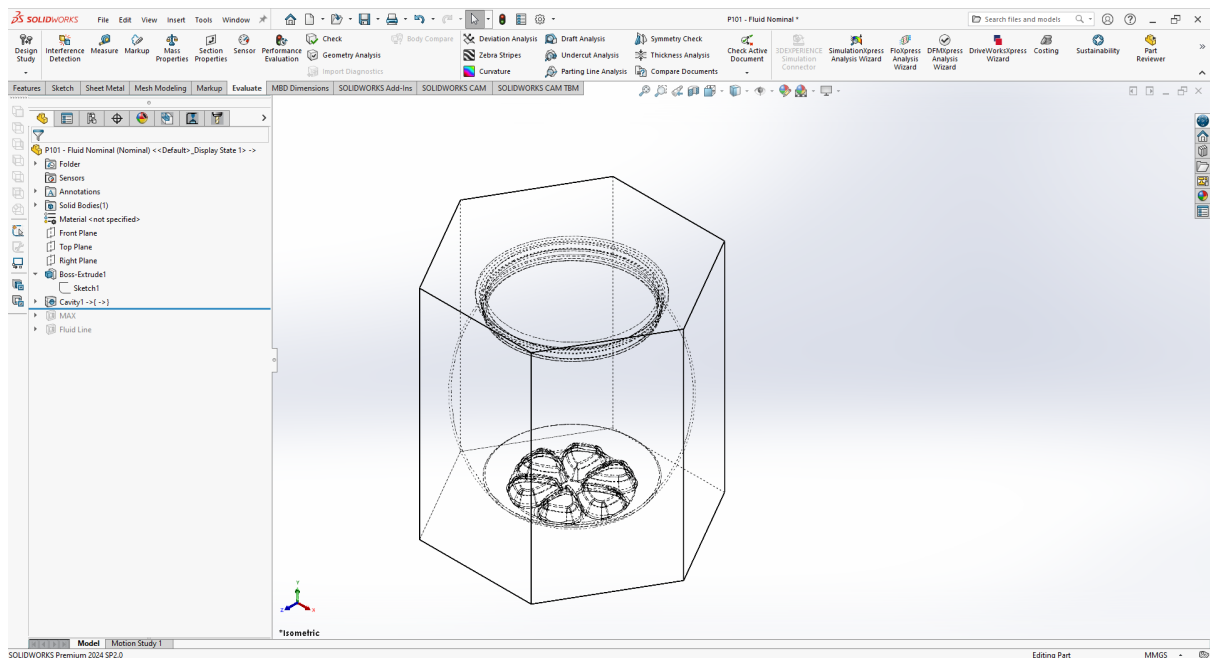


Fig. P. Fluid space post cavity process with hidden lines visible.

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40. The fluidic volume was then trimmed to only the inside of the container.

41. The result yielded the maximum total volume that can fit inside of the vessel as shown in Fig. Q. At this stage the mass properties tools of SolidWorks can be used to calculate the total volume of fluid inside the container in milliliters. The calculated total measured volume was 211.48 milliliters using this first order engineering CAD model.

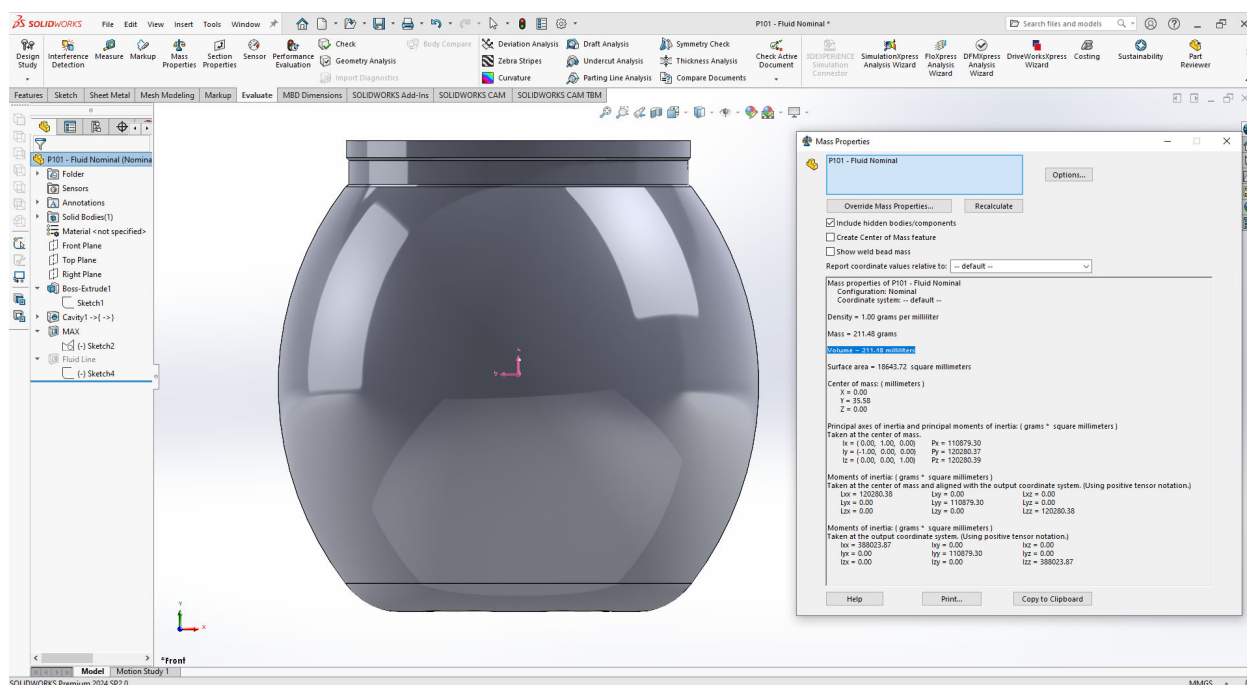


Fig. Q. Calculated total volume using first order engineering CAD model.

42. The volume to a fill line of the container was calculated by taking another extrusion cut of the remaining volume (see Fig. R). A POSA would assume that the fill line is the transition between the neck 101 and body 107 of the container which can be taken as the fluid line. The calculated fill volume was

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198.58 milliliters using this first order engineering CAD model as shown Fig. S.

Filling the container to the fill line located at the transition between the neck and the body would be associated with the container being filled with 200 mL of fluid.

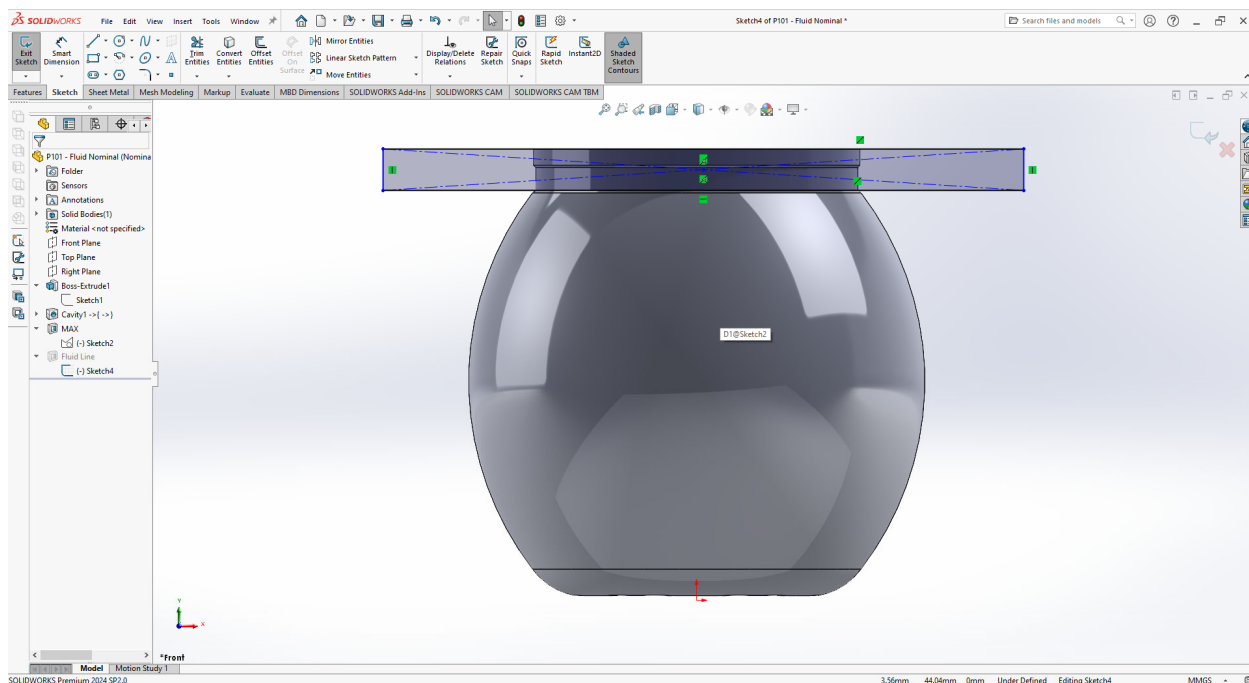


Fig. R. Rectangle for trimming the fill volume.

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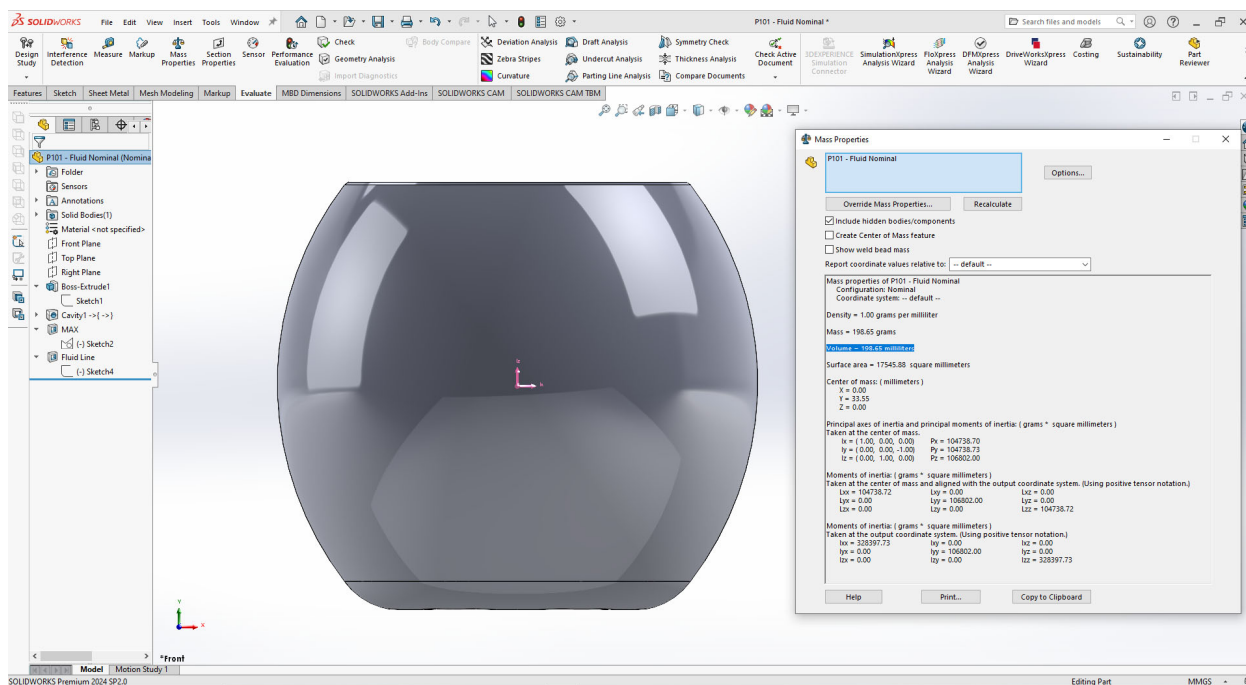


Fig. S. Calculated total volume using first order engineering CAD model.

B. Findings

43. The analysis shows that the volume limitations from the originally filed drawings filed April 19, 2010 meet the volume limitations from the updated drawings filed June 1st 2010. The maximum container volume calculated using the first order CAD model is approximately 211.48 mL and the calculated filled volume (based on the inferred fluid line) is 198.65 mL. Based on this analysis it is my opinion that the inventors were in possession of a CAD model that they used to size the container to determine the internal volume and create the figures of the Original '934 Application. A POSA would have understood, based on the original disclosure of the '934 Application that the inventor was in possession of the container having a maximum volume of 211.5 mL at least as of April 19, 2010

such that the container would contain an actual volume of liquid less than or equal to 211.5 mL.

VII. MOTIVATION TO COMBINE ACKERMANN WITH KAMINSKI

44. I understand that the Petitioner has also argued that the claims of the '904 patent are obvious based on a combination of a German Patent Publication 10200404623 A1 to Ackermann ("Ackermann") and U.S. Patent No. 4,465,204 to Kaminski ("Kaminski"). It is my opinion that a POSA would not have been motivated to combine these references.

45. Ackermann describes a container that is made of plastic and a metal lid. (Ackermann, pg. 3). A central focus of Ackermann includes the ecological benefits of a reusable container. When describing the "Prior Art," Ackermann explains the following.

Reclosable containers are usually present in the form of glass or plastic bottles with screw caps. Such containers may be difficult to clean and fill due to the small container opening. Can-like containers made of plastic (PET) are also known, having a standard lid made of aluminum that is joined to the rim of the container opening by seaming. Such a container is usable only once.

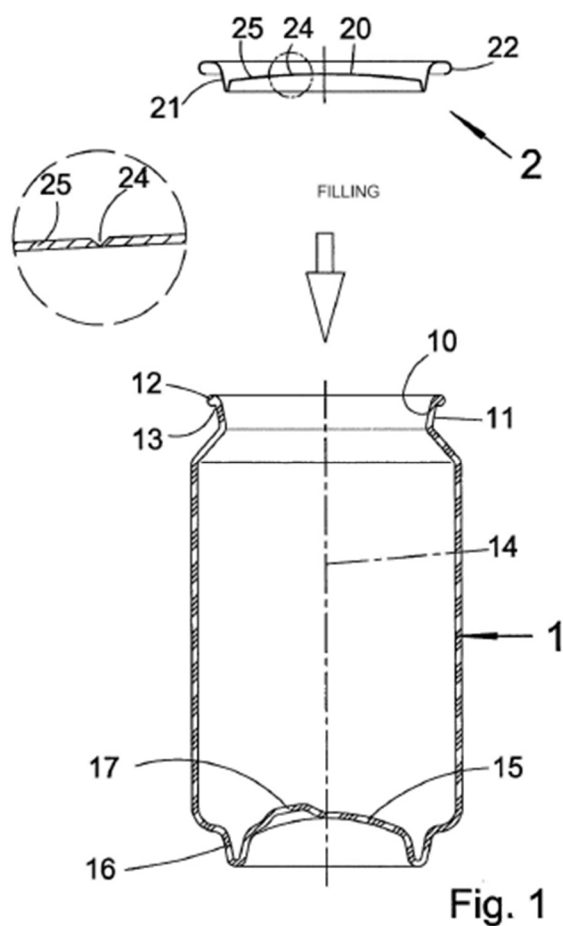
(Ackerman, pg. 3).

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46. Based on this explanation, a POSA would have understood that the features of Ackermann's container and lid were primarily intended be reusable and able to be cleaned. A POSA would readily recognize the ecological benefits of such a container because a reduction in the number of consumed single-use food and beverage containers reduces litter in undesirable places and disposables to be deposited in landfills. Kaminski's disclosed container is a single-use container. A POSA motivated by the advantages of Ackermann's container and lid would not be motivated to combine it with features from Kaminski.

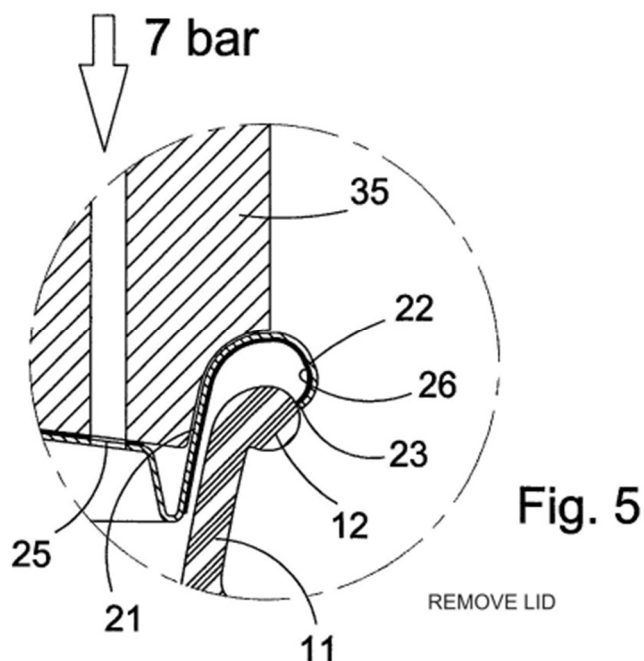
A. Reusability

47. Ackermann's container is "a reusable container." (Ackermann, pg. 3). The lid may be closed after filling or packaging. This is shown in Figure 1.



Ackermann, Figure 1.

48. After the container contents are emptied, the lid can be removed. This is shown in Figure 5, in which compressed air supplies negative pressure to the top of the lid, removing the lid from the container.



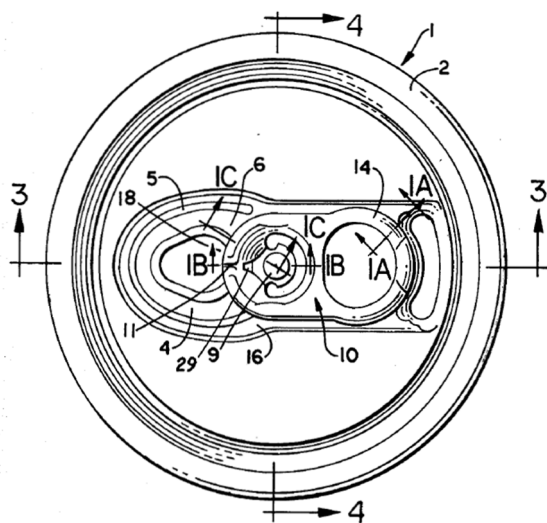
Ackermann, Figure 5.

49. The container is then cleaned and filled again and a new lid is then attached. This process is explained with steps a) through h). (Ackermann pg. 6-7). Because this process may be repeated, a POSA would have recognized that the container described in Ackermann would not be thrown away. A POSA would also have recognized that, as this process was repeated, it would prevent any number of single-use plastic containers from being used and disposed of.

50. A POSA would have recognized that the reusability of Ackermann's container was the primary motivating factor behind its design. This is because Ackermann contrasts its container design with traditional cans with standard pop top lids. Ackermann says that, unlike its claimed container, "a standard lid made

of aluminum that is joined to the rim of the container opening by seaming” is “usable only once.” (Ackermann, pg. 3).

51. Kaminski describes a standard single-use lid, exactly like the lid that Ackermann teaches to avoid. A POSA would have recognized Kaminski’s lid as a standard, single-use pop-top lid based on Kaminski’s figures. For example, the top view shown in Figure 1 is a can end 1 with a score or tear line 5, a tear strip 4, and pull tab 10 which is well known in the art as a single-use pop-top lid. (Kaminski, Figure 1).



Kaminski, Figure 1.

52. A POSA would also have recognized that Kaminski’s can end 1 (aka lid) was a standard, single-use pop-top lid because it is “directed to a pull tab for a metallic beverage-type can end or the like” (Kaminski, 1:5-8) intended to be seamed to a standard can. Specifically, Kaminski describes its can end 1 has a

“circumferentially extending raised edged 2 for attaching can end 1 to a suitable cylindrical beverage can 3” that “is well known in the art.” (Kaminski, 2:65-3:1).

53. Because Ackermann describes a reusable container with a corresponding lid that is specifically contrasted from a standard, single-use can and pop-top lid, a POSA would not have been motivated to combine it Ackermann’s teachings with Kaminski’s. Petitioner’s argument that ecological and safety reasons would have motivated a POSA to combine Ackermann with Kaminski simply because the tear strip portion of Kaminski is retained after use contradicts the express description from Ackermann. A POSA concerned primarily with ecological improvement would not be motivated to create a single-use plastic container by following the teachings of Kaminski.

B. Cleanability

54. It is my opinion that, in addition to the reusability and ecological motivations that would dissuade a POSA from combining Ackermann and Kaminski, relatedly, a POSA would also be dissuaded from making the proposed combination due to Ackermann’s objective of providing “a large container opening” so that the reusable container can be cleaned. (Ackermann, pg. 3).

55. A POSA would have recognized that containers with small openings could not be cleaned as Ackermann describes. “Reclosable containers are usually present in the form of glass or plastic bottles with screw caps. Such containers may

be difficult to clean and fill due to the small container opening.” (Ackermann, pg.

3). Kaminski’s single-use pop-top lid has a small opening and this inability to clean the container with this small opening contributes to its single-use nature and would additionally dissuade a POSA from combining Kaminski’s lid features with Ackermann’s container.

56. For all of these reasons, I am of the opinion that a POSA would not have been motivated to combine Ackermann and Kaminski as the Petitioner argues because doing so would create a single-use plastic container that significantly harms the environment.

VIII. NO PRIOR ART DISCLOSURE OF A CONTAINER WITH 211.5 ML

57. Based on my review of the Petition, it is my opinion that a POSA would not have understood the combination of Ackermann and Kaminski to render obvious a volume that is “equal to, or less than, 211.5 mL.” (’904 Patent, claim 1, limitation 1[z]). The Petition seems to state that the volume of the container is of no consequence and a POSA would have found it obvious to apply any of the features of Ackermann or Kaminski to a container of any size. (Petition, 77). This is incorrect.

58. A POSA would not have found any volume obvious merely because no prior art references described any volume, as Petitioner argues. Regardless, Ackermann does list specific ranges of volumes that its design is compatible with,

including “cans from 0.5 liters to 1 liter are considered” and “containers in the range of 0.25 liter to 2 liters.” (Ackermann, pg. 5, 8). Similarly, while Kaminski does not specify volume limitations, it does explain that its can is a “a suitable cylindrical beverage can 3” that “is well known in the art.” (Kaminski, 2:65-3:1). The standard can size includes a volume of 355 mL (12 fl oz).

59. Based on this analysis, it is my opinion that a POSA would not have recognized that Ackermann and Kaminski, which both describe volumes greater than 211.5 mL would have somehow disclosed or rendered obvious a volume that is equal to, or less than, 211.5 mL.

IX. MOTIVATION TO COMBINE HUTCHINSON WITH ACKERMANN AND KAMINSKI

60. As explained above, I am of the opinion that a POSA would not have combined Ackermann with Kaminski. For these same reasons, it is my opinion that a POSA would not have been motivated to also combine Hutchinson with Ackermann and Kaminski. In addition to these reasons, however, I am of the opinion that the reason the Petitioner provided for combining Hutchinson with Ackermann and Kaminski is incorrect and would not have motivated a POSITA to combine these references.

61. The Petitioner states that Ackermann “does not place any restrictions on the size, so a POSA would recognize that, for example, the container could be

made to any size practically needed for a beverage container.” (Petition, pg. 82).

This is incorrect. Ackermann itself also explains that the volume ranges it discloses are linked to “the radius of the torus cross section,” and changes in volume must be compensated for to ensure that the lid operates as intended.

(Ackermann, pg. 5). For example, specific ranges of the torus cross section radius may be “preferably 0.75 mm to 0.82 mm” or “approximately 0.6 mm to 1 mm when cans from 0.5 liter to 1 liter are considered.” (Ackermann, pg. 5). Later, at claim 3, Ackermann claims “the toroidal ridge (12) has a circular cross section with a radius in the range of 0.6 mm to 7 mm for containers in the range of 0.25 liter to 2 liters.” (Ackermann, pg. 8) (claim 3).

62. For these reasons, it is my opinion that a POSA would not have been motivated to combine Hutchinson with Ackermann and Kaminski.

X. CONCLUSION

63. Based on the analysis presented above, I am of the opinion that:

(1) the disclosure of the Original '934 Application provides sufficient information in the written description to support for the specific volumes of the claims;

(2) a POSA would not have been motivated to combine Ackermann's teachings with Kaminski's teachings;

Declaration of Folkers Rojas, Ph.D. in Support of Patent Owner Preliminary
Response in *Inter Partes* Review of U.S. Patent No. 11,738,904

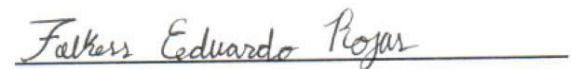
- (3) neither Ackermann nor Kaminski describe or render obvious a container with a volume equal to or less than 211.5 mL; and
- (4) a POSA would not have been motivated to combine Hutchinson's teachings with Ackermann's and Kaminski's teachings.

Declaration of Folkers Rojas, Ph.D. in Support of Patent Owner Preliminary Response in *Inter Partes* Review of U.S. Patent No. 11,738,904

64. I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, and that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements are punishable by fine or imprisonment or both. *See* 18 U.S.C. § 1001.

Date: October 30, 2024

Respectfully submitted,


Folkers Eduardo Rojas, Ph.D.

APPENDIX A

Dr. Folkers E. Rojas, PE

PhD. Mechanical Engineering, MIT
<http://www.MillieRojasEngineering.com>

EDUCATION

Massachusetts Institute of Technology

- PhD in Mechanical Engineering - June 2014
- Master's of Science in Mechanical Engineering – February 2011
- Bachelor of Science in Mechanical Engineering – June 2009
- Bachelor of Science in Nuclear Sciences and Engineering – June 2009
- Minor: Earth Atmosphere, & Planetary Science – June 2009

Course Work:

Expert in an array of Mechanical Engineering fields. Expertise includes: 1) Machine Elements, 2) Manufacturing 3) Measurement/Instrumentation, 4) Structures, 5) Heat Transfer, 6) Fluid Analysis, 7) Finite Element Analysis, 8) Product Development Process, and 10) Medical Devices. Full product development cycle expertise from design, CAD, machining, and production.

Engineering LICENSES & Review Boards

- Texas Board of Professional Engineers – Since December 2017
- New Hampshire Board of Professional Engineers – Since February 2019
- NSF Reviewer, 2023-2024

WORK EXPERIENCE

Millie Rojas Engineering Corporation

April 2021 – Current

- Engineering Services: Engineering Solutions, Prototyping, Testing, and Analysis
- Legal: Patent Litigation, Civil Litigation, Forensic Engineering Services

Raptors Design, Inc.

June 2014 – Jan. 2024

- CEO & Co-founder
- Oil Field Safety Equipment: HAWK Tool
 - Secured Repsol Foundation Award and Department of Interior Contract
 - Complete product development of HAWK safety tool: design / manufacturing / analysis / testing
 - Successful product testing of 10,000 psi test 11-inch wellbore tests that demonstrates technology at scale.
 - Engage with oil industry stakeholders: NOV, Cameron, Schlumberger, Trendsetter, Transocean, FMC Technologies, Shell, and BP

Massachusetts Institute of Technology: Instructor

February 2019 – Current (Part Time as Requested)

- Instructor 2.70 Fundamentals of Precision Product design with Prof. Alexander Slocum
- Engage with students to design, analyze, and fabricate critical machine elements.
- Convert concepts into viable easily manufactured components and guide students through the use of an array of fabrication equipment including cnc mills, and cnc lathes.
- Spring 2020 – Taught 2.70 FE course to guide students through the licensure process.

Massachusetts Institute of Technology

TA: 2.75 Precision Machines & Medical Devices

September 2011 – May 2013

- Teacher's assistant helping 2 or 3 teams (4 students per team) of students per term to converge on the design, development, and proof of concept prototype of several medical devices.
- Responsible for helping students through the fundamentals of machine design, product development, design for manufacturing, and product development.

Schlumberger Doll Research

Intern

March 2008 – August 2010

- Design and manufacturing of engineering proof of concept prototype for: 1) downhole well integrity and 2) sand control using expandable structures.
- Co-inventor on an issued patent for sand control, using shape memory alloys structures to reduce sand production.

Jet Propulsion Laboratory

Intern: SWOT Project

June 2009 – August 2009

- Increased efficiency by rapidly converging design concepts into manufacturing drawings for SWOT Dr. Richard Hodges.
- Facilitated the procurement of antenna components by serving as the technical point of contact.
- Responsible for designing and rapid manufacture of prototypes and testing materials for electronic antennas.

Jet Propulsion Laboratory

Intern: Grail Project

June 2008 – August 2008

- Design and fabrication of Kapton sheet retention disk for the GRAIL Ka-band antenna, where the prototype build was delivered 2 months ahead of schedule.
- Designed and fabricated control box housing for electronics boards for the antenna in a quarter of time from the expected delivery period.

(Folkers.Rojas@gmail.com)

2

<http://www.MillieRojasEngineering.com>

Massachusetts Institute of Technology: Undergraduate Research

PERG Lab: CSPonD Project

August 2008 – June 2009

- Responsible for developing a green energy low entropy heat exchanger for large scale manufacturing. The work is part of Prof. Slocum's Laboratory working on a joint collaboration across four departments at MIT. The research requires MatLab models and to support a low entropy generation system that would allow for improvement in the efficiency of the system.

Planetary Astronomy Lab: POETS Project

January 2008 – May 2008

- In charge of designing and manufacturing a filter-wheel/optics enclosure for NASA's InfraRed Telescope Facility (IRTF) in Hawaii. The project is part of the Portable Occultation, Eclipse, Transit System (POETS) installation; this will be first fast transfer CCD camera on a large telescope.

Planetary Astronomy Lab: Wallace Camera Project

June 2006 – Jan 2008

- In charge of evaluating, designing, and manufacturing an optical astronomical camera for the George Wallace Jr., Astrophysical Observatory, under the supervision of Professor James L. Elliot.

Planetary Astronomy Lab: Magic Upgrade

January 2007 – September 2007

- Responsible for evaluation, design, and manufacture of all parts for the upgrade of the MagIC Camera in Chile. The engineering phase of the project was completed ahead of time. The installation of the instrument of the Baade 6-meter telescope when as planned. The instrument was handed to the science group.

Planetary Astronomy Lab: Wallace Camera Project

August 2005 – August 2006

- Designing a satellite orbiter that can use interplanetary radiation as an energy source and a shielding mechanism. Supervision was provided by Professor Maria Zuber, Head of the Earth, Atmosphere, and Planetary Sciences department and a leading scientist in Mars exploration.

ACCOMPLISHMENTS

BSEE Contract Award (March 2016)
Repsol Foundation Innovation Award Winner (July 2014)
EUSPEN Challenge 1st Place Winner (July 2013)
CSPonD Masters Thesis (Feb 2011)
WAOcam Bachelor's Thesis (Feb 2009)
MagIC II (Sept 2007)
POETS IRTF Case (May 2008)

SKILLS

- **Certifications:** USPTO registered filler
- **Holistic Skills:** Rapid prototyping, cost analysis, development plan generation, contract negotiation
- **Engineering Software:** ADINA Inc, SolidWorks, ANSYS (Fluid, 1&2 way FSI, temperature, etc.), Labview, Siemens NX, Inventor
- **Math Packages:** MathCAD, Mathematica, MATLAB, Maple
- **Manufacturing Software:** Omax, MasterCam, GibbsCAM
- **Analysis:** Machine Design, Manufacturing, Structures, Thermal,
- **Languages:** Fluent in Spanish and English. Semi Fluent in Assembly Language.
- **Manufacturing Tools:** CNC Lathe, CNC Mill, CNC Router WaterJet, 3D printing, Drill Press, welding MIG and TIG, and assortment of shop tools. (Over 12 years of experience in machine shop)
- **Website Developer Software:** Dreamweaver CS6, Adobe PhotoShop and Illustrator
- **Other Software:** Wordperfect, MS Office (Word, Excel, Powerpoint), Outlook, FilePro 7, Quicken, Fastrack, and Quickbooks

AWARDS

- Repsol Foundation 3rd Convocation Winner with HAWK Project
- European Union Society of Precision Engineering and Nanotechnology Challenge Winner. First Place July 2013
- MIT Spectrum: Real World Learning. Summer 09.
- Gates Millennium Scholar

(Folkers.Rojas@gmail.com)
<http://www.MillieRojasEngineering.com>

PUBLICATIONS

- Modular apparatus for testing microfluidic cartridge, useful for point-of-care medical diagnostics and other applications. Galit H. Frydman, Alexander H. Slocum, Folkers E. Rojas. W02024073059A2. Pub. Date Apr. 4, 2024
- Modular Multi-Layer Microfluidic Cartridges, Galit H. Frydman, Alexander H. Slocum, Folkers E. Rojas, W02023018723A1 Patent Pub. Date Feb. 16, 2023
- Gray, L.A., Bisoño, A.G., Rojas, F.E., Veroneau, S.S., Slocum, A.H. Caribbean-Wide, Negative Emissions Solution to Sargassum spp. Low Cost Collection Device and Sustainable Disposal Method, Luke Gray, Andres Leon, Folkers Rojas, Samuel Veroneau, Alexander Slocum. Phycology 2021, 1 pg. 49-75.
- Massaging Device, Alexander H. Slocum, Folkers E. Rojas. US Patent 9,839,575 B2. Pub. Date Dec. 12, 2017.
- A Complementary Safety Tool for Blowout Preventers, Folkers E. Rojas, Alexander H. Slocum. Offshore Technology Conference. 2-5 May 2016.
- Entangled Structures as High Cycle Compression Springs, Folkers E. Rojas, Alexander H. Slocum. Precision Engineering Vol 42 (October 2015) 346-351
- Long Thin Structures for Generating an Entangled Flow Restricting Structure, Folkers E. Rojas, Alexander H. Slocum. US Patent 2013/0299191 A1. Pub. Date Nov. 14, 2013.
- Method and Apparatus for Bringing Under Control an Uncontrolled Flow Through a Flow Device, Alexander H. Slocum, Folkers E. Rojas. US Patent 2013/0299195 A1. Pub. Date Nov. 14, 2013.
- Apparatus and Method for Sand Consolidation, Julio C. Guerrero, Adam Paxson, and Folkers E. Rojas. US Patent 8,789,595 B2. Date of Patent: Jul. 29, 2014.
- Slocum, A.H., D.S. Codd, J. Buongiorno, C. Forsberg, T. McKrell, J.C. Nave, C.N. Papanicolas, A. Ghobeity, C.J. Noone, C. Passerini, F. Rojas, A. Mitsos, "Concentrated Solar Power on Demand", Solar Energy 85 (2011) 1519-1529
- Gulbis et al. First Results from the MIT Optical Rapid Imaging System on the IRTF: a stellar occultation by Pluto and a transit by exoplanet XO-2b. Feb 2011. <http://arxiv.org/abs/1102.5248>

LEADERSHIP ROLES

- Machine Shop Part time instructor at Edgerton (3 yrs)
- TA Precision Machine Design (3yrs) related to Medical Devices & Energy Projects

COMMITTEE ROLES

- American Society for Precision Engineering (Task Force: Precision Design TLC Member) - 2023

(Folkers.Rojas@gmail.com)

<http://www.MillieRojasEngineering.com>

5

APPENDIX B

United States Patent Application

For

An improved container

Prepared by

Wilson Daniel Swayze, Jr.

Inventor

Merrilee Kick
3401 Gary Drive
Plano 75023

Field of the Invention

The present invention relates to containers and more particularly to a container having a body which may be formed from plastic and a lid which may be formed from metal.

Background

Containers having an easy-open-end have been used with a metal lid and container in order to provide a source of merchandising beer and soda for a number of years. These metal containers are formed from cutting metal and folding the metal to an appropriate shape. Metal however does not lend itself well to being molded, and making a new shape by designing a mold out of the sheet of metal is time-consuming and expensive. Thus, it is difficult to achieve any type of design in order to increase the desirability of the package/container with a metal container. However, the pop top lid is very popular with consumers and fairly inexpensive to purchase.

Plastic containers have been molded into various shapes and may include various designs in order to increase the attractiveness of the container.

Summary

A container for storing a liquid or a solid may include a container body having a container side wall and a container bottom, and may include a container lid having an easy-open “pop-top arm” which cooperates with a weakened (scored metal) area which provides access to the interior of the container body. The container may also operate with no lid.

The container body may be formed from plastic and the container lid is formed from metal, and the container body may include a vertical or slightly angled neck.

The container body may include a lip, and the bottom wall may include a center protrusion or concave shape.

The bottom wall may include a depression, and the bottom wall may include a radial extending depression.

Brief Description of the Drawings

The invention may be understood by reference to the following description taken in conjunction with the accompanying drawings, in which, like reference numerals identify like elements, and in which:

Figure 1 illustrates a side view of the container body of the present invention;

Figure 2 illustrates a side view of another container body of the present invention;

Figure 3 illustrates a bottom view of the container body of the present invention;

Figure 4 illustrates a top view of the lids and container body of the present invention;

Figure 5 illustrates a section of the lid and lip of the container body of the present invention;

Figure 6 illustrates another lid for the container body of the present invention.

Detailed Description

The present invention combines the flexibility and desirability of a container body 105 which may be formed from molding plastic or other appropriate material and a metal lid to cooperate with the container body which may include a pop top (or easy-open) lid 131 to provide access to the user of the contents of the container body.

Figure 1 illustrates a side view of the container body 105 which may include a side wall 107 which may extend radially around a periphery of the container body 105 and may include a convex side wall 107 or a concave side wall (not shown). The container body 105 may be shaped as a truncated spherical body. The container body 105 may be hollow in order to provide for a solid or liquid which may be dispensed to the user.

The distal end of the container side wall 107 may be connected to a base/bottom wall 109 in order to seal the first end of the container 105 and the proximate end of the container side wall 107 may be connected to a substantially vertical neck 101 around the periphery of the container side wall 107. An aperture 111 may extend through the vertical neck 101 in order to provide access to the liquid/solid within the container body 105. A lip 103

may extend around the periphery of the substantially vertical neck 101 in order to cooperate with the lid 113 in order to provide a seal so that the liquid or solid within the container body 105 does not leak out.

Figure 2 illustrates a side view of another container body 105a which may include a cylinder side wall 107a which may extend radially around a periphery of the container body 105a and may include a substantially vertical side wall 107a. The container body 105a may be hollow in order to provide for a solid or liquid which may be dispensed to the user.

The distal end of the container side wall 107a may be connected to a base/bottom wall 109 in order to seal the first end of the container 105a and the proximate end of the container side wall 107a may be connected to a substantially vertical neck 101 around the periphery of the container side wall 107. An aperture 111 may extend through the vertical neck 101 in order to provide access to the liquid/solid within the container body 105. A lip 103 may extend around the periphery of the substantially vertical neck 101 in order to cooperate with the lid 113 (not shown in figure 2) in order to provide a seal so that the liquid or solid within the container body 105a does not leak out.

The container body 105, 105a may be formed from molded plastic and may be integral without seams or portions of the container body may be formed from molded plastic in sections which may be glued, welded or otherwise attached together.

Figure 3 illustrates a bottom view of the container body 105 and illustrates the container side wall 107 extending radially outwards and illustrates the bottom wall 109 which may be connected to the container side wall 107. The bottom wall 109 may include a multitude of radially extending depressions 115 which may increase in width as the radial distance from the center increases. The depression 115 may be defined by a depression side wall 117 which extends around the periphery of the depression 115. The bottom wall 109 may include a downward extending protrusion 119 which may be centered with respect to the depressions 115 and the bottom wall 109.

Figure 4 illustrates a top view of the container 100 which may include the container body 105 and the container lid 113 which may be deformable in order to provide access to the contents of the container body 105. The

container lid 113 may extend over the vertical neck 107 and may extend around the lip 103 as illustrated in Figure 5 in order to provide a substantially watertight seal/airtight seal for the contents of the container body 105.

The container lid 113 may be formed from metal such as steel, aluminum or other types of metals and may include a weakened (or scored) area 135 which deforms and provides an opening when the 'pull top' arm 133 which may include an aperture for a finger of the user and may be pivoted by the user. The weakened area 135 may extend substantially across the entire lid 131 to provide a full aperture lid to allow the user to add other contents to the container.

The container body 105 according to the present invention may be made of an appropriate plastic/synthetic resin, typically polyethylene terephthalate (PET) resin. Alternatively, however, the container 105 may be made from polyamid resin, polycarbonate resin, polyacetal resin, polybutylene terephthalate resin or other synthetic resin having a sufficient resistance to chemicals. The container 1 may be formed by known molding processes,

such as biaxial orientation blow molding process or direct blow molding process or injection blow molding.

Figure 6 illustrates another container lid of the present invention. The container lid 613 may be formed from metal such as steel, aluminum or other types of metals and may include a weakened (or scored) area 635 which deforms and provides an opening when the 'pull top' arm 633 which may include an aperture for a finger of the user and may be pivoted by the user. The weakened area 635 may extend substantially across the entire lid 613 to provide a full aperture lid to allow the user to add other contents to the container.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and are herein described in detail. It should be understood, however, that the description herein of specific embodiments is not intended to limit the invention to the particular forms disclosed.

Claims

1) A container for storing a liquid or a solid, comprising:
a container body having a container convex side wall and a container bottom;
a container lid having a pop top arm to pivot and cooperate with a weakened area to provide access to the interior of the container body;
wherein the container body is formed from plastic and any container lid is formed from metal.

2) A container for storing a liquid or a solid as in claim 1, wherein the container body includes a vertical or angled neck.

3) A container for storing a liquid or a solid as in claim 1, wherein the container body includes a lip.

4) A container for storing a liquid or a solid as in claim 1, wherein the bottom wall includes a center protrusion.

5) A container for storing a liquid or a solid as in claim 1, wherein the bottom wall includes a depression.

6) A container for storing a liquid or a solid as in claim 1, wherein the bottom wall includes a radial extending depression.

7) A container for storing a liquid or a solid as in claim 1, wherein the container body is a truncated spherical shape.

Abstract

A container for storing a liquid or a solid may include a container body having a container side wall and a container bottom and a container lid having a pop top arm to pivot and cooperate with a weakened area to provide access to the interior of the container body. The container body may be formed from plastic and the container lid is formed from metal, and the container body may include a vertical neck. The container body may include a lip, and the bottom wall may include a center protrusion. The bottom wall may include a depression, and the bottom wall may include a radial extending depression.

Figure 1

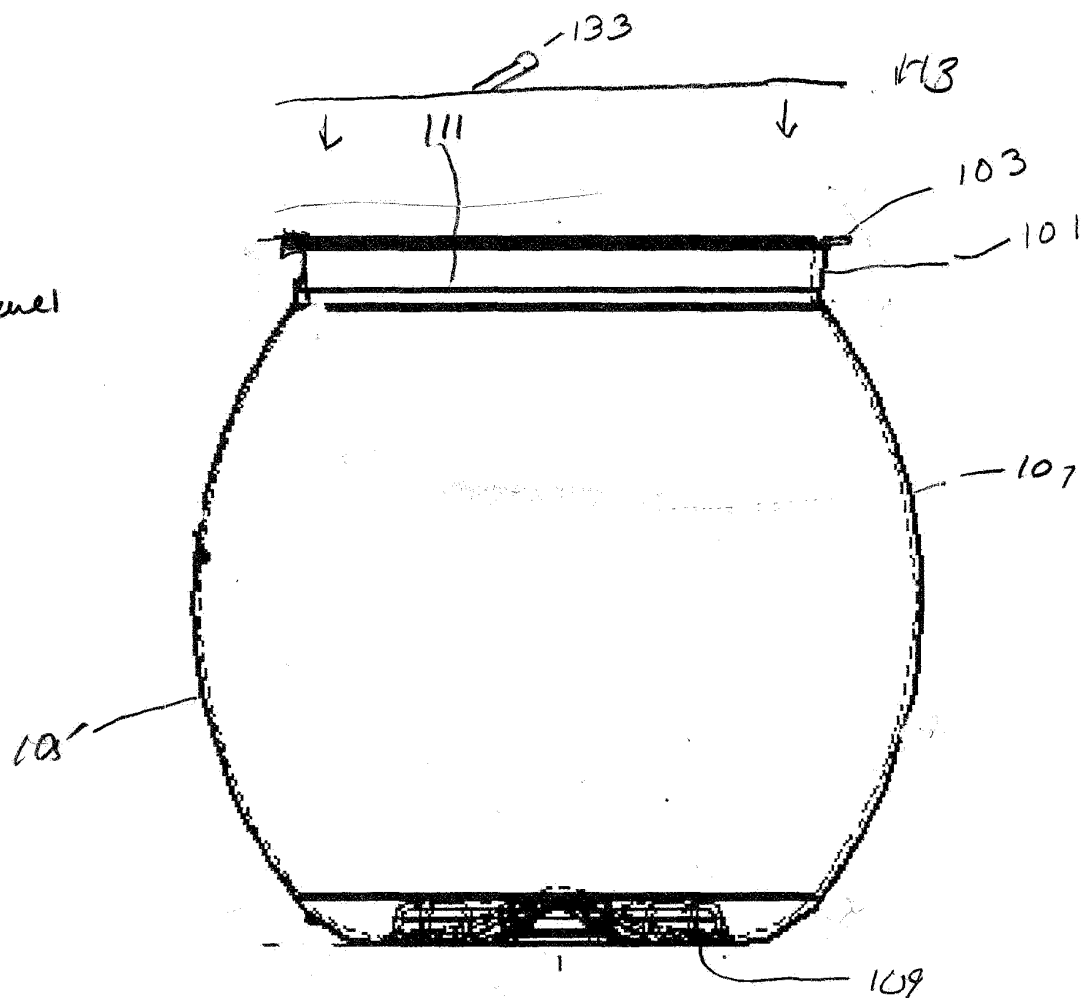
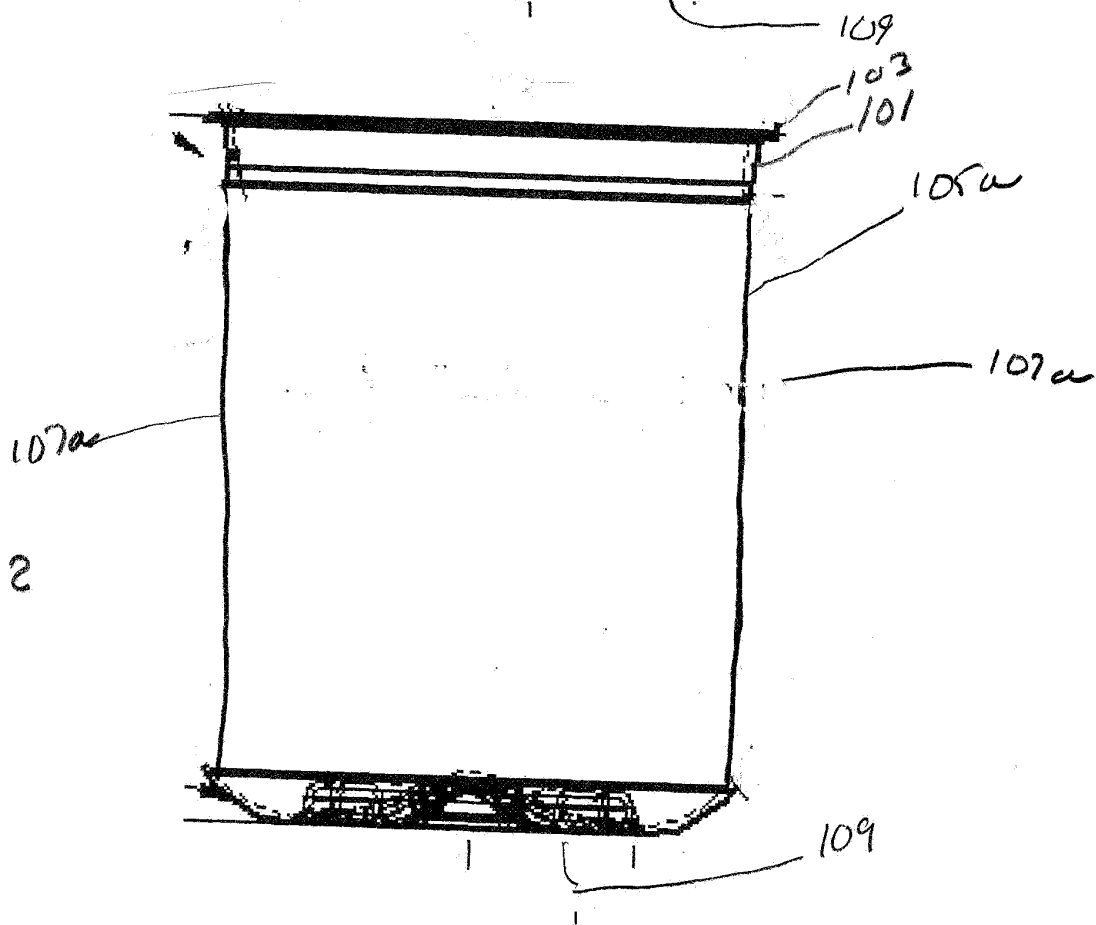


Figure 2



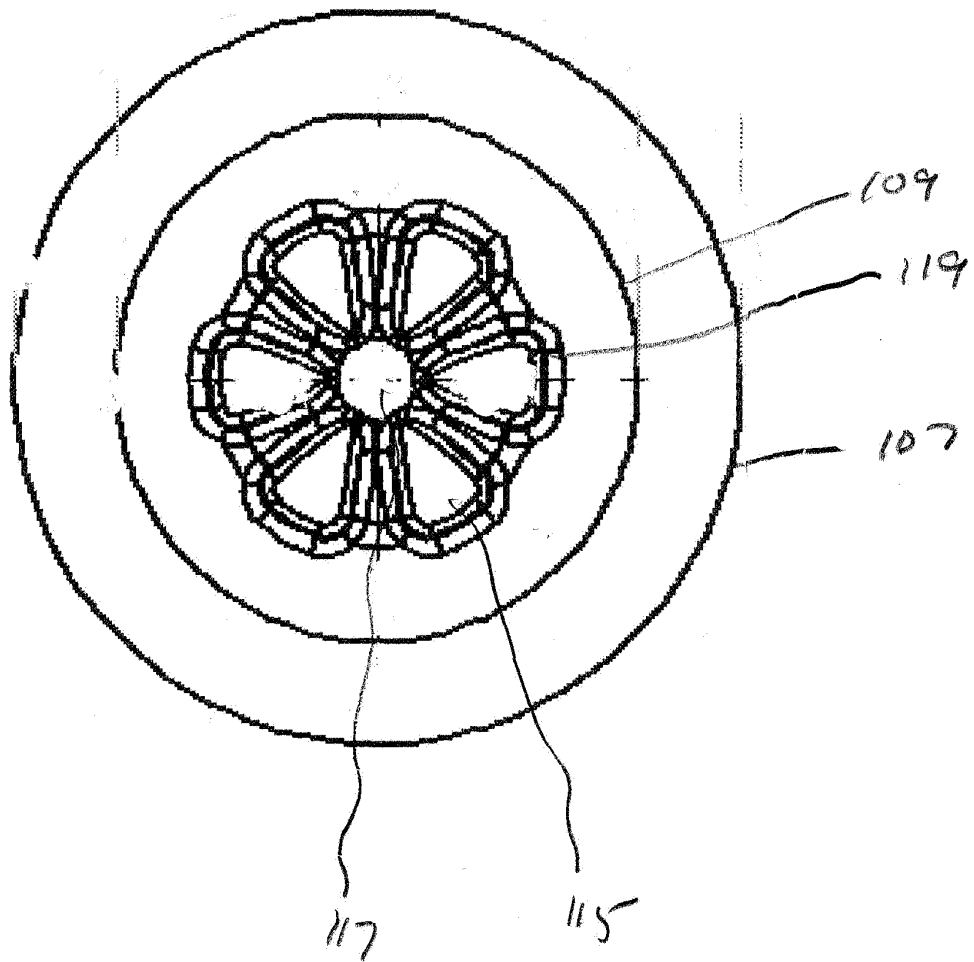


Figure 3

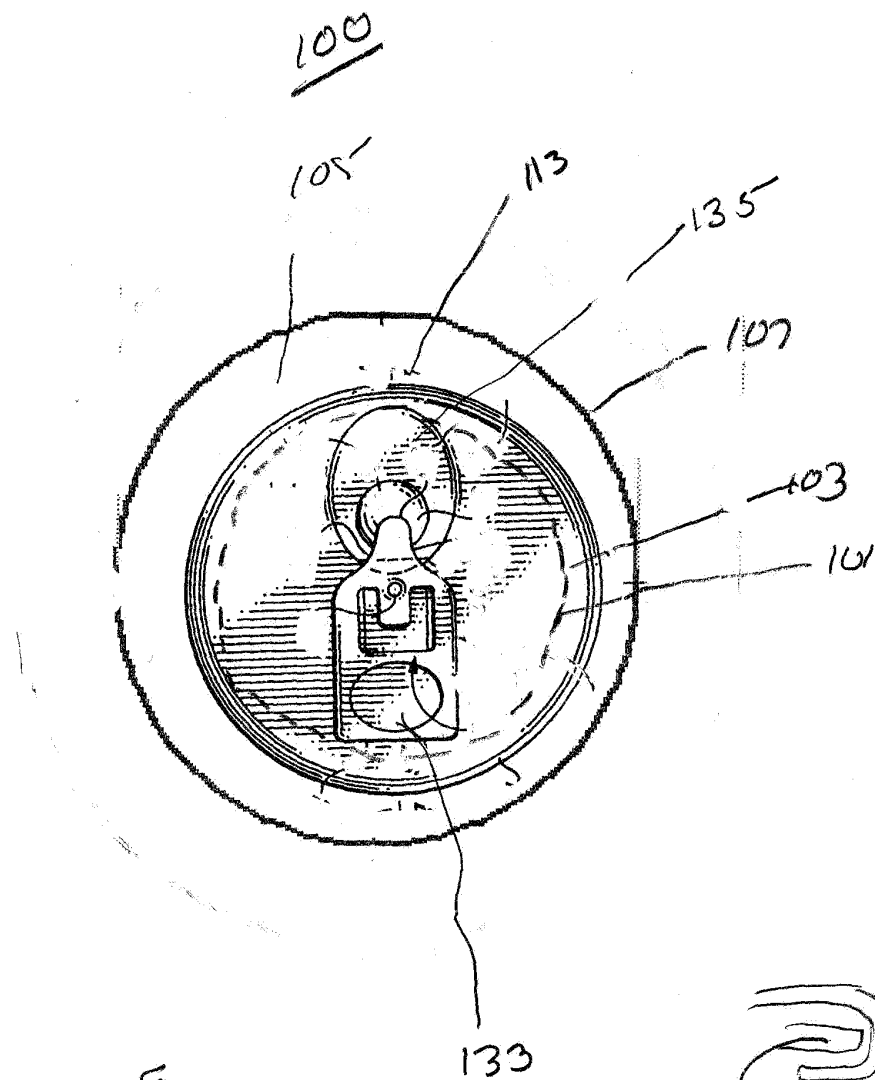


Figure 4

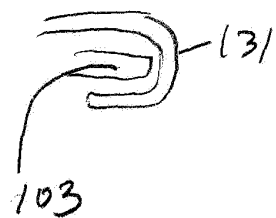


Figure 5

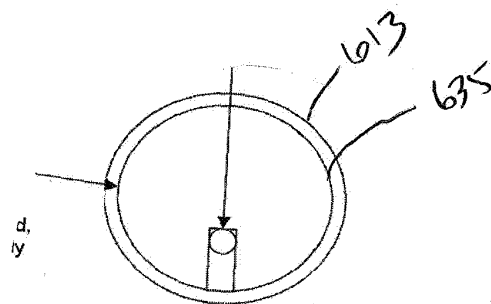
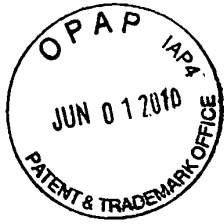


Figure 6

APPENDIX C



United States Patent Application

For

An improved container

Application Number: 12/762,934

Inventor

Merrilee Kick

3401 Gary Drive

Plano 75023

Field of the Invention

The present invention relates to containers and more particularly to a container having a body which may be formed from plastic and a lid which may be formed from metal.

Background

Containers having an easy-open-end have been used with a metal lid and container in order to provide a source of merchandising beer and soda for a number of years. These metal containers are formed from cutting metal and folding the metal to an appropriate shape. Metal however does not lend itself well to being molded, and making a new shape by designing a mold out of the sheet of metal is time-consuming and expensive. Thus, it is difficult to achieve any type of design in order to increase the desirability of the package/container with a metal container. However, the pop top lid is very popular with consumers and fairly inexpensive to purchase. Plastic containers have been molded into various shapes and may include various designs in order to increase the attractiveness of the container.

Summary

A container for storing a liquid or a solid may include a container body having a container side wall and a container bottom, and may include a container lid having an easy-open “pop-top arm” which cooperates with a weakened (scored metal) area which provides access to the interior of the container body. The container may also operate with no lid.

The container body may be formed from plastic and the container lid is formed from metal, and the container body may include a vertical or slightly angled neck. The container body may include a lip, and the bottom wall may include a center protrusion or concave shape. The bottom wall may include a depression, and the bottom wall may include a radial extending depression.

Brief Description of the Drawings

The invention may be understood by reference to the following description taken in conjunction with the accompanying drawings, in which, like reference numerals identify like elements, and in which:

Figure 1 illustrates a side view of the container body of the present invention;

Figure 2 illustrates a side view of another container body of the present invention;

Figure 3 illustrates a bottom view of the container body of the present invention;

Figure 4 illustrates a top view of the lids and container body of the present invention;

Figure 5 illustrates a section of the lid and lip of the container body of the present invention;

Figure 6 illustrates another lid for the container body of the present invention.

Detailed Description

The present invention combines the flexibility and desirability of a container body 105 which may be formed from molding plastic or other appropriate material and a metal lid to cooperate with the container body which may include a pop top (or easy-open) lid 131 to provide access to the user of the contents of the container body.

Figure 1 illustrates a side view of the container body 105 which may include a side wall 107 which may extend radially around a periphery of the container body 105 and may include a convex side wall 107 or a concave side wall (not shown). The container body 105 may be shaped as a truncated spherical body. The container body 105 may be hollow in order to provide for a solid or liquid which may be dispensed to the user.

The distal end of the container side wall 107 may be connected to a base/bottom wall 109 in order to seal the first end of the container 105 and the proximate end of the container side wall 107 may be connected to a substantially vertical neck 101 around the periphery of the container side wall 107. An aperture 111 may

extend through the vertical neck 101 in order to provide access to the liquid/solid within the container body 105. A lip 103 may extend around the periphery of the substantially vertical neck 101 in order to cooperate with the lid 113 (Not shown on Figure 1, but it is seen on Figure 4, 5, and 6) in order to provide a seal so that the liquid or solid within the container body 105 does not leak out.

The container body 105 according to the present invention may be made of an appropriate plastic/synthetic resin, typically polyethylene terephthalate (PET) resin. Alternatively, however, the container 105 may be made from polyamide resin, polycarbonate resin, polyacetal resin, polybutylene terephthalate resin or other synthetic resin having a sufficient resistance to chemicals. The container may be formed by known molding processes, such as biaxial orientation blow molding process or direct blow molding process or injection blow molding.

Figure 2 illustrates a side view of another container body 105a which may include a cylinder side wall 107a which may extend radially around a periphery of the container body 105a and may include a

substantially vertical side wall 107a. The container body 105a may be hollow in order to provide for a solid or liquid which may be dispensed to the user. The distal end of the container side wall 107a may be connected to a base/bottom wall 109 in order to seal the first end of the container 105a and the proximate end of the container side wall 107a may be connected to a substantially vertical neck 101 around the periphery of the container side wall 107. An aperture 111 may extend through the vertical neck 101 in order to provide access to the liquid/solid within the container body 105. A lip 103 may extend around the periphery of the substantially vertical neck 101 in order to cooperate with the lid 113 (not shown in Figure 2) in order to provide a seal so that the liquid or solid within the container body 105a does not leak out.

The container body of 105a may be formed from molded plastic and may be integral without seams or portions of the container body may be formed from molded plastic in sections which may be glued, welded or otherwise attached together.

The container body 105a according to the present invention may be made of an appropriate plastic/synthetic resin, typically

polyethylene terephthalate (PET) resin. Alternatively, however, the container 105a may be made from polyamide resin, polycarbonate resin, polyacetal resin, polybutylene terephthalate resin or other synthetic resin having a sufficient resistance to chemicals. The container may be formed by known molding processes, such as biaxial orientation blow molding process or direct blow molding process or injection blow molding.

Figure 3 illustrates a bottom view of the container body and illustrates the container side wall 107 extending radially outwards and illustrates the bottom wall 109 which may be connected to the container side wall 107. The bottom wall 109 may include a multitude of radially extending depressions 115 which may increase in width as the radial distance from the center increases. The depression 115 may be defined by a depression side wall 117 which extends around the periphery of the depression 115. The bottom wall 109 may include a downward extending protrusion 119 which may be centered with respect to the depressions 115 and the bottom wall 109.

Figure 4 illustrates a top view of the container which may include the container body 105 and the container lid 113 which may be deformable in order to provide access to the contents of the container body 105. The container lid 113 may be formed from metal such as steel, aluminum or other types of metals and may include a weakened (or scored) area 135 which deforms and provides an opening when the 'pull top' arm 133 which may include an aperture for a finger of the user and may be pivoted by the user. The weakened/scored area 135 may partially open to provide access to the contents of the container.

Figure 5 illustrates a side view of the container lid 103 which may extend over the vertical neck 107 and may extend around the lip 131 in order to provide a substantially watertight seal/airtight seal for the contents of the container body 105.

Figure 6 illustrates another container lid of the present invention. The container lid 613 may be formed from metal such as steel, aluminum or other types of metals and may include a weakened (or scored) area 635 which deforms and provides an opening

when the 'pull tab' arm 633 which may include an aperture for a finger of the user and may be pivoted by the user. The weakened area 635 may extend substantially across the entire lid 613 to provide a full aperture lid to allow the user to add other contents to the container.

Figure 7 illustrates the thicknesses of the plastic sidewalls, neck and flange. This also illustrates the maximum volume of fluid, and the location for the "fill line" during the container filling process.

Figure 8 illustrates the general dimensions of the rounded container in millimeters (cylindrical container measurements not shown from Figure 2).

Figure 9 illustrates the bottom view of the container.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and are herein described in detail. It should be

understood, however, that the description herein of specific embodiments is not intended to limit the invention to the particular forms disclosed.

Claims

1. A container for storing a liquid or a solid, comprising of a container body having a container convex side wall and a container bottom;
2. A container lid having a pop top arm to pivot and cooperate with a weakened area to provide access to the interior of the container body; wherein the container body is formed from plastic and any container lid is formed from metal.
3. A container for storing a liquid or a solid as in Claim 1, wherein the container body includes a vertical or angled neck.
4. A container for storing a liquid or a solid as in Claim 1, wherein the container body includes a lip.
5. A container for storing a liquid or a solid as in Claim 1, wherein the bottom wall includes a center protrusion.
6. A container for storing a liquid or a solid as in Claim 1, wherein the bottom wall includes a depression.
7. A container for storing a liquid or a solid as in Claim 1, wherein the bottom wall includes a radial extending depression.

8. A container for storing a liquid or a solid as in Claim 1, wherein the container body is a truncated spherical shape.

Abstract

A container for storing a liquid or a solid may include a container body having a container side wall and a container bottom and a container lid having a pop top arm to pivot and cooperate with a weakened area to provide access to the interior of the container body. The container body may be formed from plastic and the container lid is formed from metal, and the container body may include a vertical neck. The container body may include a lip, and the bottom wall may include a center protrusion. The bottom wall may include a depression, and the bottom wall may include a radial extending depression.

Container Shape

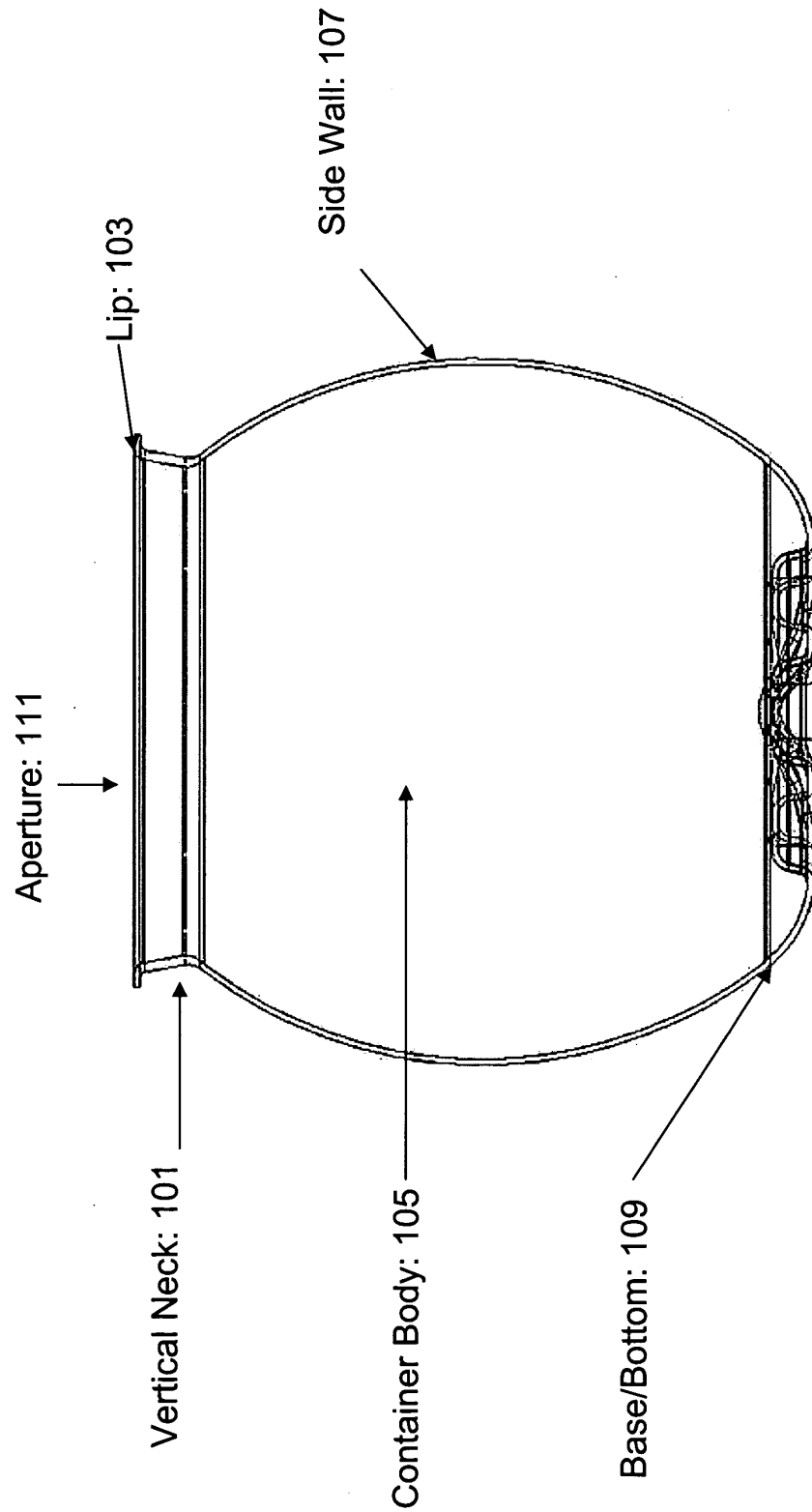


Figure 1

Date: May 22, 2010

Buzzballz, LLC
1711 Briercroft Court, Suite 100
Carrollton, TX 75006
Application Number: 12/762,934

Container Shape

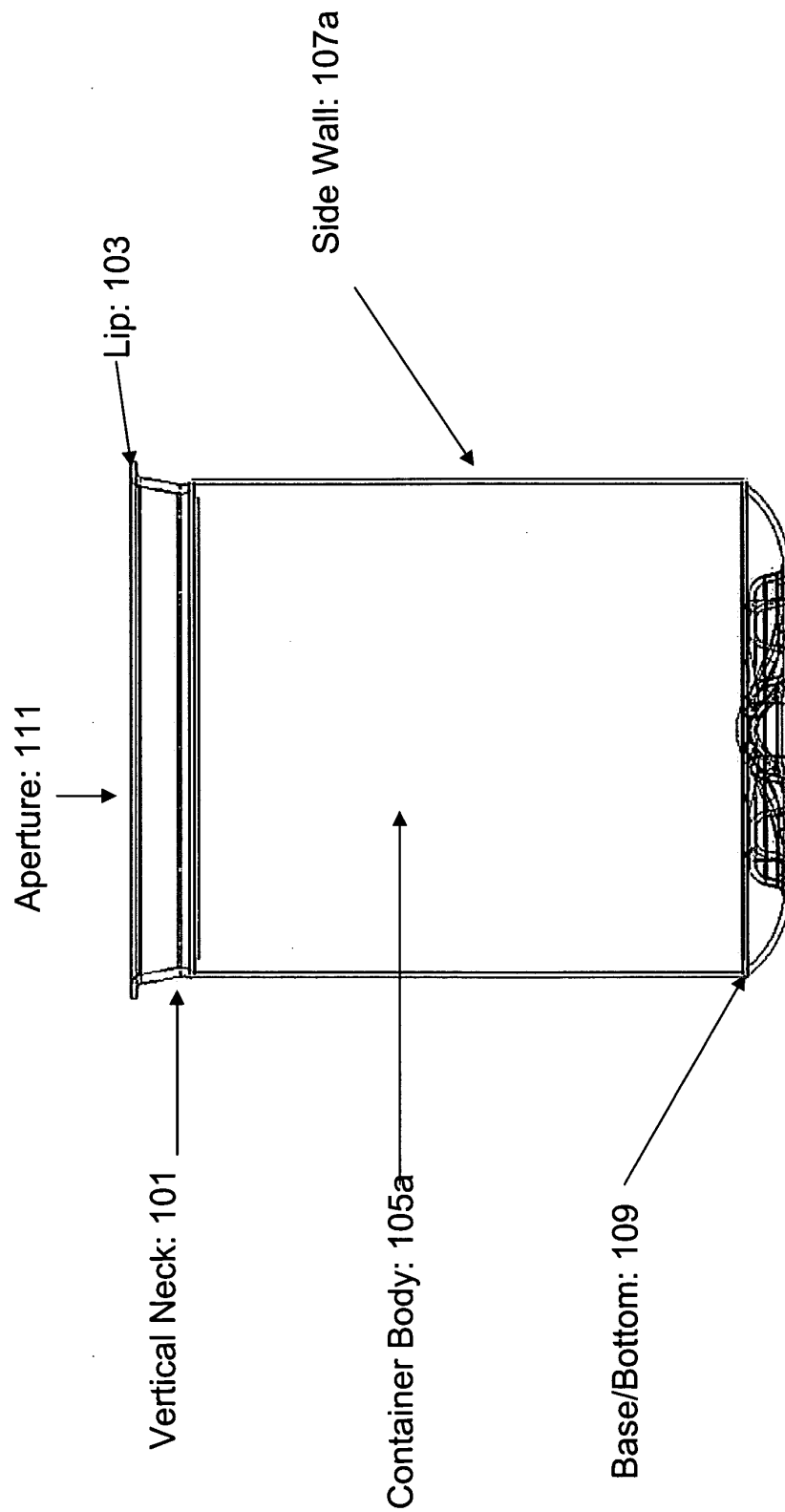


Figure 2

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Application Number: 12/762,934

Bottom of Container

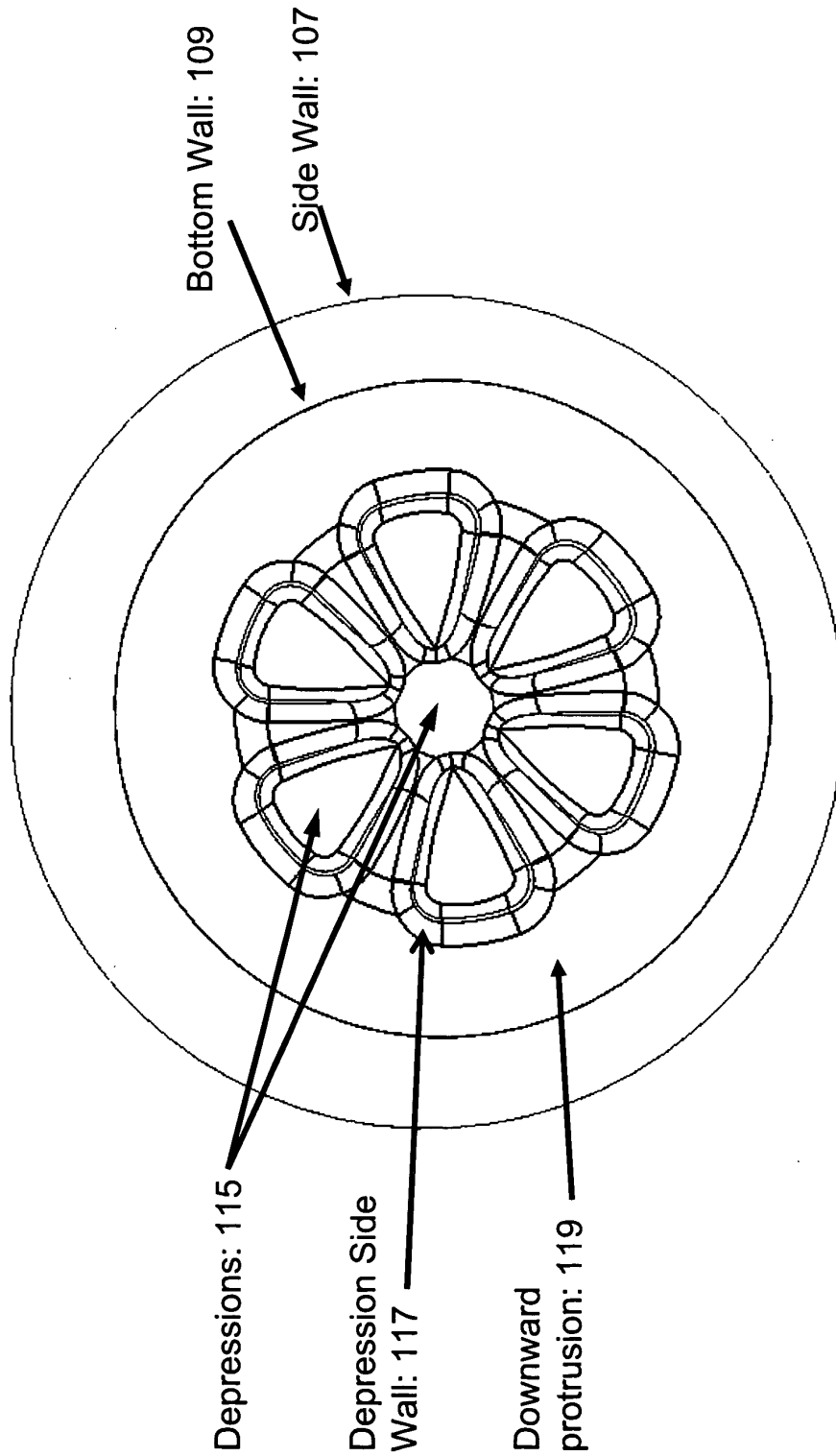


Figure 3

Buzzballz, LLC
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Carrollton, TX 75006
Application Number: 12/762,934

Date: May 22, 2010

Top View with Easy Open Lid Partial Aperture (Aluminum)

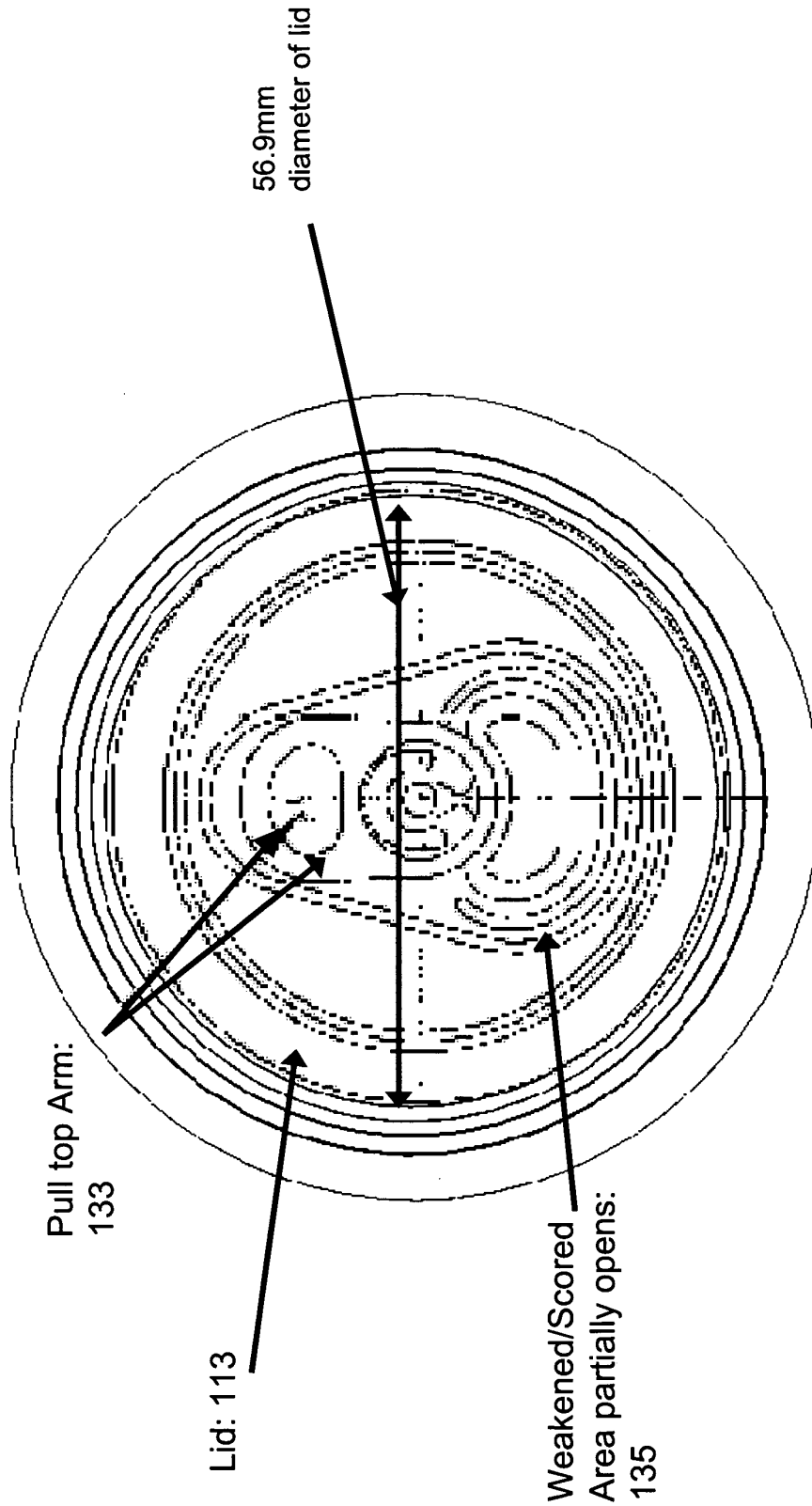


Figure 4

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Carrollton, TX 75006
Application Number: 12/762,934

Date: May 22, 2010

Side View - Lid & Lip of Container

(Note: The lip and lid are enlarged to show hook)

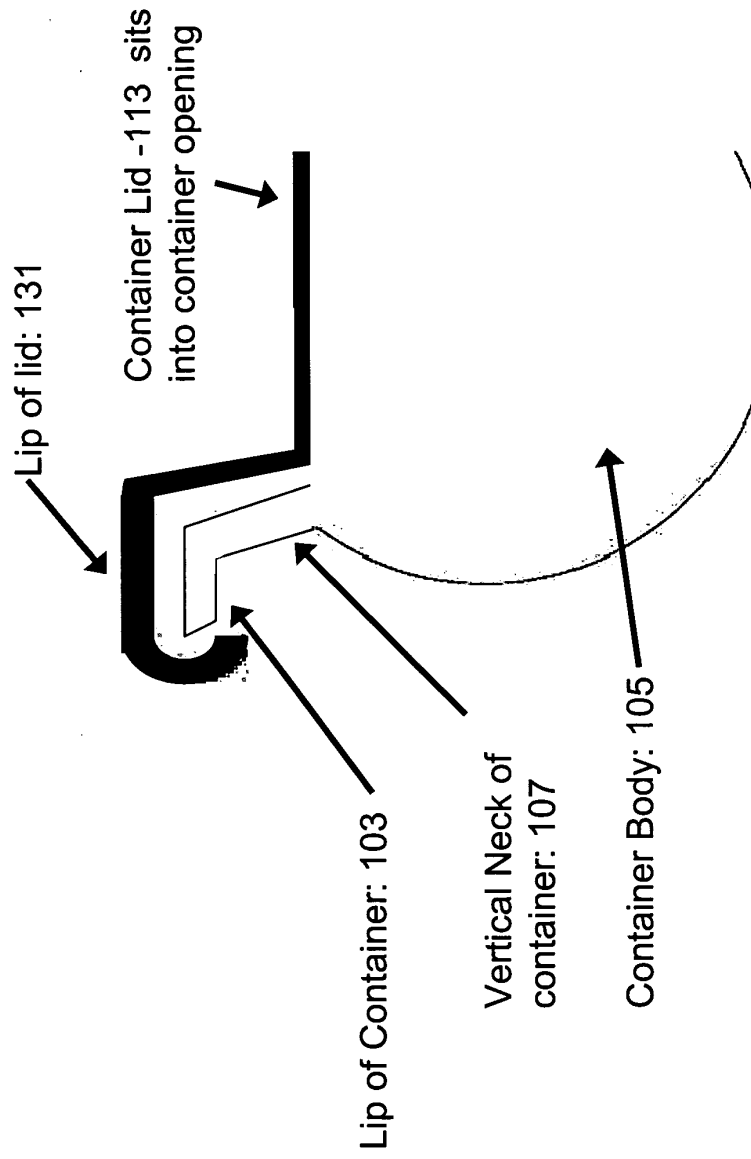


Figure 5

Date: May 22, 2010

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Carrollton, TX 75006
Application Number: 12/762,934

Top View of Container With Easy Open Lid Fully Open Lid (Aluminum)

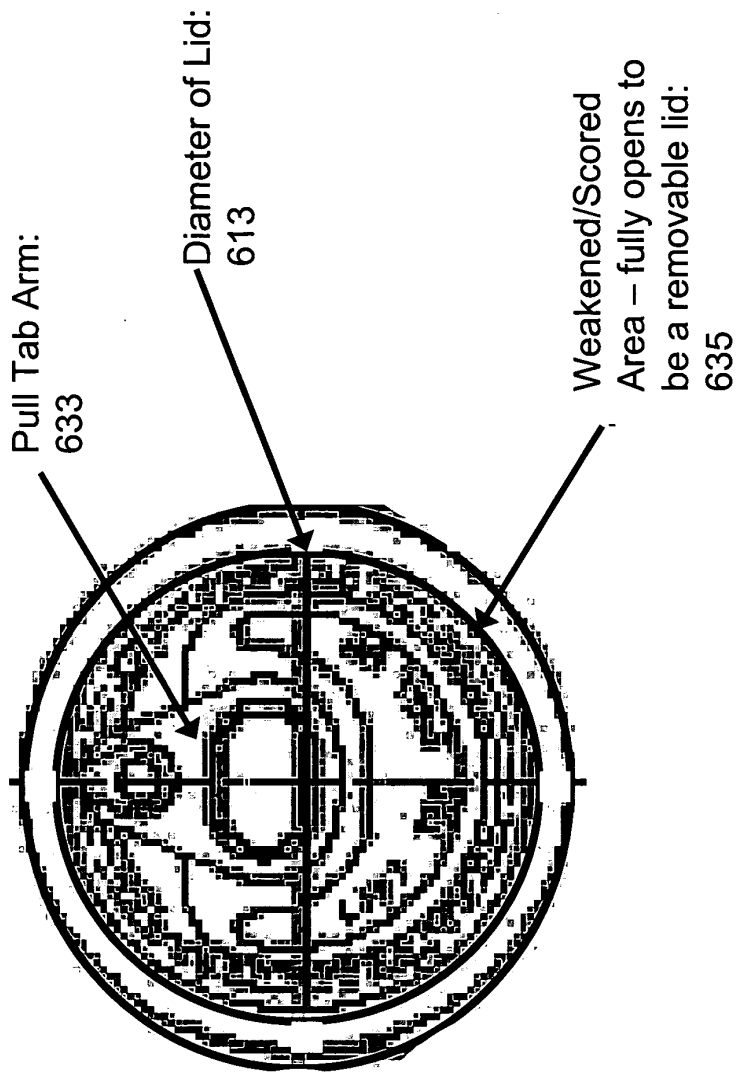


Figure 6

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Thickness of Sidewalls & Volume

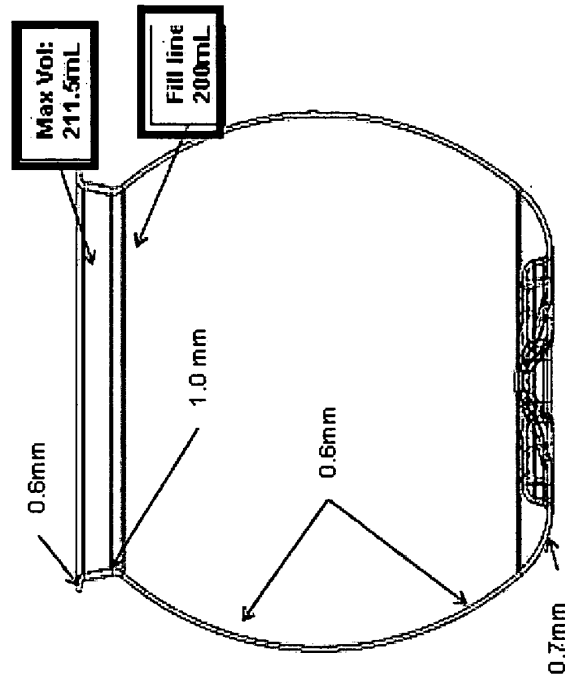


Figure 7

Date: May 22, 2010

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Measurements in Millimeters

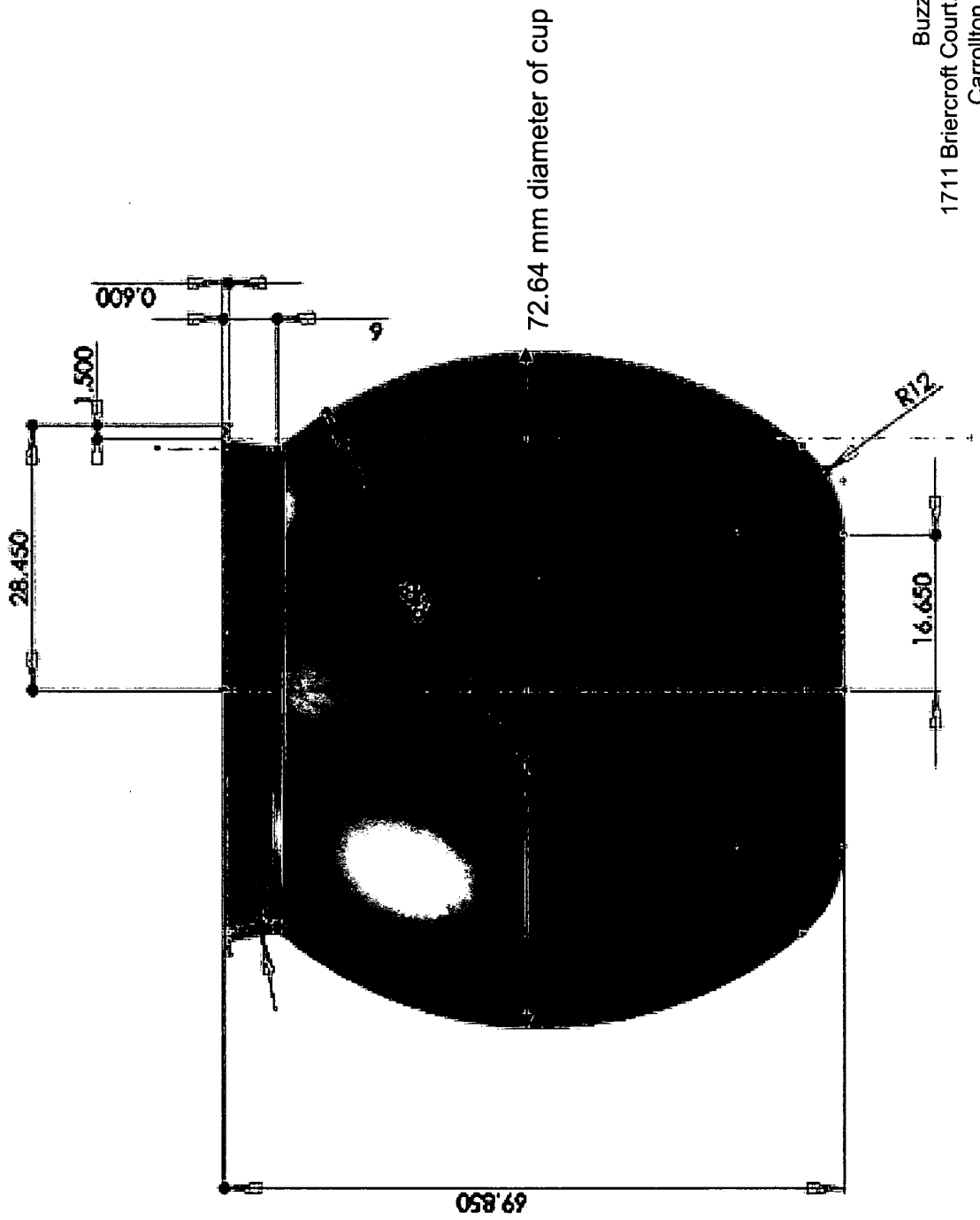


Figure 8

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View:
Bottom of Container

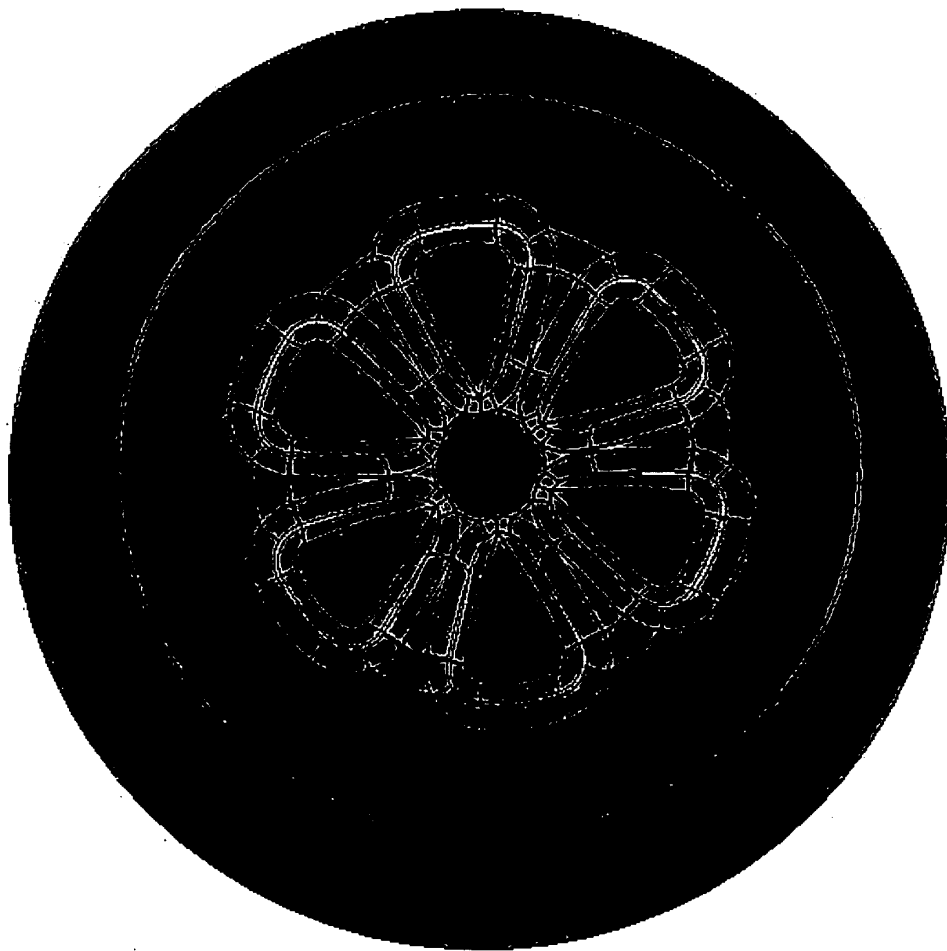


Figure 9

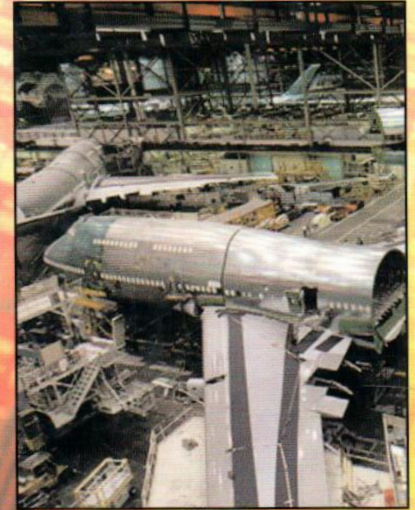
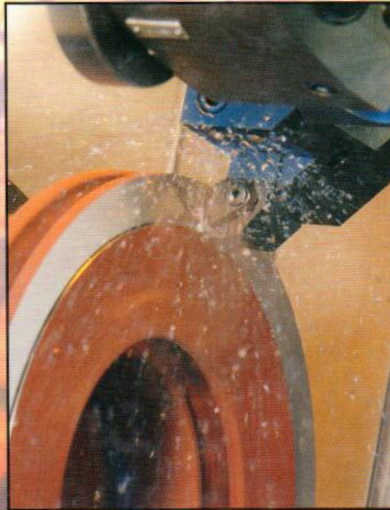
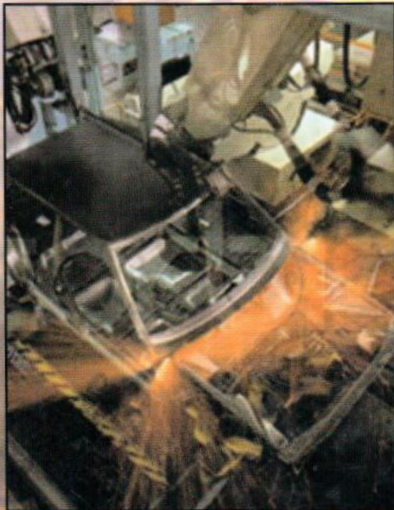
Date: May 22, 2010

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Application Number: 12/762,934

APPENDIX D

MANUFACTURING ENGINEERING AND TECHNOLOGY

FIFTH EDITION



Serope Kalpakjian • Steven R. Schmid

Manufacturing Engineering and Technology

FIFTH
EDITION

Serope Kalpakjian

Illinois Institute of Technology

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The University of Notre Dame



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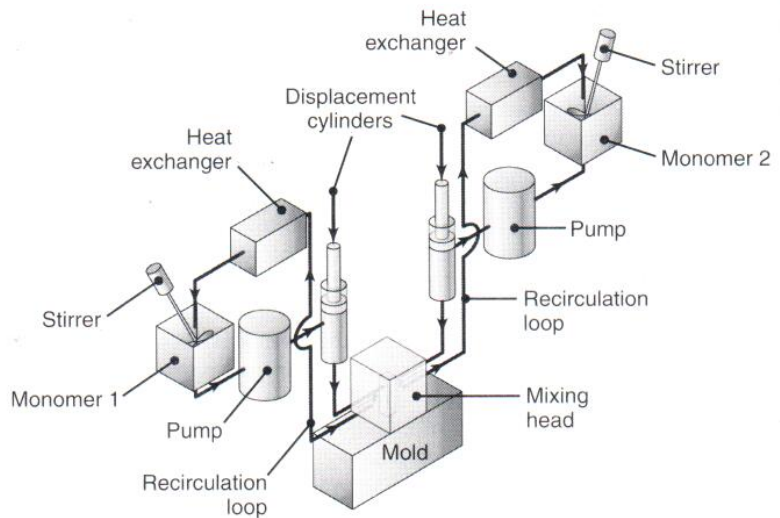


FIGURE 19.15 Schematic illustration of the reaction-injection molding process. Typical parts made are automotive-body panels, water skis, and thermal insulation for refrigerators and freezers.

19.4 Blow Molding

Blow molding is a modified extrusion- and injection-molding process. In **extrusion blow molding**, a tube or preform (usually oriented so that it is vertical) is first extruded. It is clamped into a mold with a cavity much larger than the tube diameter and blown outward to fill the mold cavity (Fig. 19.16a). Depending on the material, the blow ratio may be as high as 7:1. Blowing usually is done with a hot-air blast at a pressure ranging from 350 to 700 kPa (50 to 100 psi). Drums with a volume as large as 2000 liters (530 gallons) can be made by this process. Typical die materials are steel, aluminum, and beryllium copper.

In some operations, the extrusion is continuous, and the molds move with the tubing. The molds close around the tubing, sealing off one end, breaking the long tube into individual sections, and moving away as air is injected into the tubular piece. The part then is cooled and ejected from the mold. Corrugated-plastic pipe and tubing are made by continuous blow molding in which the pipe or tubing is extruded horizontally and blown into moving molds.

In **injection blow molding**, a short tubular piece (*parison*) first is injection-molded (Fig. 19.16b) into cool dies (parisons may be made and stored for later use). The dies open, and the parison is transferred to a blow-molding die by an indexing mechanism (Fig. 19.16c). Hot air is injected into the parison, expanding it to the walls of the mold cavity. Typical products made are plastic beverage bottles (typically made of polyethylene or polyetheretherketone, PEEK) and small, hollow containers. A related process is **stretch blow molding**, where the parison is expanded and elongated simultaneously, subjecting the polymer to biaxial stretching and thus enhancing its properties.

Multilayer blow molding involves the use of coextruded tubes or parisons and thus permits the production of a multilayer structure (see Fig. 19.4b). A typical

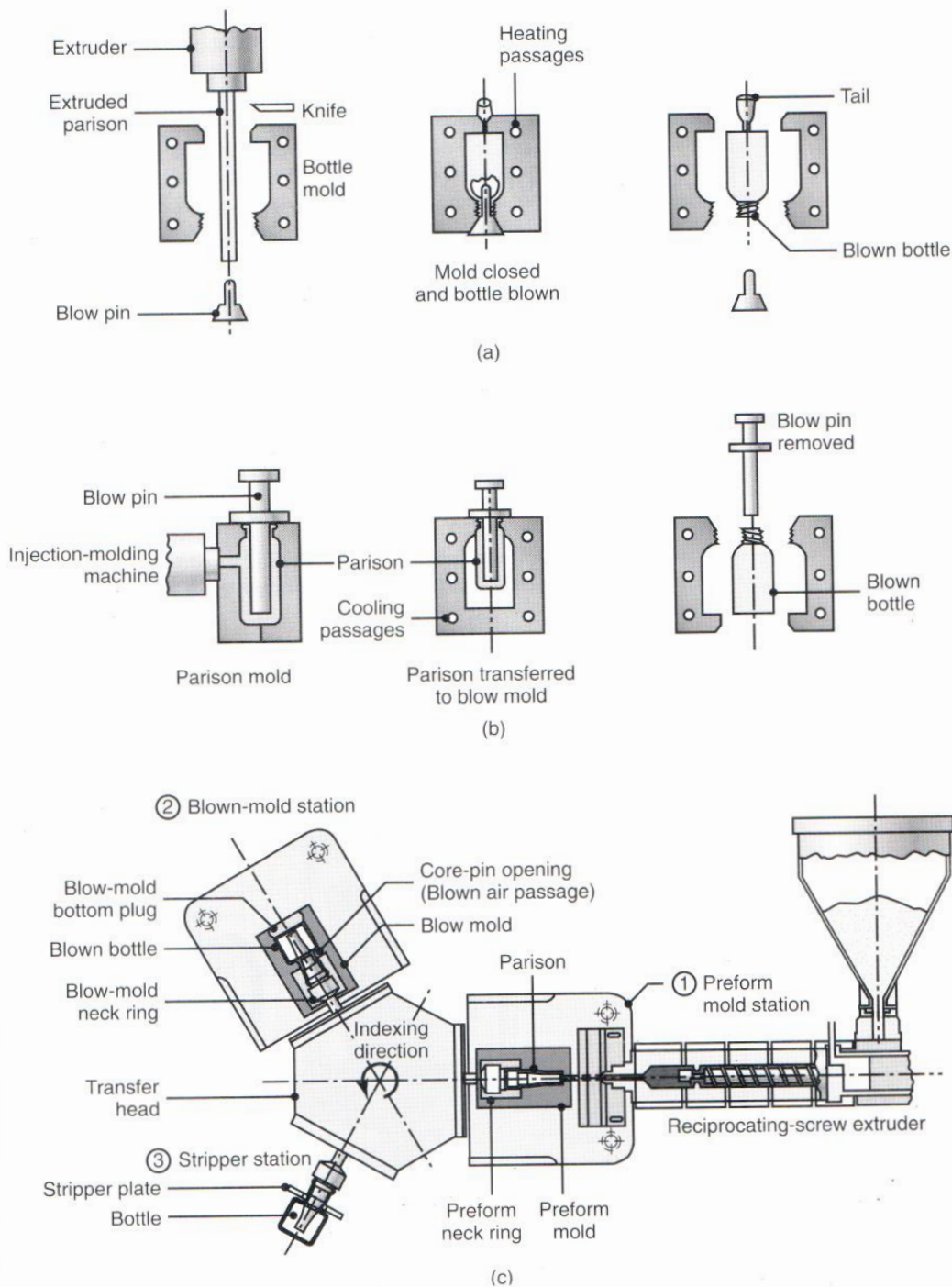


FIGURE 19.16 Schematic illustrations of (a) the extrusion blow-molding process for making plastic beverage bottles; (b) the injection blow-molding process; and (c) a three-station injection blow-molding machine for making plastic bottles.

example of such a product is plastic packaging for food and beverages, having such characteristics as odor and permeation barrier, taste and aroma protection, scuff resistance, the capability of being printed, and the ability to be filled with hot fluids. Other applications of this process are for containers in the cosmetics and the pharmaceutical industries.

19.5 Rotational Molding

Most thermoplastics and some thermosets can be formed into large, hollow parts by *rotational molding*. In this process, a thin-walled metal mold is made in two pieces (split-female mold) and is designed to be rotated about two perpendicular axes (Fig. 19.17). For each part cycle, a premeasured quantity of powdered plastic material is placed inside the warm mold. (The powder is obtained from a polymerization process that precipitates a powder from a liquid.) Then the mold is heated (usually in a large oven) and is rotated continuously about the two principal axes.

This action tumbles the powder against the mold, where the heat fuses the powder without melting it. For thermosetting parts, a chemical agent is added to the powder; cross-linking occurs after the part is formed in the mold. The machines are highly automated with parts moved by an indexing mechanism similar to that shown in Fig. 19.16c.

A large variety of parts are made by rotational molding, such as storage tanks of various sizes, trash cans, boat hulls, buckets, housings, large hollow toys, carrying

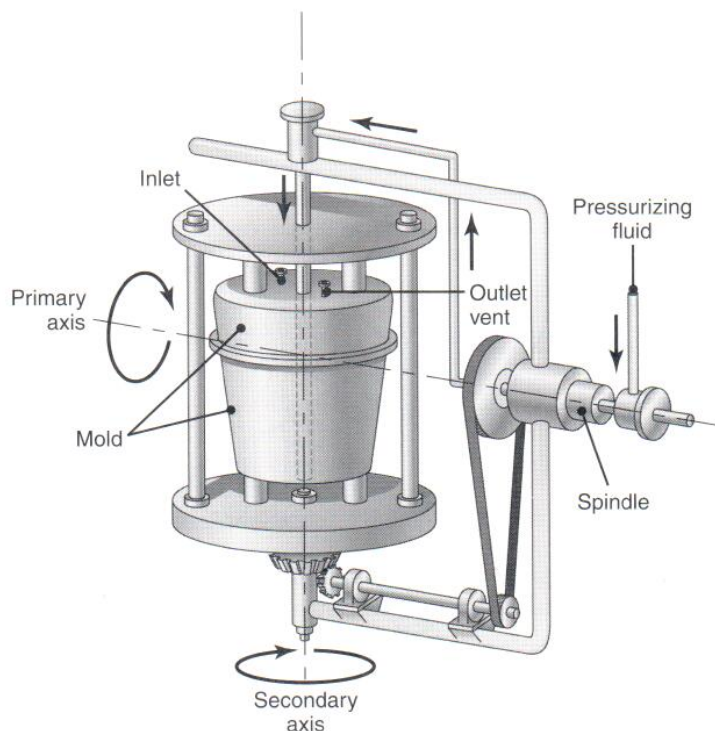


FIGURE 19.17 The rotational molding (rotomolding or rotocasting) process. Trash cans, buckets, and plastic footballs can be made by this process.

- Wear of tools, dies, and molds can affect the dimensional accuracy of the parts produced.
- Human errors and miscalculations.

As a result of these factors, the dimensions of parts will vary, thus making continuous monitoring during production necessary.

35.7 General Characteristics and Selection of Measuring Instruments

The characteristics and quality of measuring instruments generally are described by various specific terms, defined as follows (in alphabetical order):

- **Accuracy:** The degree of agreement of the measured dimension with its true magnitude.
- **Amplification:** See Magnification.
- **Calibration:** Adjusting or setting an instrument to give readings that are accurate within a reference standard.
- **Drift:** See Stability.
- **Linearity:** The accuracy of the readings of an instrument over its full working range.
- **Magnification:** The ratio of instrument output to the input dimension (also called *amplification*).
- **Precision:** Degree to which an instrument gives repeated measurement of the same standard.
- **Repeat accuracy:** The same as accuracy, but repeated many times.
- **Resolution:** Smallest dimension that can be read on an instrument.
- **Rule of 10 (*gage maker's rule*):** An instrument or gage should be 10 times more accurate than the dimensional tolerances of the part being measured. (A factor of 4 is known as the *mil standard rule*).
- **Sensitivity:** Smallest difference in dimension that an instrument can distinguish or detect.
- **Speed of response:** How rapidly an instrument indicates the measurement, particularly when a number of parts are measured in rapid succession.
- **Stability:** An instrument's capability to maintain its calibration over a period of time (also called *drift*).

Selection of an appropriate measuring instrument for a particular application also depends on (a) the size and type of parts to be measured, (b) the environment (temperature, humidity, dust, and so on), (c) operator skills required, and (d) the cost of equipment.

35.8 Geometric Dimensioning and Tolerancing

Individually manufactured parts and components eventually are assembled into products. We take it for granted that when a thousand lawnmowers are manufactured and assembled, each part of the mower will mate properly with another component. For example, the wheels of the lawnmower will slip easily into their axles, or the pistons will fit properly into the cylinders, being neither too tight nor too loose.

Likewise, when we have to replace a broken or worn bolt on an old machine, we purchase an identical bolt. We are confident from similar experiences in the past that the new bolt will fit properly in the machine. The reason we feel confident is that the bolt is manufactured according to certain standards and the dimensions of all similar bolts will vary by only a small, specified amount.

In other words, all bolts are manufactured within a certain range of dimensional tolerance; thus, all similar bolts are *interchangeable*. We also expect that the new bolt will function satisfactorily for a period of time, unless abused or misused. Bolts periodically are subjected to various tests during their production to make sure that their quality is within certain specifications.

Dimensional tolerance. This is defined as the permissible or acceptable variation in the dimensions (height, width, depth, diameter, and angles) of a part. The root of the word “tolerance” is the Latin *tolerare*, meaning “to endure” or “put up with.” Tolerances are unavoidable, because it is virtually impossible (and unnecessary) to manufacture two parts that have precisely the same dimensions.

Furthermore, because close dimensional tolerances can increase the product cost significantly, a narrow tolerance range is undesirable economically. However, for some parts, close tolerances are necessary for proper functioning and are worth the added expense associated with narrow tolerance ranges. Examples are precision measuring instruments and gages, hydraulic pistons, and bearings for aircraft engines.

Measuring dimensional tolerances and features of parts rapidly and reliably can be a challenging task. For example, each of the 6 million parts on a Boeing 747-400 aircraft requires the measurement of about 25 features, representing a total of 150 million measurements.

Surveys have shown that the dimensional tolerances on state-of-the-art manufactured parts are shrinking by a factor of 3 every 10 years, and that this trend will continue. It is estimated that accuracies of (a) conventional turning and milling machines will rise from the present 7.5 to 1 μm , (b) diamond-wheel wafer-slicing machines for semiconductor fabrication to 0.25 μm , (c) precision diamond turning machines to 0.01 μm , and (d) ultraprecision ion-beam machining to less than 0.001 μm . (See also Fig. 25.17.)

Importance of tolerance control. Dimensional tolerances become important only when a part is to be assembled or mated with another part. Surfaces that are free and not functional do not need close tolerance control. Thus, for example, the accuracy of the holes and the distance between the holes for a connecting rod are far more critical than the rod’s width and thickness at various locations along its length (see Fig. 14.7).

To appreciate the importance of dimensional tolerances, let’s assemble a simple round shaft (axle) and a wheel with a round hole. Assume that we want the axle’s diameter to be 1 in. (Fig. 35.17). We go to a hardware store and purchase a 1-in. round rod and a wheel with a 1-in. hole. Will the rod fit into the hole without forcing it or will it be loose in the hole? The 1-in. dimension is the **nominal size** of the shaft. If we purchase such a rod from a different store, at a different time, and select one randomly from a large lot, the chances are that each rod will have a slightly different diameter. Machines with the same setup may produce rods of slightly different diameters, depending on a number of factors, such as speed of operation, temperature, lubrication, and variations in the properties of the incoming material. If we